BEFORE THE

CALIFORNIA ENERGY COMMISSION

In the Matter of:	)	Docket No. 12-EPIC-01
	)	
Implementation of the	)	Workshop
Investment Plans for the	)	RE: Second Triennial
Electric Program Investment	)	Investment Plan
Charge Program	)	

Joint Workshops on the Proposed
2015 -2017 Triennial Investment Plans
for the Electric Program Investment Charge Program

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

MONDAY, MARCH 17, 2014
10:00 A.M.

Reported by:
Kent Odell

APPEARANCES

Commissioners Present (*Via telephone)

*Robert Weisenmiller, Chair

Presenters

Laurie ten Hope, Energy Commission
*Damon Franz, Energy Division, CPUC
John Minnicucci, Southern California Edison Company
Percy Haralson, Southern California Edison Company
Suna Taymaz, Pacific Gas and Electric Company
Frank Goodman, San Diego Gas & Electric Company

CEC Staff Present

Pam Doughman
David Hungerford
Rizaldo Aldas
Jamie Patterson
Erik Stokes
Lorraine Gonzalez

PG&E Staff Present

Amanda Moore, Regulatory Case Manager, Pacific Gas and Electric Company

Also Present

Frank Ramirez, National Director for Governmental Affairs, National American Indian Veterans
Nehemiah Stone, Benningfield Group, Board member of California Energy Efficiency Industry Council
William Toman, with Cal Poly San Luis Obispo
Kenneth R. Broome
Dave Watson, Slice Energy
Walter Silva (ph), Philips Lumileds
Scott Elrod, Palo Alto Research Center
*Elissa Brown, Sierra Nevada Conservancy
Art Rosenfeld, Lawrence Berkeley Laboratory
Mark Berman, Davis Energy Group
*Fred Bauman, Center for the Built Environment, U.C. Berkeley
Merwin Brown, Electric Grid Research
Ferhaan Jawed, Pacific Gas and Electric Company

I N D E X

P R O C E E D I N G S

MARCH 17, 2014 10:03 a.m.

MS. DOUGHMAN: Just a few housekeeping items before we begin. I need to inform you that this workshop is being recorded and the recording will be posted on the Energy Commission's webpage, as well as the transcript.

For those of you not familiar with this building, the closest restrooms are located off to the left behind the hearing room. There is a snack bar on the second floor under the white awning.

Lastly, in the event of an emergency and the building is evacuated, please follow our employees to the appropriate exits. We will reconvene at Roosevelt Park located diagonally across the street from this building. Please proceed calmly and quickly, again following the employees with whom you are meeting to safely exit the building.

And now Chair Weisenmiller will welcome us to the workshop.

CHAIR WEISENMILLER: Welcome to this Joint Workshop on the second EPIC Investment Plans. This workshop provides another

opportunity for stakeholders and the public to provide input for the development of the second set of EPIC Investment Plans. This workshop follows upon the February 7th Scoping Workshop for the Energy Commission plan and the February 21st Webinar for the EPIC funds administered by Edison, PG&E, and San Diego. In addition, we're having another workshop in Southern California on March 21st.

The Energy Commission's proposed initiatives are designed to improve reliability, safety and affordability by supporting incremental and breakthrough advancements in clean energy. These advancements will help achieve California's clean energy goals and follow the loading order for electricity. The plan includes initiatives for energy efficiency and demand response, renewable energy, and distributed generation and storage, and the infrastructure needed for Smart Grid and Electric Vehicle charging.

This draft proposed initiatives for market facilitation will build on discussions at the February 7th workshop indicating a need for EPIC funds to expand commercialization assistance

for emerging clean energy technologies.

The staff draft EPIC Investment Plan proposes the option of using EPIC to help fund New Solar Homes Program if other funding sources are not available.

Thanks for your participation today and we look forward to your feedback.

MS. DOUGHMAN: Thank you, Chair Weisenmiller. So today we are having a joint workshop with the Energy Commission, Pacific Gas and Electric, San Diego Gas and Electric, and Southern California Edison. And this is to discuss the proposed 2015-2017 Triennial Investment Plans, the initiatives for those plans for the Electric Program Investment Charge.

So our next speaker is Damon Franz. Damon, are you on the phone?

MS. TEN HOPE: While we wait for him to connect, Pam, why don't you run through the agenda?

MS. DOUGMAN: Okay, so the agenda for today, we'll have an introduction from the California Public Utilities Commission, followed by the Energy Commission. We'll have Laurie ten Hope and staff discussing our proposed

initiatives for the 2015-2017 EPIC Investment Plan.

Then we will have public comment on the Energy Commission's proposed initiatives. We plan to break for lunch around that time, and after lunch we plan to have the Investor-Owned Utilities discuss their proposed initiatives. To begin that discussion, we'll have John Minnicucci from Southern California Edison discuss the EPIC Investment Framework for the Investor-Owned Utilities, then each of the utilities will walk through their proposed initiatives, giving some examples, and then there will be a brief discussion of intellectual property issues from the perspective of the Investor-Owned Utilities.

Then we will have public comment on the Investor-Owned Utilities' presentation, and after that we will have a continuation of public comment on the Energy Commission's proposed initiatives if additional time is needed.

So we're about to unmute all callers to see if our speaker from the CPUC is on the phone. If you are not from the CPUC, please mute your phone. Damon, are you on the phone? Okay, well, I think – Damon? I think we'll go ahead and get

started with the Energy Commission's presentation. Following the Energy Commission's presentation, we will hear from the CPUC.

MS. TEN HOPE: Good morning. I'm Laurie ten Hope, I'm the Deputy Director for Research here at the California Energy Commission, and with the absence of Damon from the CPUC, just a little bit of context for those of you who may be new to this process.

The CPUC established a proceeding and developed the Electric Program Investment Charge, and we are in the midst of implementing the first Investment Plan with the four Administrators that both the Chair and Pam identified, so the Energy Commission and the three Investor-Owned Utilities are administering Investment Period 1 and we're here today to talk about Investment Period 2.

So you will be seeing solicitations rolling out from the utilities and the Energy Commission for that first time period, and we're planning for the second. So that overlap, I just want you to keep that overlap in mind, and the second plan is to build on what we anticipate accomplishing in the first investment period.

I understand that Damon is on now, so

he'll be able to walk us through.

MS. DOUGHMAN: Damon, are you on the phone? Please go ahead, Laurie.

MS. TEN HOPE: Okay. So I'm going to start with the Energy Commission's presentation and just provide a little bit of context. This will be kind of rolling through at a pretty high level, and I'm sure the utilities will feel the same way, kind of rolling through what we anticipate our second investment plan will cover.

And as I was saying, this is going to be for the time period of 2015, 2016, and 2017. I am going to provide a little bit of context for what we anticipate will be in our plan, and then the staff members will walk through each of the initiatives. This will be pretty high level and we expect to have a draft plan out by the 21st and that will allow you to take a little bit more look at the context of what we're envisioning for each of these initiatives. So for the next slide, please.

Our initiatives in the 2015-2017 Investment Plan are based on, first of all, SB96 which was a statute passed in 2013, it provided some priorities for the Energy Commission's

portion of the EPIC Investment Plan, with an interest that, at a minimum, the investment plan include storage, renewable energy, energy efficiency, forecasting of renewables, electric vehicle grid integration, and renewable energy grid integration. So the scope is not limited to those areas, but those are established as priorities with an expectation we would identify the barriers and gaps to research in those particular areas.

We have received over 100 sets of comments and want to thank you for those; those have been reviewed and are reflected in the initiatives. We have done an assessment of the current state of R&D at this point, and what we see is some of the R&D gaps based on the first Investment Plan activities by the Department of Energy, the utilities, and other private sector actors, and looking at what the key factors driving clean energy development are.

It probably goes without saying that the initiatives incorporate the CPUC's final decision, their defined program areas, their emphasis that we follow certain guiding principles, and what was termed "electricity

value chain," tie the research back to the electricity system and identify the areas that have the greatest potential value proposition for ratepayers. Next slide.

So I'm not going to go through all the differences between Investment 1 and 2, but just to give a high level of an example in energy efficiency -- let me just say the Investment Plan itself will give a reflection in all the topic areas of what is covered in Investment Period 1 and what will be covered in the second one.

In the first plan in energy efficiency, we established a foundation for large-scale demonstration deployments and feel that now with the foundation that we'll be ready for some large-scale demonstration projects that you'll hear about in the Technology Demonstration & Deployment area.

But in the Applied Research, there's still a need for ongoing technology work, both at the technology level and the integration level, in order to meet ZNE goals and really up the energy efficiency of existing buildings. But one of the things that we've added in the second plan is a "golden carrot" type project for super-

efficient consumer electronic devices. And so we'll be interested in feedback in this new area.

In the Industrial, Ag and Water Area, we've focused both in pre-EPIC and the EPIC first plan on technology demonstrations for the Industrial Ag and Water area. And so this time we're going to step back and look for what are some of the enabling technology opportunities. We've done four rounds of demonstration projects, so looking for more of the breakthrough type technologies. And we're also going to focus on end use water efficiency; it wasn't the major focus in the first plan, and the drought kind of brings that to fore.

The next topic area is Technology Demonstration & Deployment. As I basically mentioned, the first plan focused on IAW Demonstrations, so this time we're going to focus on the building sector demonstrations. And in the second plan, we're really looking for ways it's going to accelerate the ZNE or near-ZNE buildings and communities, so we expect that through the first plan we'll be doing individual sites and we're looking at either procurement strategies or incentive strategies, ways that

this will be deployed more on a subdivision, full development power park-type basis. So we have some ideas in that area, but we're also looking for stakeholder input.

And lastly, market facilitation. In our first Investment Plan, we initiated some pilot programs in workforce development and permit assistance for local governments, and in the second plan we've really taken a step back based on workshops we had in the development of the first plan and our February 7th workshop, and we're really proposing to diversify the market facilitation area quite a bit and look for strategies that will accelerate deployment through institutional procurement, product validation, partnerships with incubators, linkages with the investment community. And so, again, we're going to put forward some new initiatives in this area and, you know, tell us if you think these are good ideas, or if you have some others you'd like to put on the table.

And lastly, the Chair mentioned we are incorporating NSHP as a potential option in the second Investment Plan. There is a shortfall in the New Solar Home Partnership Program and we're

looking at all funding options to fund market support in NSHP, and keeping the door opened at this point in the second Investment Plan.

All right, so we're going to take a little detour back to Damon Franz with the CPUC, and then we'll roll through the initiatives.

MR. FRANZ: Hello?

MS. DOUGHMAN: Go ahead, Damon. We'll switch over to your presentation now.

MR. FRANZ: Thanks. Sorry I'm a little bit late, I had a little trouble dialing in. My name is Damon Franz, I'm the Supervisor of the Emerging Procurement Strategy Section at the PUC and we are responsible for EPIC implementation.

I want to thank the CEC for holding these workshops. When we were developing sort of the policy around EPIC, we recognized the importance of having a lot of stakeholder input into the plans. This is really a program that is meant to be for the public, to address public benefits, and so public participation and public input is really important to the process, so I just want to encourage participation and sort of robust comments. Next slide, please.

So just to give you a little bit of

background on the EPIC program, the EPIC Program kind of picks up where the PIER program left off, and the PUC sort of took over a formation of policy around this program in 2011. And it's really kind of meant to fill this gap in technology development from the stage where somebody has a good idea, or somebody has either demonstrated a workable technology that can improve electric system functioning to get them to the point where they can get that product to market and to where it can sort of deliver value to California's electric ratepayers.

So we're really trying to assist in the development of new technologies that need a little boost to get developed and to come to market.

So where we are in the process right now, as you heard the first Triennial Investment Plans were proposed just a little bit over a year ago, and when that happens, so just like these plans that happen as a result of a public process, stakeholders provided input to the CEC and the three IOUs, they brought their plans to the CPUC and at that point parties have more opportunity to comment on the plans and just sort of shape

their final outputs. So those were filed in December of 2012, went through a Proposed Decision, went through some public vetting, and were approved in October.

And now we're at the point in the first set of Investment Plans where the CEC and the IOUs will be holding solicitations to award projects on a competitive basis. So that will be happening simultaneously with the development of the second round of Investment Plans. So if you look at the first round of solicitations and you find that there's a gap, or there's something missing, some area where we need funding that isn't being provided, you know, the second Investment Plan period is sort of where to try to shape that process and to get that input into the plan.

So just to reiterate, everything is awarded competitively and the Administrators have to report on any non-competitive awards in their Annual Reports to the Commission. Next slide.

Just a quick look at the funding. As you can see, the CEC, industry and the three Investor-Owned Utilities, PG&E, Edison, and San Diego, administer the program. The CEC

administers the program across all funding areas, so you can see down on the left from Applied Research, that's very early stage development when there's an idea and it needs to be assigned and reassigned, and it's gotten to the point where it sort of is a product that can be marketed. Technology Demonstration and Deployment, that's demonstrating that the product provides value testing it out, gathering data. Market Facilitation is a little bit further along where there's a product that has a value proposition, but just hasn't been proved out enough to get the funding to get it to market. So those are sort of three areas down the value chain. The Utilities only fund the second one, so when you're formulating your comments and your feedback, sort of think about where the appropriate place for the funding should go. And this is an annual funding over three years. Next slide.

So as I just mentioned, the program is now live, it's very exciting. We are just getting going with projects in the first Investment Plan period. So in case you're confused about how the overlapping investment

periods work, the first Investment Plan -- there are three Investment Plans, the first one is 2012-2014, the second is 2015-2017, and the last one is 2018-2020. Because we were delayed in getting the first investment plan launched, we were held up by some legislation and a few other things, unspent funds from the first investment period can roll over into the second and funds are essentially considered committed as soon as they're kind of dedicated to a project. So the Program Administrators have until the end of 2014 essentially to kind of refine the product, the projects and get the solicitations out. And at that point, those 2012-2014 funds will be considered committed to those projects. And we as the CPUC will not only help shape the Investment Plans for the next triennial period, but we'll oversee the implementation of the first one, so we'll be overseeing the solicitations for projects and the Annual Reports on how the solicitations went and what those projects are. Next slide.

As I mentioned, we have continuous oversight of the program. Annual Reports are filed February 28th of each year. We've received

the Annual Reports from the first year, but because the decision authorizing the first set of Investment Plans just passed, there wasn't too much to report on, we expect a much more robust report next year. And at the end of 2016, we'll hire an independent evaluator to sort of look back and just see how the program went, and make sure that we're meeting our goals of funding projects that provide value to ratepayers. Next slide, please.

So if you have any questions on EPIC, we try to keep all the documents regarding the current Investment Plan cycle and the development of the future Investment Plans on our webpages. You can look at our website, the CEC's, and the three IOUs, and those are the places to go if you are a company and you're interested in participating in the solicitations for projects. Next slide.

So this is just my contact information. Anyone who has any questions on the program, on the process for soliciting comments, any concerns about the way the program is being implemented, don't hesitate to contact me at the email or the phone below. Email is probably best, but feel

free to give me a call, as well.

So that concludes my presentation. Again, I'd like to thank the CEC and the PAs for having these webinars and I encourage robust participation. Thanks.

MS. DOUGHMAN: Thank you, Damon. Now we'll go back to the Energy Commission.

MS. TEN HOPE: Slide 6. So this is Laurie. Thanks, Damon, for your presentation and your guidance on the program.

So we're going to walk through the initiative and the first one up are going to be the Applied Research and Development area. We don't have funding yet internally, but envisioned at about $55 million a year in the Applied Research area. There are 11 strategies here, Energy Efficiency and Demand Response, both in buildings and in process energy, clean generation, looking for innovations both at the distributed level and at the utility-scale renewables, as well as reducing the environmental and public health input of energy. There are four Strategic Objectives in the Smart Grid area from Smart Inverters, Distribution Modeling Tools, communication between customer devices and

utility devices, and the integration of Plug-in Electric Vehicles to the electricity system. And finally, two crosscutting areas around advancing breakthrough energy concepts and providing federal cost share for Applied Research awards.

So this first area is earlier in the innovation pipeline, it's not basic research, but it's in the lab scale testing and pilot scale testing, and I'm going to turn it over to my colleague in one second, but I wanted to let you know that we'll be going through these presentations for about an hour, and then we'll have 45 minutes for public comment, and then we'll break and move to the utility presentations. If we still have additional folks that would like to comment, we'll loop back to additional public comment at the end of the day.

So the things that we're particularly looking for, and I'd like you to think about with the presentations, are we missing some critical areas, that you know, some breakthrough opportunities or deployment strategies that you think would really make a difference.

On the other hand, do you see some stuff here that's like, yeah, I mean, there's a little

bit more that could be done, some incremental improvements, but it's an area that's pretty well covered by other research, because we want to hone in on the areas where we can really bring value to ratepayers. So if you think some areas could be dropped, that's as useful. I mentioned that we're looking at a golden carrot, so we are looking for some larger funding opportunities in particular areas, you know, where a flagship-type program might really be warranted. So we'd look for your comments there, as well.

So with that introduction, I'm going to turn it to David Hungerford, who will walk through the Applied Research Energy Efficiency Initiatives.

MR. HUNGERFORD: Good morning. I'm David Hungerford. I'm a Senior Scientist in the Energy Efficiency Research Office of the R&D Division. For the first Strategic Objective, our purpose here is to build on our past investments in energy efficient technologies and identify promising new technologies with the potential to reduce energy consumption. The first initiative under this is to continue investing in advanced devices and systems to improve building

performance, reduce costs, facilitate consumer adoption, and inform future codes and standards efforts. Under that, we have five general research efforts and they're divided sort of according to technology.

The first is Lighting Systems and Controls, especially; the second is Heating Ventilation and Air-Conditioning Systems, especially advanced systems; the third is exploring new ways to use building envelope to reduce leakage and improve efficiency, the fourth is to address the growing proliferation of small plug-in devices throughout the home, what we call "plug-loads," and we're hoping to spend some effort on plug-load devices; we're also looking at retrofit strategies for existing buildings in support of AB 758.

The second initiative, the problem we were facing is getting to the level of efficiency necessary to achieve the Zero Net Energy goals, will require an integrated approach to building design and need to meet three critical criteria, builder support and cooperation, consumer acceptance, and costs that are comparable to current construction practices.

We have two research areas we want to focus on there. The first is to develop and test standardized prescriptive design packages for Zero Net Energy Residential Multi-Family and Commercial Buildings; the second is to create a design optimization competition, one of the golden carrots that Laurie referred to, for Zero Net Energy Residential, Commercial, Multi-Family and Low Income Buildings in our communities.

The third initiative is to look more at applying well established in other fields, social science research methods to the problem of adoption and use of energy efficient technologies to improve energy efficient technology development by applying established social science research methods to empirically determine how people respond to and engage with new buildings and designs and systems, how people adapt their lifestyles to new technology opportunities associated with ZNE buildings, and how people will best respond to opportunities to retrofit existing building, again, in support of AB 758.

The three main research areas will be to look at best practices for contractors and

comparative analysis of emerging contractor business models with the fundamental goal of being able to diagnose building inefficiency in providing customers with reasonable options for fixing those problems. The second is consumer acceptance, address the fundamental issue of consumer acceptance and adoption of emerging technology by exploring ways in which the technology research and development process could include social science research components that anticipate end user needs, expectations, understandings and their capabilities.

The third is to look at new ZNE buildings and to develop empirically-based understanding about the development process and the real world operation of ZNE Buildings so that we can make them work in practice, as well as in theory.

The fourth initiative is to deal with indoor air quality. As buildings become tighter, previously minor sources of indoor pollution are of increasing concern. We have two research areas to approach here, one is developing and demonstrating metrics for tracking and comparing indoor air quality in buildings. The second is to develop approaches to improving indoor air

quality by considering both technological solutions and occupant behavior.

The fifth initiative, the purpose is to develop, validate, and document energy saving technologies that are in the research and early development stages in industrial, agricultural, water and wastewater plant settings. There's a substantial amount of research that's going to be done under this initiative and it's divided into four general areas, the first under industrial and agricultural is to look at process improvements for energy intensive industries, the development of technologies that substitute or materially change the underlying process.

The second major area is in the water and wastewater sectors, and there are four subcategories here, the first is to look at advanced membrane filtration technologies for water treatment, both for water supply and for wastewater; the second is to collect data from new and existing facilities to develop reliable estimates of savings potential and cost alternatives of water disinfection systems.

The third is to evaluate existing installations of water re-use technologies of

both centralized regional facilities and of individual industrial sites to better understand the potential of water reuse to save water and energy in California.

And the fourth is to identify potential efficiencies in the process of moving water around within the wastewater facilities and the water treatment facilities to identify efficiencies there.

The third major area under this initiative is to develop a clearinghouse for advanced energy efficient technologies for use by the Industrial Ag and Water sectors so that there's sort of a one-stop shop, a place where the ability to identify the cutting edge technologies is available to those sectors.

And the fourth is to identify new research priorities by engaging experts and others through workshops and technical advisory meetings.

The sixth initiative is to promote water and energy efficiency in residential and commercial buildings. We have three research areas under that. The first is to increase the efficiency of end-use devices; the second is to

increase substitution of gray and stormwater for landscaping and other purposes; the third is to identify leakage and waste to distribute use of better water metering and control technology.

Now I'm going to move on to the next Strategic Objective, to develop new technologies and applications that enable demand response technologies to assess performance, increase reliability, and improve forecasting techniques. While the basic technologies for demand response have been proven, there remain substantial need for building operational experience and empirical evidence that supports the case for adapting energy markets and designing programs that displace traditional generation resources with DR.

The second investment plan will focus on developing and testing and demonstrating demand response technology and operational capabilities in the following areas: first, constructing performance datasets needed for DR to compete with generation as a resource; the second, to provide technical and operational data to support new programs and market products that take advantage of DR characteristics; and the third,

to improve the capability of forecasting DR performance.

The first initiative, Strategic Initiative 1 under this, will focus on increasing the potential for Demand Response to displace fossil generation, while maintaining grid reliability and integrating intermittent and highly variable renewable resources.

Three research areas will be our focus. The first is to develop and test advanced demand response technologies, building on previous efforts in that direction; the second is to develop and evaluate, control and monitoring hardware and software systems to provide enhanced highly reliable demand response and storage performance forecasting, and allowing increased utilization of DR as a reliable substitute for generation resources. The third is to assemble and evaluate performance data to be able to make reliable estimates of performance from different end uses and customer types, under different conditions, which is a necessary condition for DR to be able to substitute for generation as a resource.

I think we're moving on to the next

initiative for the next Strategic Objective.

MR. ALDAS: Okay, good morning everyone. My name is Rizaldo Aldas. I'm the Lead for Renewable Energy and Advanced Generation. The next two Strategic Objectives were prepared under Renewable Energy and Advanced Generation Program with the help from staff and I would like to acknowledge them.

The Strategic Objective three is to develop innovative solutions to increase the market penetration of distributed, renewable and advanced generation. We all know that distributed renewable energy advanced generation is a key goal for us. It is specifically mentioned in Governor Brown's Clean Energy Jobs Plan, as well as the Renewable Portfolio Standard. There are several forms of distributed, renewable and advanced generation technologies and there are common barriers such as high overall cost, depending on technology and resource, intermittency and reliability. So DG was addressed in the first Investment Plan, and in the second Investment Plan we would like to further support that, but addressing some areas that were not addressed in the first Investment

Plan and we intend to further advance that technology.

We have five initiatives proposed under this Strategic Objective 3. The first three are supporting the core renewable energy resources, while the last two, Initiatives 4 and 5, are addressing the needs for emerging and advanced generation, the technologies.

For the first initiative under Objective 3, the intent here is to lower cost, efficient and sustainable bioenergy, and have innovations to improve that Biomass-to-Energy systems in the state. The intent is to help realize the full benefits of biomass and help support some of our upcoming policy goals, for instance, the recommendations under the current Integrated Energy Policy Report, the upcoming SB 1122, for example, so prepare the technologies to help address those. The intent here is to develop and demonstrate early stage innovative technologies, techniques, and deployment strategies for biomass waste stream to electricity and provide co-benefits. In the first Investment Plan, we supported a wide range of research from the biomass energy and in the second Investment Plan,

we'd like to focus on a few resource areas, resource technologies.

Okay, some of the potential projects here may involve developing technologies, addressing the high temperature conversion, for example, on forest biomass, or those that are addressing the advanced biomass conversion technologies and application of biomass or sustainable and biomass harvesting, processing, and handling systems.

In the second initiative under Objective 3, this is to develop integrated and hybrid photovoltaic technologies and strategies to reduce costs and advance Zero Net Energy buildings. The intent here is to develop next generation distributed PV technologies and strategies with the intent of increasing overall conversion efficiencies, possibly the adoption of building integrated PV and having PV thermal systems.

Distributed Solar PV was addressed in the applied section of the first EPIC Investment Plan and we are intending to use the early conclusions and recommendations that will come out of that and use it for these applications and primarily focus on these other areas, for example, in the

first Investment Plan we were looking at smart inverters in this area, but for the second Investment Plan, we were looking at more on the technology development side and some specific focus on hybrid PV and thermal technologies, as I mentioned.

The third initiative under Objective 3 is focused on an area that was not included in the first Investment Plan, and this will be on the In-Conduit Hydrokinetic Power. There were assessments, for example, at the Energy Commission that shows the potential of the Hydrokinetic Power, for instance, a recent study showed 250 megawatts of available and existing open channel drops of nine feet or more, and there is significant greater generation opportunities that exist, for example, by replacing the pressure valves in pressurized water, or wastewater conveyance pipelines. So for this particular initiative, we will develop the tools, strategies and technologies to advance the pre-commercial development and demonstration of In-Conduit Hydropower turbines and generators. We will also try to address the need for developing the testing protocols or procedures

for evaluating these new technologies.

Under the fourth initiative, as I mentioned a while ago, this will be focused on the new emerging technology and advanced generation technology. This will help develop early stage innovative electricity generation technologies and novel applications with breakthrough potential in the commercial market. Some target technology that will have the potential for dramatically increasing conversion efficiency, reducing system costs, and expanding the use of renewable and advanced generation technologies. These are just some of the potential projects that may be supported under a wide range of possible projects under the breakthrough initiative examples may include novel technological solutions to enable increased deployment of clean and advanced distributed power generation – designs, materials, control systems that have the potential to significantly reduce the cost, or improve the durability and increase the reliability, system designs for example, for turbines or fuel cells, enabling control systems to better integrate renewable distributed generation with the grid and

addressing user requirements.

The fifth initiative on piezoelectric-based materials, this is coming out of the recent Energy Commission study on the assessment of piezoelectric materials for roadway and energy harvesting. Some of you may not be familiar with the piezoelectric materials, these are materials that generate electricity with the application of stress and so with that, there is a wide opportunity for harvesting that energy whenever stress or vibration are available. So this will take advantage of the developments in piezoelectric materials, availability of existing waste and mechanical energy to expand the generation of energy from these untapped resources, for example, we can use the piezoelectric devices to harvest power from, say, existing roadway surfaces, for train tracks, building materials for other under-utilized applications. Next slide, please.

The Strategic Objective number 4, the intent here is to improve the power plant performance, reduce costs, and accelerate market acceptance of existing and emerging utility scale renewable energy generation. The utility-scale

clean energy generation is defined as a standalone generation facility, that is, they are directly connected to the grid. There are several sizes for capacity, we heard in different studies. We have used 20 megawatts as a benchmark for utility-scale, and this objective is in support of some of the State goals such as Governor Brown's Clean Energy Jobs Plan, as well as the RPS, and the intent here is to address the need to improve the cost and performance of existing systems, possibly by developing new cost-effective enabling technology and strategies.

So we have four proposed initiatives under Objective four that are addressing the needs for solar energy, forecasting, geothermal, and wind energy. For the first initiative, which is on boosting concentrated solar power by reducing system costs and increasing performance. CSP or Concentrated Solar Power is one area that was included in the first Investment Plan. In the first plan, the focus was on components such as heat transfer fluids, thermal storage, and in the second Investment Plan, we would like to look at the other more critical components of CSP such

as reflectors and receivers. CSP technologies have different system configurations that they all use different designs of mirrors or reflectors and receivers or observers to concentrate sunlight to heat fluid to produce steam that drives a turbine to produce electricity.

So this initiative will support research to encourage the performance of those reflectors and mirrors for system applications, reduce manufacturing operation, and the maintenance costs. Some of the potential research projects here may include improving the solar transmissivity of the mirrors, developing lighter weight reflective surfaces, or developing reflector coating to reduce maintenance costs or improving the reflectivity assessments to improve maintenance and again reduce costs.

The second initiative under objective 4 is to develop the tools and strategies to increase the predictability and reliability of wind and solar energy generation. This initiative is to support research solutions, to improve intermittent renewable energy integration into the State's electric grid. And research

under this initiative will develop, evaluate and improve forecasting techniques and tools, inform grid operators of expected wind and solar power plant performance on, say, minutes ahead, hours ahead, or days ahead timescales.

In the first Investment Plan we supported the area of forecasting and so we would like to leverage any technical advancements that will be made in the first Investment Plan to further increase the accuracy of solar and wind generation forecasts and the value that they can provide to California IOUs and the California Independent System Operator.

In the third initiative under Objective 4, this is to develop advanced technologies and strategies to improve the cost-effectiveness of geothermal energy production. This initiative will support further research in geothermal energy with emphasis on existing facilities. In the first EPIC Investment Plan, we are researching on the wide scope of geothermal development from reservoir exploration and characterization through the power plants. For the second Investment Plan, the focus is on improving the performance of existing plants,

address topics from improved reservoir management and plant operation, assessing the value to the grid from geothermal generation, including ancillary services.

Now, for the fourth or last initiative under Objective 4, this is focused on upgrading California's aging wind turbines, looking at the design, cost and development improvements that are needed. This initiative will support an area that we did not include in the first EPIC Investment Plan, we will address technology issues associated with the current state of most of California's wind facilities. Much of California's best wind resource acreages are occupied by an aging fleet. Wind turbines are past their design of 20 years and are made of relatively inefficient turbines, and they are now candidates for repowering. So this initiative under Objective 4 will address the technologies and strategies that are needed to address the challenges to that repowering target. The overall intent is to improve the system performance while taking into consideration possible regulatory or social or other barriers to repowering. And we know the kind of

background is that we know that modern turbines are now more efficient at converting wind energy into electricity, and they now feature sophisticated control technologies, enhancing their contribution to the grid. So we would like to bring this to test and demonstrate in our wind resource area. Next slide, please.

The next strategic objective is Strategic Objective 5 that was developed for under the energy-related environmental research program led by Guido Franco and his team in the EA Program. Objective 5 is to reduce the environmental and public health impacts of electricity generation and make the electricity system less vulnerable to climate impacts, which is to support developing science and innovation which is also the overall primary focus of the program. There are other key drivers for coming up with this objective, for instance, the current insufficient range of comprehensive assessments of impacts of clean energy technology based on best available science, or on the recent research results confirming that the existing electricity system will become highly vulnerable to climate change and extreme events. And we know that rapid

evolvement of the electricity system offers the opportunity to reduce that vulnerability.

Under this Objective 5, there will be five initiatives. The first initiative is on implementing a roadmap to address the public health effects from energy technologies. Under EPIC 1, we are developing a detailed roadmap of research on the potential public health implications of new energy technologies. It is envisioned that the second investment period will implement a research on key topics identified in that roadmap. Some unresolved issues explored in prior studies and under the first EPIC investment period will be analyzed; an example is the atmospheric transformation and fate of extremely small particles that are emitted from power plants.

In the second initiative under Objective 5, this is developing environmental tools and information for future renewable energy conservation plans. The Draft Air Resources Board Scoping Plan calls for a future determination of post-2020 greenhouse gas targets, so the generation of electricity from renewable sources of energy with zero, or close

to zero, greenhouse gas emissions are needed for both the 2020 and potential post-2020 greenhouse gas targets. Under this initiative, we plan to develop some of the environmental tools and information that will be needed for future renewable and conservation plan such as the Desert Renewal and Conservation Plan.

Initiative 3 under Objective 5 is to improve science for water management in power generation such as hydropower forecasting and hybrid cooling towers. This initiative will assist with improvements in the way that we manage water for electricity generation; for example, a hydrologic forecast can be off by up to 40 percent because little is known about the actual amount of water contained in the snowpack in high elevations in the Sierra Nevada. But there are now tools that can be used to measure the snowpack in these remote areas, which can substantially improve the forecast, allowing the electric utilities to increase revenue from their hydropower units. So with increased temperature due to climate change, for example, the amount for water for cooling will increase and the performance of the cooling units will decrease.

So this research proposes to investigate the use of hybrid units to address these issues.

In the fourth initiative under Objective 5, this will provide tools and information for regional climate change adaptation measures for the electricity sector. The initiative will leverage several climate change scenarios and a statewide adaptation recommendation with the main focus on the local or regional level to provide the tools and information that are needed to implement adaptation measures for the electricity sector. It will examine the potential effects of a changing climate and wind and solar availability and other parameters to determine the potential impacts on renewable sources of electricity.

And lastly, Initiative 5 under Objective 5, the intent is to provide small grants to solicit innovative energy-related environmental research. We would like to implement a wide open solicitation to provide seed funding for innovative energy-related environmental research concepts, and we find that programs designed this way are excellent opportunities to discover unconventional ideas that can revolutionize a

given area of work. And so thank you.

MS. TEN HOPE: The next presenter is Jamie Patterson for the Smart Grid Initiatives, I believe the next three slides.

MR. PATTERSON: Good morning. I'm Jamie Patterson. I'm a Senior Electrical Engineer in the Research and Development Division, and we're on slide 13, looking at Strategic Objective 6. Our objective here, is to advance the use of smart inverters for grid support in California, and our Initiative 6.1 to achieve that is to develope smart inverter capability to improve Grid operations. Advanced smart inverters offer solutions to the challenges of high penetrations of renewables, can increase the penetration of photovoltaics, and provide other Grid effects. This initiative will move inverter capability beyond California Rule 21 and IEEE1547A requirements to those of 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 where features that allow inverters to ride through voltage sags and surges, while also going offline for anti-islanding purposes, will be most

beneficial. Research under this initiative will also expand smart inverter communication capabilities and they're included within the research areas under this initiative.

Can we go to Slide 14, please? Thank you. This is Strategic Objective 7. Our objective here is to develop advanced distribution modeling tools for the future Smart Grid. Our Initiative 7.1, to achieve that, 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 CAISO. These modules are needed to visualize the dynamic operation of the distribution system. Current tools provide only a simple snapshot of the grid, while new tools will allow utilities and the CAISO to analyze the interactions of Smart Grid equipment in a dynamic and changing manner. These tools will include Smart Grid elements and be capable of simulating the operation of California's future smart distribution system.

Can we go to Slide 15, please? Our

objective here, Objective 8, is to advance customer systems to coordinate with utility communications. Our initiative to achieve 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 equipment for Demand Response, Electric Vehicles, and Smart Inverters, and 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 the combined benefits for their customers. This initiative will develop customer energy management systems to coordinate the various energy devices in a customer premised network, and communicate a system response to the utility grid side to help with distribution operations. These management systems will also enable coordination of the generation and load to maximize their benefit for the consumer, and will enable their participation in energy markets.

Thank you.

MR. ALDAS: Good morning. This is

Rizaldo again. We are in Slide 16, Objective 9. This is for efficient integration of plug-in electric vehicles to the electricity system. This is an objective developed under the transportation research area with Rey Gonzales and his team. Its focus is on Plug-In Electric Vehicles and its efficient integration into the electricity system. Plug-In Electric Vehicles and companion electric transportation technologies offer a promising and potentially revolutionary alternative for meeting the state's transportation needs. PEVs or Plug-In Electric Vehicles can provide a number of benefits to the electricity grid when integrated with smart charging technologies and other strategies. So better research is needed to determine how these can effectively be integrated into the electricity grid and how to minimize, for instance, the carbon footprint or which technologies continue to advance the capabilities. Objective 9 supports the strategies identified in the 2013 Zero Emission Vehicles, or ZEV Action Plan. ZEV was released as a result of the Governor's Executive Order in 2012 establishing expectations for agencies to

expedite the rapid commercialization of Zero Emission Vehicles with a goal of 1.5 million Zero Emission Vehicles by 2025.

Objective 9 also supports the Vehicle-Grid Integration Roadmap. This roadmap maps the way to develop solutions that enable electric vehicles to provide Grid services while still meeting consumer driving needs, and that vehicle integration roadmap also supports the ZEV Action Plan.

So there are three initiatives proposed under Objective 9, the topics are on PEV, Vehicle-Grid integration, and Battery Recycle. With the exception of Battery Recycle, the other two initiatives were not included in the first EPIC Investment Plan, but we had projects in this area under the previous funding program. The second EPIC Investment Plan will leverage the findings and results from this ongoing and past efforts.

The first initiative under Objective 9 is to advance electric vehicle charging and grid services to maximize the renewable resources and improve grid flexibility. The initiative will develop advanced methods of smart and efficient

charging for Plug-In Electric Vehicles that help mitigate intermittency issues associated with renewable generation so that will allow for a higher mix of renewable resources such as wind and solar into the grid. The initiative will look for opportunities to utilize the distributed battery capacity of an electric vehicle fleet as to Grid storage, and create opportunities for rapid response and operational flexibility to provide regulation and load following capabilities.

The second initiative is focused on the vehicle-grid integration and the intent is to advance the development of VGI, or Vehicle Grid Integration technologies, and methods into residential and private or public fleet applications. The initiative builds on previous VGI projects, that is, developing the communication and protocols to enable bidirectional power flow to perform vehicle to grid and vehicle to building strategies. And the research will further advance the development of VGI technologies and methods by expanding beyond military bases and government fleets and into residential and private or public fleet

applications. The research will leverage findings from ongoing Department of Defense military installations VGI projects, including continuing to determine cost benefits of VGI through Demand Response or load shifting, and to determine impacts VGI may have on PEV batteries. Some of the examples of projects that may be included here include understanding vehicle use profiles, plug-in electric vehicle cost benefits, and battery life challenges with VGI and under residential, and private or public fleet applications, assessing VGI grid impacts for different VGI applications and technologies, and developing VGI business models for residential and private or public fleet applications.

The third initiative under Objective 9 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's transportation grows, it is essential that efficient, safe, environmentally sound, and cost-effective recycling systems be developed for recycling large format lithium ion batteries. The initiative will further develop existing battery

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

MR. STOKES: Okay, so this is Erik Stokes. I will be presenting the crosscutting elements for the Applied Research and Development Area.

Okay, so one of the takeaways from a lot of our policy reports is that we need really both a mix of incremental improvements to existing technologies, also some breakthrough ideas, and this Strategic Objective is meant to address the latter of those two.

We have two funding initiatives under this objective, the first of which will provide seed level funding for potentially disruptive technologies. And this initiative really aims to address that funding gap early in the technology development process, and aims to really help researchers prove out and determine the feasibility of some of their early concepts.

The second initiative under this objective will conduct incentivized prize competitions for targeted challenges in the electricity sector, especially in areas where there hasn't been much advancements made in the market. And most people's familiarity with these types of competitions has been X Prize, but even organizations such as DARPA are starting to utilize these competitions as a way to kind of foster a broader set of innovators to compete and collaborate, and really bring some new ideas in thinking to some of these industry-specific challenges. Next slide.

Also under the last plan we had an initiative for Federal cost share, and in this plan we're also proposing a similar initiative. And the aim of this initiative is really to use EPIC funds to leverage federal funding by providing cost share to entities that apply for and ultimately receive an award from a federal opportunity announcement, either from the Department of Energy, Department of Defense, or even other entities like the U.S. EPA.

MS. TEN HOPE: Okay, so we're going to leave the Applied Research area and move into

Technology Demonstrations, so in this area we're looking for pre-commercial demonstrations and commercial-scale deployment. So these are the projects that have already proved themselves in the lab and are ready for the demonstration phase.

Here, we have six objectives, again, we sort of follow the loading order kicking off with the demonstrations in the energy efficiency area, and then renewables, and smart infrastructure. In the middle, taking microgrids to the next level which is sort of an integrative strategy of energy efficiency, renewables, and Smart Grid, so it kind of pulls all of them together.

We'll start again with Dave Hungerford for the Energy Efficiency Demonstration Projects.

MR. HUNGERFORD: All right, for the first Strategic Objective under this, or for our first initiative under this Strategic Objective, in this Investment Plan we want to focus primarily on the demonstrations in the building sector with an emphasis on the technologies investigated in the first Investment Plan. The objective here is to produce independent technical and economic performance data on promising efficiency and

Demand Response technologies to document savings and performance. This will 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 government buildings. In this initiative, we're going to expand that work to additional sectors.

The second initiative, we'll focus on demonstrations in large-scale deployment of emerging integrated demand-side management and other smart technologies to maximize efficiency or achieve Zero Net Energy building goals. Under this, we have four research areas we're looking at, the first will be to demonstrate and deploy an integrated suite of emerging demand-side management technologies, including 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 residential multi-family and commercial developments, the idea being to come up with straightforward design groups that allow builders

and developers to not have to develop everything from scratch, but to be able to move from something that's already on paper on how to do this correctly, and the third area is to create an information exchange for facility owners, design professionals and trades, to share demand-side management and ZNE information based on demonstrations and deployment results.

The fourth is to integrate social science behavioral research into the development and implementation phases of the demonstrations to make sure that the demonstration designs also consider the fact that people have to live in and operate these buildings.

MR. ALDAS: Good morning. We are in slide 21 for Objective 13. The focus of this Strategic Objective is on field demonstration and evaluation of Biomass-to-Energy conversion systems and tools and strategies that can enable or help the demonstration and deployment of that system. The intent here is to kind of help realize full benefit from our abundant biomass and organic waste resources in California and we are also timing the objective 13 with some of the state policy goals, for instance, the SB 1122, we

expect that to be operational soon and that particular bill requires an incremental 250 megawatts of renewable feed-in tariff procurement from small-scale bioenergy projects. This is also supportive of the other policy goals like the recent IEPR and the Bioenergy Action Plan.

Objective 13 is designed to leverage the efforts and results from the first EPIC Investment Plan, for instance, under the Applied R&D we are supporting development of Biomass-to-Energy and enabling technology. Examples of these are methods and strategies to convert biomass in the forest and/or by interface or the development of Digester and emission control strategies, those that are under Applied R&D in the first Investment Plan. And we expect that some results or early conclusions, or some of the recommendations from those efforts can be incorporated once we implement the Technology Demonstration and Deployment Solicitations for Bioenergy under the second Investment Plan.

We are proposing two initiatives for Objective 13, these initiatives are aligned with the two practical routes for converting biomass to electricity, these are the high temperature or

fast rate process and the biological conversion process, primarily by anaerobic digestion. Assuming that these two pathways, have a distinct set of deployment matters and challenges, they're in different stages of pre-commercial and commercial readiness and they warrant a unique set of solutions.

For the first initiative under Objective 13, this focuses on demonstrating and evaluating the technical and economic performance of emerging systems. The focus is on woody biomass and other low moisture biomass such as order pruning and other agricultural crops. The focus is on field demonstration or early stage deployment of thermal chemical Biomass-to-Energy conversion technologies, systems, and market strategies that have been successfully demonstrated at the pilot scale, so that's a requirement that they have to be demonstrated or approved in smaller scale. The intent is to improve the technical and economic feasibility of these systems, for instance, improve the conversion efficiency, reduce the waste products coming out of that, including emissions while reducing the capital and operating and

maintenance costs, and essentially prepare the technology for more accelerated commercial deployment. There are several projects that may be supported here, examples may include demonstration and deployment of pilot-scale proven technologies and strategies to expand efficient and sustainable use of biomass to align, for example, with fire prevention activities, demonstrating an integrated thermal chemical conversion systems, along with advanced pollution controls to meet local land safety and air quality standards, or demonstrate advanced biomass fuel management, including handling delivery systems and possibly densification systems to reduce transportation costs and expand fuel markets.

The second initiative under Objective 13 is focused on accelerating the demonstration and deployment of emerging biodigester and integrated clean generation technology. The intent is to cater to the agricultural, primarily for example the dairy waste, or dairy manure, and other animal facilities, municipal and other food processing organic waste, mainly COH or wastewater, for example, from municipal food

processing facilities. And the focus of this initiative is on field demonstration, again, and early stage deployment of anaerobic digestion, innovative technology systems, and market strategies that have been successfully demonstrated at the pilot scale, with the intent of improving the overall performance of these systems, for instance, in terms of both conversion and efficiency, air emissions, provide data to support integration and permitting requirements, improve costs, and other economic parameters, again, with the intent of supporting the data needed for larger scale commercial deployment of these technologies.

There are several projects that may be supported, examples can include biogas from wastewater treatment, municipal organic waste, diversion, food processing, and co-digestion, which is directly called in the SB 1122 target of 110 megawatts from these facilities.

Another example is a project from dairy and agriculture bioenergy, again, which is in support of 19 megawatts target called for under SB 1122. Thank you.

MR. PATTERSON: We're on Slide 22. And it's Strategic Objective 14. Our objective here is to take microgrids to the next level, maximizing their value to customers, and our initiative to achieve that objective is using microgrids to evaluate a combination of emerging technologies to determine the best integrated performance and least cost configurations to meet the customers' energy needs. This initiative will use microgrids as a demonstration tool for evaluating systems of integrated energy technologies and the benefit they can provide to customers and the grid. These microgrids will demonstrate the technical and the 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, please. Strategic Objective 15. Our objective here is demonstrating advanced energy storage systems to lower cost and improve grid reliability. Our initiative to achieving that objective is demonstrations of advanced energy storage technologies and transmission distribution and customer-side applications to transition to the commercial market. The California ISO identified energy storage as an important resource to enable integration of renewable energy at increasing penetration levels.

Under Assembly Bill 2514, the California Public Utility Commission has set energy storage procurement target decisions that require 1,325 megawatts by 2020, starting in 2014 and made fully operational by 2024. This initiative will build upon the 12 ARRA, that's American Recovery and Reinvestment Act funded storage projects in California, that prove the feasibility of energy

storage to provide grid benefits. Information from these demonstrations will help develop an evaluation protocol for the CPUC for benchmarking and reporting purposes. Meeting California's energy storage targets will require demonstration to advance the use of energy storage from emerging technologies to commercially available, viable, and cost-effective technologies that can compete in the AB 2514 procurement market.

Slide 24, please. Strategic Objective 16, our objective here is to expand smart charging and Vehicle-to-Grid power transfer for Electric Vehicles. Our initiative to achieving that objective 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 demonstration with vehicle fleet owners, the second plan will expand the market participation to geographically distributed individual vehicle owners, vehicles

owners that are basically not located in one place. The goal is to enable individual participation of plug-in electric vehicles in the market by having them aggregated by either utilities or third parties and to resources that are large enough to participate in utility or independent system operator markets. Thank you.

MR. STOKES: Okay, so just like in the Applied R&D Initiative, we also have a federal cost share for the technology demonstration and deployment initiative, same process using EPIC funds to better leverage federal investments.

MS. TEN HOPE: And our last area is Market Facilitation. I know it's hard to listen for this long, but we have a few more initiatives in the Market Facilitation area, four Strategic Objectives. And as I mentioned earlier, some of these are new to the second Investment Plan. And Pam Doughman will present these initiative topics.

MS. DOUGHMAN: 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 support for third-party testing and validation of new technologies.

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 pull for clean energy. However, before investing in large quantities of energy-related equipment, these groups need greater certainty. They need greater certainty that the product is clearly cost-effective from a lifecycle perspective, that takes into account

independently verified costs and benefits. They also need greater certainty that the product can be incorporated into existing systems and construction processes. Greater certainty is also needed that there are no impacts on the training and availability of skilled labor to install and maintain equipment, as well as 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.

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 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.

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.

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 an upfront incentive to help transform the use of rooftop solar in the new housing market and make solar energy systems affordable for more investor-owned utility 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 New Solar Home Partnership funding open, including combining different funding sources provided that total funding does not exceed the $400 million cap for

the New Solar Home Partnership established under Senate Bill 1 in 2006.

So now we'll be opening it up for public comments. We have questions for stakeholders. The first question is: Are critical research initiatives missing? If so, provide examples and explain why. The second question: Can some initiatives be dropped because of progress made to address this issue? The third question: What issues are deserving of significant funding due to their high potential for ratepayer returns? And the last question: Are there initiatives that should be combined? Please explain why. So we will begin with questions from people attending in person, if you could fill out a blue card, there are blue cards around the corner as you came in. And then after you speak, please provide a business card to the Court Reporter with the headphones there. And then after we take questions from the room, we will ask people participating through the WebEx to use the raised hand function and then we will unmute your phone so you can speak and ask your questions.

Okay, people in the room who would like to make a comment, if you could give your card to Erik Stokes -- if you can raise your hand, Erik?

MS. TEN HOPE: Or Lillian, who is walking around with blue cards. Just have them come up right here.

MS. DOUGHMAN: If you could come up to the microphone at the end table there?

MS. TEN HOPE: Give them to Erik, and Erik will call people up, and then please help yourself to the chair. These microphones, when you sit down you need to click the microphone on and then just announce your name.

MR. STOKES: If I could just remind everyone, when you come up please say your name and the organization you're affiliated with. So first is Frank Ramirez.

MR. RAMIREZ: I see a green light there. Ah, good, it's a good day. Thank you very much. Frank Ramirez, National Director for Governmental Affairs for the National American Indian Veterans. Impressive, all the activities of trying to save energy, water, etc. I wanted to put into the mix, and I've been talking with the State Water Control Board and some of the private

groups, about the new technology for evaporation suppression. Evaporation and seepage is kind of interesting; in California we lose about half of the water source due to evaporation and seepage. Tomorrow, the Western Water District is going to adopt 100 percent drip system because of evaporation, that's how significant it is, it's major. I met a group out of Canada that's doing some work, they have a two-year pilot project in Southern Nevada with the Southern Nevada Water Authority, and they've reduced in two bodies of water 31 percent reduction in the evaporation. It does two things, it saves water, it also increases the capacity for hydroelectricity, and it reduces the cost of pumping. Los Vaqueros down in the Contra Costa Water District, the water at Los Vaqueros Reservoir comes from pumping from the valley at a very high cost, and so if you're able to reduce the evaporation in those types of bodies of water, it saves water, environmentally safe, reduces energy control, and this technology has been approved by U.S. EPA, U.S. Fish & Wildlife, NSF, so it's good technology, fairly new, the current issue of the AWWA Journal, a water journal, has just put it --

I call it the centerfold article -- on this technology. I think it's very important. I brought a package that I can leave here, but I would definitely like to see evaporation put on the front burner. This could be installed in 20 minutes without a major cost for infrastructure, it's very low cost, and the impacts are impressive. Thank you.

MS. TEN HOPE: Thank you. Just to get a sense of how many people want to speak, would you please raise your hand if you would like to speak in the room so we have just a sense? Okay, not a lot of public speakers. So go ahead, Erik, and call up one at a time.

MR. STOKES: Okay, so the next, and I'm probably going to mispronounce this wrong, but Nehemiah Stone?

MR. STONE: Nehemiah Stone with Benningfield Group and I'm also a Board member of the California Energy Efficiency Industry Council. And I have comments mostly representing the Council. So we submitted a letter, comments, and I'd like to reiterate some of the major points of that because I think what we research, I think, is no more important than how we do it.

And we're seeing a trend that we're not that comfortable with in the research, and that is a trend towards all the research projects going to universities, national labs, you know, trade associations, or companies that are looking for help in developing a product that they can then sell. Most of our members don't fit that. Most of the research that we have done that has benefitted California has led towards an improvement in Codes and Standards, and in measures to help control energy use that none of our members are making a profit off of. It's advanced, it's truly public interest energy research that would not be done otherwise.

I think one of the best ways of taking a look at what we see as the eventual outcome of the direction that things are going is this last NOPA; none of the successful proposers were from the category that I'm talking about, they were all national labs, universities, or manufacturers or trade associations, manufacturers looking to make a profit on what they were developing. All of those are good, but they are not the whole world and the Energy Commission is going to be missing out on a lot of very important research

if firms like ours are kept out of the mix. And there is nothing in the rules that says we can't play, but if you look at the fact that grants mean that there's no profit to be made, and you're asking for-profit companies to put proposals together when there is no way for us to make, to sell a widget afterwards, you are essentially eliminating us. And we have some other concerns about the way contracts are handled and we would like to help the Commission figure out how to meet the goals that you have, including protecting the public interest and the dollars spent in a way that does not exclude our firms. I have a lot more to say, but you have other people to talk, so I will keep it short unless there's any questions. Okay, thank you.

MR. STOKES: Okay, next is William Toman with Cal Poly SLO.

MR. TOMAN: Good morning. My name is Bill Toman, I'm working with Cal Poly San Luis Obispo on some cutting edge studies we're doing for the Department of Energy regarding wave energy utilization in the state.

We're very happy to report that recently Cal Poly was awarded a $750,000 grant from the

U.S. Department of Energy to facilitate siting and costing studies for potentially siting a national wave energy test center offshore of California somewhere. We're working in conjunction with Humboldt State University and the Scripps Institute of Oceanography at U.C. San Diego, along with Cal Poly San Luis Obispo.

I want to talk about the issue of cost share, federal cost share. Just as an example, this most recent grant had a requirement of a 25 percent applicant cost share. My readings through some of the EPIC material, I see numbers of caps around 10 percent. So in this case, for the one that we just recently won, which was done mostly with cost share provided by the California universities that would not have been as helpful as a larger amount. The Department of Energy tells us that after they evaluate the year-long study that we are embarking on, in competition by the way with facilities in Oregon, that they will at some point issue a grant solicitation for actually building this test facility, which could cost as much as $60 million. It would center the wave energy industry here in California, the tremendous benefit for Ratepayers long term in

meeting greenhouse gas emission reduction targets and costs. DOE most likely will ask for a 50 percent cost share with the Build Funding Opportunity Announcement, as they call them. And in my meetings with the Department of Energy in Washington, there's a constant theme of where is the State of California in supporting wave energy? Where is the State funding to evidence their commitment to furthering this promising technology? I'd like to look to the Energy Commission through the EPIC program to help provide an answer to those questions from the Federal Department of Energy. I think this is something that would be a tremendous return on your investment. Thank you very much.

MR. STOKES: Okay, next is Ken Broome.

MR. BROOME: Ken Broome. I've submitted a response to your questionnaire regarding a commercial demonstration of small-scale low head hydropower, and in order to prepare a proposal it will take a lot of work on my part to assemble the site, the fabricator, the engineer, and so forth. So I'd like to know when we're likely to be given a request for a proposal and how long we'll be allowed for the response.

MR. STOKES: Yeah. So as far as the response, it varies from solicitation to solicitation. RFIs or PONs for the first Investment Plan will be coming out over the next couple months, still to be determined when PONs for the second Investment Plan will be coming out.

MR. BROOME: But this will be at what month of the year?

MS. TEN HOPE: We've posted on our website for the first Investment Plan the solicitations that we anticipate doing, initiating through June of 2014, and then the solicitations that will follow in the last six months of the year. And as we get more precise, we'll post individual quarters. This plan right here that we're talking about for 2015-2017, these are staff proposals at this point, they need to go through an internal review at the Energy Commission, and then be submitted to the Public Utilities Commission. And so the plans won't be finalized until the end of 2014, I believe, is when the CPUC is intending to make a decision. And so we would not anticipate

solicitations on this plan until spring of 2015 at the earliest.

MR. BROOME: Thank you.

MR. STOKES: Okay, so Dave Watson from Slice Energy.

MR. WATSON: Hi. I'm Dave Watson with Slice Energy. I was really glad to hear the increased interest in integrated demand side management technologies, which traditionally mean integration of efficiency and traditional Demand Response. My comment is that I'd like to see additional integration or emphasis on fast Demand Response, which can be used for grid balancing purposes. It is a fraction of the cost of peaker plants and grid-scale storage, and can be used in conjunction with those resources and assets in an effective way to help integrate renewables onto the grid. So just the word Demand Response, I think, needs to either be split into different categories, or somehow an emphasis on this newly emerging Demand Response technologies that allow for both regulation up and regulation down, similar to a generator. So I'll just put a pitch in that I think that's a really important topic that maybe alluded to in the integrated demand

side resources, but I just want to amplify that point.

MS. TEN HOPE: We're not going to respond to each person, just to make sure that you have plenty of time to get your comments on the record, so I would just keep bringing folks up.

MR. STOKES: MR. STOKES: Walter Saur (ph).

MR. SILLEVIS-SMITT: Good morning. My name is Willem Sillevis-Smitt with Philips Lumileds. I saw a lot of research initiatives in the area of building technologies, which I think is very encouraging and a very important topic. One suggestion I'd like to make is to identify lighting as a separate technology within the group of technologies that encompass building technologies. Lighting accounts for about 20 percent of total electricity consumption and so any gains in the efficacy of lighting and market adoption, consumer adoption of lighting that can be made and can be accelerated, I think will greatly help energy savings. So I'd like to refer also to the way the Department of Energy handles solid state lighting specifically as a form of energy efficient lighting, there are

separate programs set up for the acceleration of development and market adoption of solid state lighting as a separate area within the overall building technology program there, and I think that would be a very good example. I would also like to suggest that to the Commission to consider this as a separate research initiative. That's my comment. Thank you.

MR. STOKES: Okay, next is Scott Elrod with the Palo Alto Research Center.

MR. ELROD: Thank you. Scott Elrod. I work for the Palo Alto Research Center. First, I want to say it's a very impressive set of initiatives and what strikes me is how comprehensive it is. So my comments aren't about the comprehensiveness, they're more about affordability and some ideas around how to maybe organize this.

We are performers on several ARPA-E grants at PARC and so we're familiar with the solicitations, and each solicitation has in it $20 to $30 million, and those solicitations, some of them map fairly directly onto things that you're trying to address through the EPIC Program. So the concern I would have is that,

for the $160 million, how can you address all those things at once? It's a very ambitious agenda. So just one idea would be to try to organize the solicitations around what is actually the vision for the future, and I suspect that these visions were and are prominent in your thinking, but I'm wondering if the solicitations themselves could be organized in this way. So a grouping of solicitations that are oriented toward, say, the homeowner of the future, the energy user in the home of the future; or a group of solicitations around the corporation of the future and its interaction with the energy system. So maybe there could be 10, 15 solicitations which are addressing the different pieces of the value chain, the communications required, the energy storage required, the renewable generation that could be sited in those places, and that would be a way, I think, to further focus the effort and ensure that there's enough money to deliver on what those visions are. I also think there's great value in bringing together the performers on different aspects or different projects, and so this could also provide a means to bring together the

principal investigators, the performing organizations together around that theme, the theme being this specific vision for, say, the 2030 homeowner and his or her interaction with energy. Thank you.

MS. TEN HOPE: And I think we're ready for -- well, let me do a call first, anyone else that would like to speak in the room? So we'll go online. Yes, we -- Fred Bauman, please go ahead. Fred, would you mind chatting your comment? The sound doesn't seem to be working very well. And we'll read it here in the room. Fred, could you type your question into the chat function on the WebEx, and we'll read it in the room? Is there anyone else in the room who would like to make a comment at this time? Is there anyone else on the WebEx? Okay, yes, we will read a question that has been texted through. Just a moment.

This is a question from Elissa Brown: "In some state solicitations, there is a match waiver for projects benefitting low income communities. Some of the technology demonstration projects such as Forest Bioenergy do not have access to much match funding. Could

you consider match waivers for these programs?" This is from Elissa Brown with the Sierra Nevada Conservancy.

Art Rosenfeld, please go ahead.

MR. ROSENFELD: Can you hear me, Laurie?

MS. TEN HOPE: Yes, we can.

MR. ROSENFELD: I'd like to make two comments, one is a simple question. The Investment Plan 2 funding notices, funding opportunities, seem to be delayed until the end of the year, but on your website you have Industry, Ag and Water showing as coming in before June. Why am I confused? Are there two different deadlines in Industry, Ag and Water?

MS. TEN HOPE: The lists that are on the website are for the current Investment Plan, Investment Plan 1, and the ones we're talking about today are for the second Investment Plan that will roll out in 2015.

MR. ROSENFELD: Oh, thank you very much. And while I'm on, I would like to make one comment. I would like to emphasize Frank Ramirez's comment on evaporation. I've been working with Russell Sykes at Harvard and we have an evaporation control with brightening water

with underwater clouds, bubbles, and our estimate is we can save one foot of evaporation per year at moderate costs, and there are nearly half a million acre feet available. So I do think that's a hot topic and maybe we can combine our efforts. Frank Ramirez, if you could email me at ArtRosenfeld@gmail.com, I would be very interested in talking to you. Thank you very much.

MS. TEN HOPE: Art, did you want to state an affiliation?

MR. ROSENFELD: Oh, I'm sorry, Lawrence Berkeley Lab. Thank you, Laurie. And a former Commissioner.

MS. TEN HOPE: It's a pleasure to have you online. Thanks, Art.

MR. STOKES: Okay, so we have another commenter from the room. Mark -- I can't read the last -- from the Davis Energy Group. Is it Berman?

MR. BERMAN: Thank you. I'm Mark Berman, President of Davis Energy Group. And we've done work over the years for the California Energy Commission. And I have a number of thoughts. One is I'd like to reiterate something the

gentleman from Palo Alto Research Center said, although $60 million sounds like a lot of money, it's not as much as it used to be, and I'm concerned that it's getting spread too thin, too many initiatives at the same time. And I'm wondering if some prioritization is needed, or, as was suggested looking toward a theme. And one of the themes that I would suggest is the roots of the California Energy Commission, and that is efficiency within buildings and energy in and on buildings, and that includes new and existing. We've done some work in existing housing and retrofitting it and it's a real challenge. There's a lot more that needs to be done there to figure out how to motivate homeowners to do what seemingly obviously is in their interest, and there are many other areas within buildings where energy can be saved, demonstrations are needed, products are available, but uptake is low to the Valley of Death.

And finally, I would like to reiterate what Nehemiah Stone mentioned. We are seeing a trend more and more of awards going to larger and larger institutions, which certainly large institutions have a place to play; but so do

small adept entrepreneurial organizations such as the one I represent, a couple of dozen people that can do some really good and effective work, and have over the years, in areas that have no hope of generating a profit in the future. And so the concept of match funding makes no sense for a modest sized company to do work in an area that's not going to yield revenue in the future. And the concept of spending $20,000 to put in a well-thought-through, hopefully, proposal in response to a solicitation that you may or may not get, and no possibility of profit on the other end, with accounting oftentimes micromanaged, the value proposition is declining, and that's not good for the Commission, it's certainly not good for the health of our companies, and it really just doesn't make sense for so many grants to be out there that disallow profit, when profit in fact in most instances is used for training, reinvestment, and creating more proposals. So that does need to be re-thought. Please pay careful attention to the comments of the California Energy Efficiency Industry Council, they come with good intention and lots of experience. Thank you.

MS. DOUGHMAN: So we have a comment online, I'll be reading it in a moment. So this comment is from Fred Bauman. He is with the Center for the Built Environment at U.C. Berkeley. His comment is related to the first Strategic Objective. Fred writes: "I think it is important to specify strategies that will improve and promote indoor environmental quality in relation to all of the energy efficiency and demand response research efforts. The presented list includes such human factors as social science research methods and indoor air quality, but the list does not talk about thermal comfort and overall indoor environmental quality, which is obviously important for the success and adoption of any of these technologies. It may be implied that the demonstration projects will require comfort and indoor environmental quality issues to be included, but I encourage you to explicitly include these in your plan. Proposers may respond by including these topics in their research methods and by also including these topics in their clean technology developments."

We'll check one more time, if you are online and you would like to make a comment, please use the raised hand function.

MS. TEN HOPE: Could we move to our Next Steps slide?

MS. DOUGHMAN: Yes, so the Next Steps, please submit written comments by the close of business on March 28th. Please send your comments by email to Docket@energy.ca.gov. Please include the docket number 12-EPIC-01 in the subject line. And please send an electric copy to LorraineGonzalez@energy.ca.gov. You may also send a paper copy to the California Energy Commission, Dockets Office, Mail Stop 4, regarding Docket No. 12-EPIC-01, 1516 Ninth Street, Sacramento, California 95814-5512. And with that, we will break for lunch. We'll return at 1:00 to hear from Investor-Owned Utilities.

MS. TEN HOPE: Shall we go to 1:15?

MS. DOUGHMAN: Oh, 1:15, yeah.

MS. TEN HOPE: Thank you, everyone.

(Break at 12:01 p.m.)

(Reconvene at 1:17 p.m.)

MS. MOORE: 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 IOU, Draft Initiatives. The IOU Administrators of the EPIC Program are Pacific Gas and Electric Company, Southern California Edison Company, and San Diego Gas & Electric Company.

My name is Amanda Moore, Regulatory Case Manager for Pacific Gas and Electric Company, and on behalf of all the EPIC IOU Administrators, I would like to thank you for participating in 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 begin with John Minnicucci of Southern California Edison Company, who will provide EPIC Investment Framework from the Perspective of the IOUs. Next, we will have a segment where we discuss

each of the IOU's EPIC Investment Plans for the 2015-2017 cycle. That will be followed by an EPIC Intellectual Property Discussion given by John Minnicucci. Finally, we will have a talk about EPIC Research, Development and Deployment Journey. And at the end of today's presentation we will have the opportunity for stakeholders to Make comments and ask questions.

With that, I would like to get today's presentation started with John Minnicucci of Southern California Edison.

MR. MINNICUCCI: Thank you, Amanda. Next slide, please. One more. There we go. So I'm not going to spend a lot of time on these next slides, we presented these slides at our Webinar in February, but we feel it's important to provide a little bit of context to kind of demonstrate what the utilities are faced with in California, so just a real brief survey of some of the energy goals: once-through cooling, coastal power plants in California will no longer be able to run water through a cooling cycle at a single pass. That means they either have to shut down or retrofit. That could cause impacts to the transmission system that needs inertia in its

current form, the way we operate, to continue to run.

AB 32, everybody is familiar with the AB 32 Standards. That has a very very large impact on a variety of things, including utility operations, again not being able to rely on your more standard forms of generation and looking toward different types of generation.

Renewable Portfolio Standard, 33 percent renewables by 2020, a very aggressive target, good for the State of California, but it is something that we have to manage as a utility. Again, operations are not similar to how they had been.

The Governor also has a 12,000 megawatt localized energy resource goal. While this is not a mandate, it does show the direction in policy for California, and localized energy resources will definitely change how we manage our distribution systems. And most recently, the State Energy Storage Procurement Requirement, which requires the utilities procure 1,325 megawatts of energy storage by 2020. These goals are aggressive and advantageous for the state, but they also present a lot of challenges, which

is why we're here and why we're very interested in pursuing these types of programs that you'll hear about in a little bit. Next slide, please.

So just roughly, on the left side what you're seeing, gridlock reliability through rotational inertia, remember the power plants that we were talking about, big moving mass is what keeps the system reliable and stable today; in the future, we see that reduced stability because of the change in the generation mix: the wind blows when the wind blows, the sun shines when the sun shines, and without big rotational mass you're going to have to work other solutions to keep the grid stable.

Dispatchable Generation -- today, well, not necessarily today, but in the past you could pick up the phone and have a generator come on line and in a matter of hours and things are not quite as dispatchable these days. And in the future, it's going to be even more different with stochastic generation, again, you know, clouds pass over a photovoltaic and what happens on a distribution system. Rather than seeing these things as blocks of power for planning purposes, you're going to be looking at blocks of power at

a distribution circuit level, and trying to manage at that level which is not something that we had historically done.

Passive/Predictable Loads -- the future might have transactive loads. With Demand Response and energy efficiency programs and the potential to have those programs play a role in reliability, it's no longer just managing how people turn lights on and off, and businesses operate, it really becomes much more dynamic and much more unpredictable.

Human-in-the-Loop Grid Management -- you know, you have operators that sit in substations and work the system; in the future, with all of the change to the distribution system, we think that we're going to have to focus some of the intelligence in a distributed manner as opposed to everything being centralized. The human-in-the-loop is just not fast enough to deal with what we think is coming at us.

And then lastly is the Rigid and Centralized System Control. We're going to have to build flexible and resilient distributed systems in order to manage the grid of the future. Next slide, please.

Let's talk a little bit about EPIC. Damon from the CPUC had gone through what the EPIC Program is in a broader sense this morning, this is what the EPIC Program means to the Utilities. The CEC will administer about 80 percent of the authorized budget and the Utilities will administer about 20 percent. The CEC's program is broad-based, they'll be doing the applied research, technology demonstration and deployment, and market facilitations. The Utilities, on the other hand, will only be doing the technology demonstration and deployments. Some of the reasoning behind that is the utilities have grids with which to do these demonstrations and deployments.

A difficulty with having said grid is that, that grid must be safe and reliable when you're doing these demonstrations, so we have to be very sure that this stuff is going to work before we do a demonstration, which means it will be lab tested and challenged through a variety of processes before we actually get it out onto the grid. And then with respect to the electric system value chain, the utilities are typically going to focus on grid operations, market design,

distribution and transmission, which is kind of our forte and what we do in the market, generation demand-side management, and other activities will be focused mainly on the CEC.

The Utilities may do programs or projects that touch on generation or demand side management, but it's not a demand side management or generation program in and of itself, it's how you incorporate either data or operations into utility systems to ensure a safe, affordable and reliable grid. Next slide, please.

This I'm hoping people are familiar with. This will be probably the sixth time we've presented this, but this is the Investor-Owned Utility EPIC Framework. And the reason we do this at every meeting is the Utilities are very much working together on EPIC. It doesn't make a whole lot of sense for Utilities to unnecessarily duplicate, or pursue research that we can better work on together. That's not to say that there shouldn't be projects that each utility is doing. An example is the behind-the-meter work on Electric Vehicles that the Commission has ordered us to do. All three Utilities are doing work in that area by order, but also it makes sense

because all three Utilities have different systems and billing systems and whatnot.

But to quickly cover the topic areas, Renewables and Distributed Energy Resource Integration, clearly something that's very important in California; Grid Modernization and Optimization -- we can't get to our targets and goals without having a more modernized and optimized grid; Customer Focused Products and Services Enablement -- again, this is not directed toward doing energy efficiency or Demand Response programs, it's making those programs or helping those programs interact more effectively with the grid. And then the last target area is crosscutting and foundational. This is where, you know, cyber security communications, all the things that are going to stitch this new and modern grid together, that's where those projects would be done. And if you look to the far right, and I apologize for those on the phone that can't see this, we have a list of some of the key drivers. California has got a lot of ambitious objectives and we want to help California get there, and we think by doing the projects that you're going to hear about, that will help move

us into the right direction. So without further ado, I'm going to hand the microphone over to Mr. Percy Haralson, who is going to talk about SCE's projects.

MR. HARALSON: Thank you. Good afternoon. Okay, the slide that you see right now, this is showing that we have really a consistent framework from EPIC 1 to EPIC 2. You see the same basic categories, same four categories that you saw in EPIC 1. We see EPIC 2 as the continuation of that.

What I'm going to be talking about today is I'm going to talk about the proposed projects that Southern California Edison has, that fall into these categories. Out of the four categories, we have about 21 proposed projects and I'm going to go ahead and discuss five of those today. So next slide, please.

Okay, the first one is really focused on storage and you heard John talk about kind of the exciting and kind of aggressive proposals that we have on the board for California. One of those for Southern California Edison is to install and make available about 580 megawatts worth of storage onto the grid. That's going to be a

challenge. And it's a challenge because we're talking about relatively new technologies. When you talk to different manufacturers, each manufacturer kind of has their own view of how that device would interface to the grid, and how it would be controlled, all the way from what type of communications to what communications protocol is used, and then also how that device acts automatically, too, on its own.

The goal of the first project, it's called Optimized Control of Multiple Storage Systems, and it is exactly that. We want to be able to go ahead and show how multiple vendors can interoperate with each other and can also interface with existing utility control systems, too, behind the scenes. Now, it's interesting because in my experience, you know, years and years ago I remember doing the same kind of thing with capacitor banks, a much simpler technology, but I can remember back in the '90s having each vendor meet, at the time it was the DNP3 Standard, and each different vendor kind of had their own way of interpreting the standard, and when you went ahead and you put these systems together, or the controls together, you found out

that they wouldn't interoperate with one another. So it won't be surprising to see the same type of outcome with this, then, too.

The other thing that's going to be a challenge in here too is to be able to go ahead and see how these technologies support a lot of different functions because storage isn't as simple as capacitor banks. It really comes down to what particular use case are you using the device for, and how do they interoperate with one another for each use case, too. So this will be much much more challenging than it has been in the past.

We're going to be also demonstrating how these devices can operate in their own standalone mode, and how they can go ahead and work together as a team, both to mitigate localized problems and also work as a team to go ahead and mitigate system level problems. Next slide, please.

The next project is the Versatile Plug-In Auxiliary Power System, we call it VAPS. The whole idea of this really is you look at when our people are out in the field working at a site, they typically have their truck running, it's sitting their idling and they're using the power

from the truck to go ahead and power their power tools and all of the other ancillary devices that they need, including radio communications, safety gear, you know, all of the essential pieces of equipment. And the whole concept of this is to come up with a device, or to have a device and show how it can be used where instead of it being like a portable generator, or the truck itself that would be running on gasoline or diesel, this would be an energy storage device that could be charged up, it could be brought out to the field, it can be set up, and then all of the equipment when the crew is using it would be running off of that energy storage device.

Now the advantage of that, you know, you think about it, for people that are kind of used to, say, like hybrid cars now days, it's not an alien concept anymore to come to a stop or to be sitting in front of a facility waiting for someone to come out and you're sitting there with the air-conditioner on and the engine is not running, and that's because the car really is using the energy that is stored in the battery to go ahead and run those services, in that case air-conditioning, so that you're not sitting

their idling all the time.

Now, the other thing that this project will be doing and showing will be the use of battery technology that really is consistent with what's being used in automobiles, too. So this is the *Chevy Volt*, or the *Ford Focus* EV. And when I say that, what I mean is that internally the device will be made up of the same basic modules that are used in the cars. The advantage of that, there's obviously an advantage of scale that we see for it, and we think that's going to really help the device be much more cost-effective. The other thing that this does, though, too is that it allows us to take a look at using energy storage battery modules that are coming from vehicles as a secondary use, so we see this as also a possibility of taking vehicle batteries that are no longer used in the vehicles, but could be used as a secondary use case, then, in the VPAPS or the VAPS system. What that does, then, is it also gives us the ability to get more use out of the batteries before they're recycled and increases the value, really, of those assets then, too, and reduces the amount of batteries that are then having to

be disassembled and lost then. Next slide, please.

The next project is the Cyber Auto-Response and Policy Management System. Now, when you think of cyber security on the grid, cyber security comes in a lot of different flavors. Normally, with every system that you purchase, every control system, you get a different flavor of security from that particular manufacturer. And one of the things that Southern California Edison has done as part of their previous projects was to go ahead and come up with what we call the Common Cyber Security Services. And the whole concept to that is to have a set of security services that are standardized, that can be used or leveraged onto any system that the utility uses, then, or brings into the company. The advantage of those is multifaceted: one is, obviously if you have a lot of different systems with each one having their own cyber security system, or their own flavor of that, you end up having people to support that specific flavor of cyber security. The other piece that is important about having a common cyber security service is that it makes the monitoring of those

systems and the integration of those systems into the security organization much more consistent also.

When you think of cyber security, you also think of not only the ability to be able to recognize when, or to 1) make the system secure, it's like the locks and the keys, but you also want to be able to recognize when there's a break-in, you know, just like you have for a home, if you have a break-in, it's detected and then at that point, though, it turns over to a human, then, that has to make a response. All right, somebody comes and checks on it, that kind of thing, well, that takes time and it takes individuals to make those decisions. So in this project, what we'll be doing is leveraging that common cyber security services platform that we had developed previously, and we would be now showing it with the abilities of being able to automatically recognize when there is a break-in, or a potential break-in, and instead of just passing that on to a set of humans that would then go ahead and decide what they're going to do about it, the system would have automatic mitigation schemes built into it, then, that

would then go ahead and basically -- you know, picture in your mind somebody breaks into your house, right, well, what you'd really like to do is you'd really like to be able pick that person up, throw him outside, and re-key the lock, right? I mean, that's really what you'd like to do, and that's really what this is trying to do. It would have the ability to go ahead and recognize it, terminate the session that the cyber attacker is coming in on, and then be able to re-key basically those end devices in the field so that, then, you're basically restarting the whole thing all over again if somebody is trying to break in.

As part of this, we would be deploying this and showing it with these automatic policies, which is changes on the system and the keying, basically, to end point devices. These would be things like field radios, digital fault recorders, it could be smart inverters in the future, and then also our relay equipment. So this is the protective equipment in our substations and our distribution system. Next.

The next project is the California ISO Operations and Utility Grid Coordination Project.

And this is a crosscutting and foundational strategy and technology project. If you look at the California ISO today, they are the balancing authority for the state and are tasked with being able to control what generation is available for the amount of load that is out on the system. Now, it's one thing to be able to do that when you have a lot of wholesale power that's being generated on the transmission side, they're well-positioned to be able to do that and to have the information for it and the control capabilities to handle that. But as we get into a change into a market where a lot of the generation will be on the distribution side, things change a little bit because the California ISO doesn't really have the ability to see that deeply into the distribution system. So you have instead the utility that is managing the distribution system, and you have less and less ability for the California ISO to be able to control those devices on the distribution side.

So one of the things that this project would be focused on is what technology does it take and what type of communications does it take to be able to have meaningful grid need

notification that can then be pushed down through the distribution system and to the premise and be able to go ahead and have a response that you expect from the devices on the other side of the meter. This is not a Demand Response type program, this is really more of a control program for generation and load, combined. And in particular, as we're focusing on this, is we're really focusing on the communications technology of what it would take to make that work. Again, California ISO is really focused on using wholesale pricing information and, to a retail customer wholesale pricing just doesn't have any meaning to them at all, so our focus on this would be how you go ahead and turn that into really grid need type signals instead, and those grid need signals can then be interpreted by equipment, then, at the customer premise. Okay, next please.

The next project is our Microgrid for Enhanced Grid Reliability & Security. You know, one of the things that you look at California is we are definitely blessed with wonderful weather. You know, when you look at what's been going on on the East Coast over the last few years with

Super Storm Sandy and you see the type of devastation that it can have on the infrastructure, on the grid infrastructure, and how long it can take to go ahead and actually restore power to those customers, on the West Coast, though, we're not immune to it, you know, we have a little bit different scenarios, we still have natural disasters, we have earthquakes, we have wind storms, we do have fires, we have vandalism, all these kind of things challenge the grid. And we believe that there are learning experiences that we can glean from the East Coast. Part of that is the whole strategy of Microgrids, and one of the things that we're focused on in this project is how do you go ahead and have a system of Microgrids, how do you control the resources on the Microgrid side and have them be able to easily interconnect and disconnect as needed to the grid. What type of services can be made available to the utility with that Microgrid and that Microgrid control system?

One of the items also in this project that is important to notice or to note is that we want to be able to go ahead and leverage the EPIC

funding with other money from other sources, so in the case of this one we would be looking to potentially leverage that money with the Department of Energy, DOE, also and be able to get literally more bang for your buck out of it, then, for that project. And I think that's my last one. Yes.

MS. MOORE: Thank you, Percy, for providing that overview of SCE's draft initiatives for the second Investment Plan.

Up next we have Suna Taymaz of Pacific Gas and Electric Company. She will provide an overview of PG&E's second Investment Plan.

MS. TAYMAZ: Thanks. So next slide, Amanda. Similar to SoCal Edison, we followed the cross common IOU Framework, and I'll spend a couple of minutes describing the various projects here. This is the beginning of our R&D portfolio, it's still evolving.

Similar to my other IOU colleagues, we probably started around the same time, January, so about two and a half months to begin the ideation and planning process for the 2015-2017 EPIC portfolio, or what we're calling EPIC 2.

And part of this process was to meet with

various folks within our own electric group, so be it system engineers, planners, operators, our customer programs, our IT folks, our enterprise architecture departments, and the reason I bring this up is because the projects aren't really – you know, they're not in an abstract bubble, they came from based on real things that our planners, our engineers, our operators are seeing on the grid, or they believe they're going to start seeing on the grid in a more impactful manner.

As part of this process, we also engaged research institutions, members of the academic community, various industry associations, and across IOU benchmarking. So I think it's all important to give the context of where these proposed demonstrations come from.

So with that context, let me just spend a little bit, a couple of seconds, on each of these boxes. Renewables and Distributed Energy Resources Integration: so this is really all about demonstrating the technologies available to integrate DER, give us visibility of DD on the system, as well as storage, be that the customer side, or the utility side, and help us integrate all these new parameters into our processes. And

so that could be planning for capacity and reliability, using an integrated approach that considers DER and DG and Storage, it could also be real time control and coordination of such systems for the utility needs, as well as market needs.

John had mentioned earlier the storage procurement target, and so this is obviously high on the minds of all the utilities. Right now, not counting our pumped hydro storage, PG&E has about -- I want to say six megawatts of storage, and so by 2021, we're looking at for all of the utilities, 1325 megawatts. So we've got a ways to go to make sure we can integrate the storage properly, cost-effectively, procure it, and make sure we can deploy it and operationalize it in a way that's cost-effective for our customers.

Some of the things to think about is are there better or worse placements, the types of storage, the control and coordination of the storage resources and how to do that all in a safe and reliable manner.

Moving on to Grid Modernization and Optimization, I've characterized the projects in this section as exploring various new sensor or

smart technologies that have really come up over the past couple of years, piloting these various different applications really give us better information about our assets. We can't get around the fact that our infrastructure is built over the last 100 years, and so with an average age, that is 40 to 50 years. PG&E has 18,500 miles of transmission lines, we have a 70,000 square mile service territory, and 884 substations, so anything we can do to make the patrol of those assets more efficient, extend the life of assets safely, or be alert to real-time conditions is going to be a cost-effective measure we can pass on to our customers.

I'll also mention quickly the bottom of Grid Modernization and Optimization, so a lot has happened obviously in the mobile space over the past couple of years, we have field crews that have gone from 100 years ago paper and pen to ruggedized laptops, and we'd like to explore the next generation of technologies to help them do the work in the field and kind of the catch phrases closer to the trouble.

A third area, Customer Focused Products and Services, this is really about putting the

customer as integrated into the various parts of the value chains, so, you know, gone are the days from generation on one end to customer on the other end. It's really about having the customer in the middle, part of the utility processes, part of the market processes, and so that entails integration with customer-side devices, home networks, integrating those demand side strategies into utility and market operations.

And then finally, I'll go to the cross-cutting section, and so I would characterize the projects here around the necessary coordination, interoperability, integration, automation, and the standards, so all of the things that will help the grid work in the modern Smart Grid way to make sure that we have the support to provide the safe, reliable, and affordable services.

You will notice a significant focus on the AMI Network, so the Advance Metering Infrastructure Network. This is a big priority to provide a path for our customers and vendors to connect and communicate their various devices and applications in a seamless manner. Next slide, please.

MS. MOORE: So I'll focus on three

specific projects. The first one, so I had mentioned storage, I said we have an energy procurement target, and so all the utilities are looking at how do we -- what is the best practice for deploying storage? What is the methodology, the processes? They aren't there yet and we want to move beyond obviously the studies and the research to actual field deployment, demonstrating the benefits of that storage. We know there are likely better and worse places to put storage from a safety, reliability, and cost-effectiveness point of view, and so this demonstration would seek to develop out that methodology that we could use, you know, in a repeatable and consistent manner to demonstrate not just the operational aspects, but also the benefits, the risks and the costs.

Conceptually, you can think of a tool or data that fields a tool that helps you score storage and understand what are the best locations, what are the optimal types, how do we use it in the grid operations, as well as how do we use it in the markets. For primary benefits around this project, I've mentioned the policy attainment, so meeting our policy goals. What we

are also trying to do is assess storage as a method to maintain reliability, as well, with our growing amounts of renewable DER on the Grid, as well. Next slide, please.

So on this slide, I'll highlight the Emergency Preparedness Activities, and so in this case Emergency Preparedness Modeling and Emergency Management Mobile Apps. So Percy had also mentioned the amount of storms that you might be seeing, or even if you look across the U.S., as well as worldwide, you know, various incidents that have happened and they can be disruptful and harmful to the public, as well as to our system safety. Folks are caught off guard on restoration activities perhaps in that case, or we have not expected the level of severity or duration of these types of events. And so, without understanding what those natural hazards are and modeling them in a holistic way, you can't really have a good scenario planning in place. And so what we're really seeking to do is improve our scenario planning ability.

The demonstration would seek to pilot a holistic natural hazard damage model, and there are some various options out there, and the 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 then model the impact on the transmission line, the distribution system, actually the impact to customers, and quantify potential outages. This really helps with our estimations to restoration activities, how much research we need, where and when, and for what amount of time to bring the grid back up in a sufficient time.

PG&E has developed basic models for outage and restoration, and so this would build on that in a broader manner, leveraging newer technology around virtualization, risk ranking, impact analysis, to calculate these potential losses, and prepare proactively for restoring power.

Also, this would look at pairing this with improve mobile technology for field response, so that be it the customers, our first responders, other first responders, the public could actually have the real time information to guide them out of the path of the hazard, alert them to situations, coordinate over a wide area.

I'll give you a pretty simple example. So, in our world today, a customer calls and there's a wire down, and we roll the truck to go investigate. Let's say a certain percentage of those calls are for telephone lines down. And so if the customer could take a picture, send that to our call center and realize it's a telephone wire down, we can avert a truck roll, keep our emergency responders for the emergency, and perhaps route that to the telephone service providers. So there are real savings as far as truck rolls, operational efficiency, reduced greenhouse gases from that truck not going, lots of potential applications. Next slide, please.

So this slide describes our Real-Time Energy Usage Feedback for Customers, and this is under the Customer Focused Products and Services area. We have very strong energy efficiency and demand response programs, and John had mentioned that, as well. So our focus isn't so much on those programs, but really the grid integration, how do we make those programs effective so they can actually contribute to our internal planning processes on the distribution system, help meet our capacity and reliability needs, really

integrate and leverage those programs in a significant manner. And so, as I mentioned before, the customer has moved to the center of utility and market operations, and to really get there we have to incent our customers to really play a part in the utility model. And so one such demonstration takes the use and availability of real time data, grid data, market data, real time usage data, and using that to engage the customer and encourage or incent demand-side participation.

One concept here is gamification, so if anyone has played video games, it's a significant trend in recent years, to use it in a non-gaming context, and so this is potentially a powerful tool to change behaviors, how we interact with customers, and also how even employees can drive innovation. Traditional games, if you're familiar with video games, use points, reward badges, status broadcasts over social media, and so if we combine these types of gamification strategies with real-time data, we have the opportunity to really advance some of our customer facing programs in a more significant way so we can actually meet policy goals, achieve

grid integration, really enhance the collaborative strategies between the customer and the utility. Next slide, please.

So the last slide is an example from our Cross-Cutting and Foundational category, and this is really about demonstrating our AMI Network License Spectrum Demonstration. There has been lots of discussions, research, there is a lot of activity around licensed versus unlicensed spectrum, the various opportunities and challenges on both sides. Our network is an unlicensed spectrum, and we would seek to demonstrate on a small scale the various benefits or advantages or challenges of licensed spectrum, as well. So there are various vendors out there, again, various kind of opportunities on both sides, but this would seek to evaluate whether there is any benefit to moving to a new type of network, whether it's a potential supplemental source of bandwidth over the coming years, essentially not to lock us into one solution, knowing that the road ahead for Smart Grid communications, distribution automation, customer devices, isn't yet quite known, so allowing us the path to see the various different future

scenarios that could play out. And I think that's my last slide.

MR. MOORE: Thank you, Suna, for providing an overview of PG&E's second EPIC Investment Plan. Up next we have Frank Goodman of San Diego Gas and Electric Company. He will provide an overview of their second plan.

MR. GOODMAN: Thanks, Amanda. The approach here is similar to what you saw from my colleagues from the other Investor-Owned Utilities and following the same framework that we've used in the past triennial cycle, this is the landscape view for San Diego Gas and Electric in the second triennial plan.

We have six projects up there and that is the current list, it's not yet final. We've been working it internally with a tiger team of people and vetting by -- what do we call it -- our R&D Governance Team, which is mainly Director level people. And that list you see there is our current list, we had a much longer list when we started, but we wanted to brainstorm all the possibilities and we ended up picking what we thought were the most urgent needs to the extent we can look through our crystal ball at the time

this program gets approved, what we think they will be. But we've left enough flexibility in them that staying within the confines of those six activities we could pretty much adjust as needed to whatever happened in the industry between now and when the plan is approved. So I'm going to go through the five up above, five of our six, following Percy's lead, picking five, and it's the ones in blue that I'll walk through. And I'll say this, that we do have in this case populated more of the different elements of the framework, the initiatives, that is, than we did in the first triennial cycle. We had only activity in two of the four initiatives, this time we've got activity in all four. So the next slide, please.

Okay, now in that first initiative, which is the column on the far left, we have this project, Modernization of Distribution System Integration and Integration of DGDS. One of the things that we did in populating that initiative framework was we took a look at what would map from work already underway, and we have R&D programs going on that are funded out of our rate case R&D Program which runs through the end of

next year, and through the triennial 1 plan which is ramping up right now.

So we first asked the question, is there anything there that will need a logical follow-through in Tri-2, the next phase, if you will. And then we also said, what aren't we doing at all that might need to be done? This one is more in the category of logical follow-through to things we're doing on smart circuits and on renewables and DER integration, but it kind of starts to narrow it down into a smaller number of projects. And this will be our follow-through for what was multiple areas in the past. But it will likely be the largest of the projects, and some of the things we'll be doing in there, examples, and the actual final list of activities, it's determined in the actual project planning phase which is Phase 1 of the program, all of our projects work that way.

We might pilot a Robust Distribution Circuit Design with Adaptive Protection and Regulation Capabilities that can accommodate a wide variety of new device types at different penetration levels. New device types not just meaning DER, which is what everybody gravitates

to right away, Distributed Generation and Storage, but also could include things like SVCs, Static VAR Compensators, and other controllable power electronic devices that are emerging from the vendor community. And our issue is how do you make them interoperate together and rather than work against each other.

And then we will also continue to look at is it better, for example, to use your inverters on the DER in the power factor control mode in order to regulate voltage? Or through volt VAR control? So different operating approaches, what is better, what's worse, and in specific situations, what works in one case may be just the other way around in the other case.

And then we're going to look at different storage issues like how could you stack different storage functionalities where you put a storage system in at considerable cost, especially if it's batteries, and then you have some primary intended function and you ask, well, it's going to be sitting there, is there anything else it could be doing when it's not shaving your peak at 4:00 in the afternoon, or however you normally would use it? And start to look at how can you

layer in a number of different uses of that device and get more value out of it than just its primary use. So that's the first one. And you pretty much see there we have mapped it to these primary and secondary principles as the other IOUs, I don't need to read the list. Next slide, please.

The Data Analytics and Support of Advanced Planning and System Operations is our second one. This moves now into the middle initiative area of Grid Modernization, and it's true that a lot of these projects I'm describing actually have a primary and a secondary mapping in the initiative list, and the way I'm labeling them today is according to primary mapping. But that one I just presented, for example, it not only is DER integration oriented, but it is a part of your modernization process, as well. Excuse me, I brought a throat full of San Diego pollen with me.

The second one here is on Data Analytics and we have the concern that we're getting a lot of these data producing devices. Any controllable device generates information and data if it's an inverter sitting out at a

customer residence, you could extract information on system operations. Any power electronic device that requires to monitor, system and voltage from the utility system in order to operate itself, well, if you had the communication infrastructure in place, you could use that device as a monitoring node in addition to its primary function. So we want to look at those aspects, but then the bigger aspect that emerges is a data tsunami, a different tsunami than what Suna was talking about, different type, that is. And you've probably heard the phrase, there's this large volume of data that's going to emerge as we add more and more controllable electronic devices and they generate information that could be useful, or it could just snow your whole operating process and take it down, so we really need to get our arms around this one and ask what sort of filtering needs to be done, and at what level in the control system, and what data is not sent further upstream, but either discarded or used down at a lower level, and so on up the line. So that's what this project is about, is getting at the management of all this data that is already -- well, we're getting more

than we can handle right now and we're going back and looking at old data and finding all kinds of useful things about how well our volt VAR management systems are working, or not working, just by mining the information that is already archived in data. So you not only want to do that, though, you want to be able to handle this data stream in real time and make use of it to customer benefit to deliver a higher level of sophistication in your operations to customer advantage. Next slide, please.

So the next one here is the Monitoring Communication and Control for Power System Modernization. And here I move away just from data to the whole picture of the monitoring, and then using the information to do something useful, the control aspect, once you manage the data and have your arms around that, doing something useful with it and getting it to the place you're going to do something useful which is the communication part. And we want to get into the issues around communication architecture and standards, and sometimes I hesitate to even raise it, but IEC61850, and I commend SCE because they are doing the first 61850 conforming

substation, I believe in North America, and the North American utilities have a big investment in the legacy architecture called DNP3; however, in the long run, like 10-15 or more years down the road, there's enough advantages in the 61850 architecture that the North American utilities may want to migrate to it. So that's an area that we plan to explore more around the distributed energy resource area since SCE has moved ahead on the substation, now we're very anxious to learn from what they're doing, and then we want to start to try out what are called 61857-420 object models, which are the ones that are for DER. That's the piece of 61850 that is for DER, and begin to look at how the system would be architected here and what standards you would use in different places in the architecture and pilot them and get smarter, and answer some key questions: 1) Do we really want to migrate to 61850 or to some other new standard? Believe me, right now, 61850 is the most sophisticated, so do we want to migrate to something else other than our current platforms, or not? And if so, what will the migration process be? And the only way you can really figure that out is to start

piloting and getting familiar with some of these standards. So that's that one. Could we move to the next?

All right, this next one is around system operations development in advancement, and here we're saying, well, gosh, we are moving as aggressively as we can within the resources we have to modernize the power system, and we're putting in new hardware, new software, adopting new standards where it makes sense, and then what about the control aspects, meaning the staffing, the training, the skill sets, the workforce readiness, and then again that overall system integration issue as you're bringing the new technology software and so forth on line, are they properly integrated? And then how do you have your workforce readiness positioned to really operate it properly, to deliver the maximum value to the ratepayers? Because the value to the ratepayers will come not only from moving to more advanced infrastructure, but making darn sure you're smart about using it and you're using it right. So this one gets more into the human element and also tries to position us where we're not only ready, but we have a

process since this is an ongoing thing and we're not going to roll out the new infrastructure and be done with it, there will always be new technologies coming, and so we want to have a process in place that you can easily adapt incrementally to the changes, and not alarm your operating people, or really disrupt your operating processes with a lot of things all at once, so to be able to do it quickly and incrementally. Next slide, please.

This is my final slide and it deals with the integration of customer systems into electric utility infrastructure. I'm now in that right-most column of the initiative slide. And here, we're not trying to go behind the customer meter, there seems to be an awful lot of work going on there, whether assisted by federal, state, local, or even some of the IOU programs, and then there's major incentive programs outside of the R&D arena, major incentive programs already in place. So rather than go behind the meter, we're trying to look at that interoperability between the utility system and the customer, and we have some work already underway. And Sally Muir, my colleague here from San Diego Gas & Electric,

raise your hand, Sally, she's managing that new project area. We're laying some groundwork, but we will need to follow through, try to. And it's basically taking a look at everything you have between your advanced distribution management system at the top level to operate your power system, down through some what we call subsystems, you're working toward a system of systems, with things like DRMS, Distributed Energy Resource Management Systems, DRMS without the "E", Demand Response Management System. And other intermediates below the top level Distribution Management System, and you get down to that need for that gateway between DRMS, if you will, or whatever is the last level before you go to the customer, you need the gateway between that level and the customer, and that is what this work is about, the work Sally has underway, and we will want to follow through on it and arrive at a standardized interoperability system that allows a customer to come and hook up and plug and play with the utility distribution management system seamlessly, which means all of that information is coming out through a set of standardized protocols. And what protocols? All

of that needs to be decided. And whether or not it should include partially using the AMI because ultimately what you want to do is going to be beyond the capability of AMI, but whether you want to use the AMI as a part of it, or just have a complete separate gateway, all those kinds of questions will be answered as a consequence of this work. So that's it. I don't think I have any more slides. And with that, I'm going to turn it back over to Suna, I believe.

MS. MOORE: Yes. Thank you very much, Frank, for providing an overview of SDG&E's EPIC 2 Investment Plan. Up next we have John Minnicucci who will lead a discussion of intellectual property issues from SCE's perspective.

MR. MINNICUCCI: Thank you, Amanda. So one of the things that I wanted to bring to everybody's attention is that there may be some intellectual property issues as we move forward with EPIC. SCE issued a Request for Information to a number of suppliers for engineering and technical services, and we've received some responses, and I wanted to make those a little more publicly available than we would typically

do, just in the interest of helping to further the program and hopefully get robust comments in the subject areas.

So with respect to the RFI, there were 16 business respondents and five university respondents. The concerns generally fell within three topic areas, the first was the treatment of preexisting intellectual property. If you're a business that has done much work to develop a product or a tool, and you bring that into an EPIC program, you know, what happens to your initial intellectual property? We believe that it would be you would maintain that and that would be the sensible thing, but the decision wasn't exactly clear on how to treat the preexisting intellectual property, as the vendors had identified.

The next one was the retaining and ability to use developed IP, so as part of this program a vendor would be working with the utility and potentially there could be a development in IP. If the vendor was to take that and then build a better product, then the utilities could use and deploy and meet our system needs, that would be of benefit to the

utility and our customers because we now have something that is usable and deployable, and has passed all of our tests. So we think that that might be something worth thinking about.

And then one that almost all of the respondents keyed in on was indemnity for the State of California. That is a tall order for a business to indemnify. Now, some of the comments, "Is this an indemnification for just the research results? Is it an indemnification for some of the data that comes about? Or is it an indemnification on somebody's use or misuse of the data?" There were questions and those are things that they would like us to address or at least resolve.

And then the next issues, SCE is very aggressively pursuing DOE funding. We believe it's very important for the state that we can leverage as much as we can of these limited dollars. Someone had pointed out in the CEC presentation that, you know, $120 million to $160 million really isn't a whole lot of money and you cannot do everything with that pot of money; the utilities' portion is a little smaller, and if you're going to be doing demonstrations,

demonstrations are typically expensive, so we want to leverage that. But there are issues with IP with respect to the Department of Energy, so one of the first issues that was noted was the DOE would receive copies of all the reports, deliverables, etc. etc., and they would have full rights to disseminate them. This is a California program, but if it's matched with federal funds, I think the leverage would warrant the ability to do that. The DOE also typically has unlimited rights in the data generated under the project, that's something that right now I think the CPUC is focused on those rights, and that's something we would have to resolve if we're going to leverage.

And then patent rights. The DOE has some fairly aggressive patent right restrictions. On our big projects that we received ARRA funding for, there was a patent waiver which allowed us to move more quickly -- I wouldn't say we moved quickly, there were a lot of challenges to getting those projects done, but the patent waiver allowed us to negotiate more effectively and to move more quickly. On the issue of patent rights, I think there will be a direct conflict

between that which the DOE wants and that which is currently in the decision.

And then the final item that was noted was equipment. If the DOE is cost matching for equipment, they would have an ownership right in that equipment, that's a standard term for any of the DOE arrangements.

So I guess what I'm asking for, at least from Southern California Edison's perspective, is if any of those in the audience, vendors or universities or others that are interested in participating, have any insight or have any comments to intellectual property that you please forward them to the websites which you'll see at the end. We'd like to discuss them and hopefully resolve any potential issues so that we can move forward effectively. Thank you.

MS. MOORE: Thank you very much, John. Up next, we have a joint IOU discussion regarding the EPIC Research, Development and Deployment Journey, and that will be led by Suna Taymaz of Pacific Gas & Electric Company.

MS. TAYMAZ: Thanks, Amanda. Next slide, please. So I'll kick it off, but colleagues, please feel free to jump in. We just thought

we'd share a little bit along what we traditionally call the RDD&D Journey, so Research, Development, Demonstration, and Deployment if we look at the CEC Portfolio, as well, it's the entire R&D spectrum. And so it really has been a journey for those that have been following and it's been four months since the decision was approved. We had three public forums, we've got another one at the end of this week, and so we've had discussions with academia, research institutions, etc., so we're moving. Many vendors have asked us, you know, where are the solicitations, and so we're moving them as fast as we can.

The feedback tells us that we're focused in the right areas, so far, and we look forward to hearing your comments, as well. There are a lot of various areas to pursue in the Energy space, but the feedback that we've heard is that we're focused on the right things to meet policy goals, grid challenges, emergent challenges.

A couple things just to highlight, you know, on our journey there's a quote there from Thomas Edison, "I've not failed, I've just found 10,000 ways that won't work." And so we really

are looking towards these demonstrations to provide us the learnings are important, in fact, invaluable, and in some cases knowing that something is not grid deployable, or does not meet cost benefits, that is also a success. A gentleman this morning mentioned it's not about an end product, it's about in many cases the codes and standards to support that technology, or that strategy, or that goal. So those are all very important as we start down this journey.

Also, you may sense that there are similar things that we're focused on, be it the three utilities, or the CEC, or other research institutions, and that's also by design. Innovation and R&D by nature, it's a community event, we don't innovate by having one person work on one thing and then someone else works on another in a bubble, it's all about bringing those ideas together and building upon each idea and moving it forward, and so we're not looking to sort of -- collaboration is a more important word than duplication in that case.

I'll also mention, so we're building our capabilities now since the Decision on November 14th, and so we're building the processes,

understanding what are some of those bottlenecks or roadblocks, and what our role is as the R&D groups within the various utilities. And so a couple of things, you know, we need strong governance, we also need portfolio flexibility, and so those things, and we're also in utility environments, and so innovation doesn't fit easily into that space, and so a couple of things we've come along with is there's some flexibility in our portfolio, it has to be managed as a portfolio, you've rebalanced your projects based on risk and return, and so that is something that we're actively adopting.

We found a key need to facilitate certain processes or almost like the internal expediter, so John mentioned IP issues, the things where we find we are, let's say, stepping in to help expedite our contract negotiations, ramping up projects, facilitating the external and internal exchange of information, and hence we've set up our various websites to help get that information flowing.

And then finally, the last bullet there, EPIC is really the beginning of the journey, and so demonstrating something in even a small-scale

pilot or lab, actually the beginning of the journey; there's a road after that, and that's what we're also focused on, and that road to deploy at grid scale in a safe, reliable, cost affordable manner also includes the change management, the customer adoption, the industry adoption, the regulation that goes along with it, and so those are all things that we're thinking of as we look towards grid challenges and meeting them.

MR. MINNICUCCI: Thank you, Suna. Those were great points. One of the things that it wasn't as evident in this presentation because we wanted to spend time talking about what our potential projects might look like, and to get some feedback on those, but there's been a tremendous amount of collaboration between the three utilities. It's not very often you see all three utilities with their logos on anything, and this is one area where we meet weekly, even in the down times, we're meeting every other week to coordinate, collaborate, discuss, and move this forward, so Suna brings up an excellent point, it really is about the collaboration and coordination of things, rather than just picking

one thing or another.

And, you know, if you look at the projects, there are flavors of each of the utility's projects that kind of touch on the other projects, and that's entirely intentional because we don't have all the answers at SCE -- I know that's shocking to those of you in the room, but we rely on a lot of other very very intelligent and bright people to pull this off. And when you think about, you know, how much money there really is, Edison's operating budget is right around $14 million per year. If you put that in a broader context, our Tehachapi Storage project is a $50 million project. Our Irvine Smart Grid demo is an $80 million project. Those are single projects. So, I'm just putting that into context. This is not a program that is going to solve everything, it's a program that through collaboration and coordination we're going to identify things, there are going to be some failures, but those are important learnings, as well.

MS. MOORE: Thank you very much for that discussion. Next we have the opportunity for stakeholders and public comment and questions, so

we will start here in the room. We ask that you fill out this blue card and include your name and affiliation on the card, and please bring a business card to me, as well, if you have any comments.

So the first comment we have is from Merwin Brown of Electric Grid Research. Please hit the --

MR. BROWN: -- with CIEE. A number of you are working on data collection and data analysis techniques. Another piece of all of this is that, with a deployment of the rooftop photovoltaic-type technologies and energy storage in a distributed fashion, the ability to model the load has become more and more difficult because it's hidden, if you will, behind sources, building sources. It sounded like, but no one actually said in any of your projects that you were looking at using data taken from customer behaviors to be able to either better model and predict what the load behavior is going to be under transient conditions, or, and even longer term projections, or actually measure it. So I was just curious if that is a problem that you're addressing in some of this research.

MR. GOODMAN: Thanks for raising that, Merwin. The short answer is yes and indeed one of the things that has come to light in discussions back in our shop is conservation voltage reduction practices were established way way back, and the nature of load has changed, and it's become more inductive, less resistive. But we don't really know what it is. So, yes, we plan to look not only at customer data as far as better understanding our loads, but also some of the measurements right in the circuits.

MR. JAWED: This is Farhaan Jawed with PG&E, and I would say the same is true for our company, as well. And if you think back to some of the slides that Suna went through, one of the areas we highlighted in blue, the first one under the Renewables and DR Integration, that referred to this exact phenomena, so you have increased DG, increased potential for storage, and what are the implications for load forecasting, particularly on the distribution side. So it is very much on our radar and part of the plan, if you will.

MR. HARALSON: Yeah, and from our perspective, too, it's not only on the plan, but

it's kind of right up front, as a matter of fact. And I apologize, you know, as we go through these example projects we've talked about, it's literally just examples, you know, you pick up five out of 21 projects, that kind of thing, and in reality there's a lot of modeling and things like that in these other projects, too, that address some of that. But it's a huge problem for the utilities. You know, it's kind of funny when you talk to the operations groups, you know, they're kind of used to the way things operate today, and when you tell them that, hey, you've got a lot of distributed generation out there, the first response is, "Well, that's not that big a deal." You go, "Well, no, you've got distributed generation that is hiding load that is out there, that you're not going to know about and it's not going to show up until you have a fault on the circuit." And then all of a sudden all the generation jumps ship, all the load shows up, and this is a whole lot more than you counted on before. So they're getting the idea, too, and realizing it, so it's absolutely an important piece.

MS. MOORE: Thank you. The next comment

is from Nehemiah Stone of Benningfield Group.

MR. STONE: Since you just introduced me, I won't introduce myself again. One of the ways of energy storage that we've had for the longest time has been our reservoirs, and there's a lot obviously, a lot of demand on water outside of just electricity. And if you covered it, I apologize, but I didn't see within what you were looking at how any research focused on balancing what the needs are - the other needs for water versus what we need to keep the grid functioning right. Is that part of the research that you're going to be doing, too? I'll take that for a no. You know, it came up to me when you were talking about how well you guys are all working together and that's great, but there's other utilities out there that are not generating electricity, but that are using the exact same resources as you are, and the constraints that like you were talking about the grid planners that were thinking about the past, I mean, there will be other constraints in the future on the use of water for generation that we've just barely seen the tip of the iceberg on.

MR. JAWED: Just a comment. The utility

portion of the EPIC program tends not to focus on the generation piece of it, so that might be part of the reason why we're not as focused. That said, water is obviously a significant problem for California, so as a theme it's certainly something to be aware of.

MS. MOORE: Thank you. Are there anymore comments or questions here in the room? Okay, at this time we would like to give people on the phone an opportunity to make a comment or ask a question. We ask that you use the raised hand function to ask your question.

MS. GONZALEZ: There's a question from Alvin White, who is a member of the public. The question is: "A question for all you utilities: if it were anticipated that the construction of new nuclear power plants in California was to be permitted in the future, would the utilities consider R&D in the area of nuclear power?"

MS. TAYMAZ: This is Suna from PG&E. So I guess I won't answer that question broadly, but I will say specifically the workshop today and our focus is on the EPIC Program, it's transmission, distribution, the integration of demand side management, so generation, be it

nuclear, hydro, traditional forms of generation isn't in the scope for our program.

MR. MINNICUCCI: Yeah, this is John Minnicucci, specifically we're not allowed to do generation research as part of the EPIC Programs.

MS. MOORE: Are there any more questions or comments online? Any more questions or comments in the room? Last call? Okay, great.

Written comments are due March 28th and the last slide provides the contact information for each of the utilities. Please submit your comments to the websites, the email addresses listed there on the page. Thank you all for participating in today's workshop. Have a good day.

(Whereupon, at 2:31 p.m., the workshop was adjourned.)

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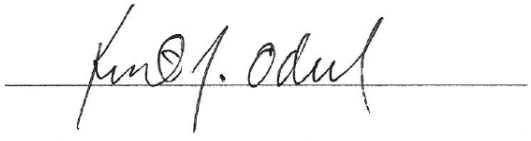
REPORTER'S CERTIFICATE

I do hereby certify that the testimony in the foregoing hearing was taken at the time and place therein stated; that the testimony of said witnesses were reported by me, a certified electronic court reporter and a disinterested person, and was under my supervision thereafter transcribed into typewriting.

And I further certify that I am not of counsel or attorney for either or any of the parties to said hearing nor in any way interested in the outcome of the cause named in said caption.

IN WITNESS WHEREOF, I have hereunto set my hand this 16th day of April 2014.



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I do hereby certify that the testimony in the foregoing hearing was taken at the time and place therein stated; that the testimony of said witnesses were transcribed by me, a certified transcriber and a disinterested person, and was under my supervision thereafter transcribed into typewriting.

And I further certify that I am not of counsel or attorney for either or any of the parties to said hearing nor in any way interested in the outcome of the cause named in said caption.

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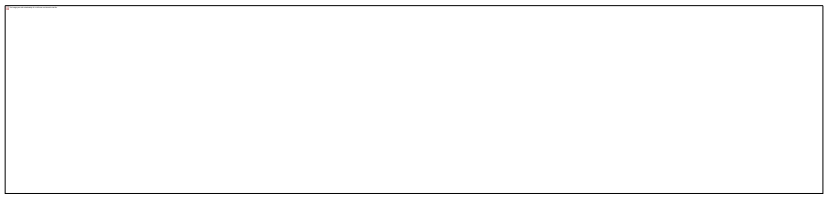

Karen Cutler
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