EFFICIENCY COMMITTEE WORKSHOP

BEFORE THE

CALIFORNIA ENERGY RESOURCES CONSERVATION

AND DEVELOPMENT COMMISSION

In the Matter of:	)	
	)	
2008 Rulemaking on Load Management Standards	)	Docket No. 08-DR-01
	)	
Implementation of Public Resources Code Section 25403.5	)	
	)	

CALIFORNIA ENERGY COMMISSION

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Gabriel Taylor

ALSO PRESENT

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Walt Johnson, California Independent System Operator

Richard Schomberg
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Eric Lightner (via teleconference)
Department of Energy

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San Diego Gas and Electric Company
GridWise Alliance

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P R O C E E D I N G S

10:07 a.m.

PRESIDING MEMBER PFANNENSTIEL: This is the Energy Commission Efficiency Committee workshop on the load management standards. This is the first of what will be five workshops on the general area of load management standards, as the Energy Commission, in collaboration with the Public Utilities Commission, works to make sure that we have in the state demand response measures that are effective and efficient, and in fact, meet both the needs of the customers and the needs of the systems.

I'm Jackie Pfannenstiel; I'm the Chair of the Energy Commission, and the Presiding Commissioner on the Efficiency Committee. To my right is Commissioner Rosenfeld, who is the Associate Member of the Efficiency Committee.

And we are honored to have with us today Commissioner Rachelle Chong from the Public Utilities Commission, who's been the lead Commissioner there on this effort.

To my immediate left is my Advisor, Tim Tutt. And to Commissioner Chong's left is her Advisor, Andy Schwartz --

MR. CAMPBELL: Campbell.

PRESIDING MEMBER PFANNENSTIEL: -- I'm sorry, Campbell. Too many Andys.

And I think that we have a pretty full day with some very interesting discussions of a smart grid. So, we're starting the consideration of the load management standards with the very big picture, which is the grid of the future.

And we'll have a number of presentations. And as I looked through the slides, I can assure you that every presenter has a different vision of what this grid of the future will be, although the visions are not necessarily contradictory, they emphasize different features of it.

There's a real urgency to addressing smart grids at this time as we take on the whole general question of demand response. The urgency is driven partly by the fact that the utilities are in the process of putting in advanced meters. And we want to make sure that those are going to connect with the future grid in a way that makes sense to the state's ratepayers.

There's also a public interest in making sure that the electric systems of California connect in the most efficient way. The Legislature's interested in this, and many public policymakers, from different perspectives.

So, we're asking you today, people in this room, to help us get it right. To make sure that we approach the systems correctly, efficiently and in a way that really prepares us for the needs of the 21st century in California.

And we will today be just gathering information and you're here to help inform us so that as we make decisions in the future we'll do so based on the best, most current information. So I appreciate people having taken the time to be here. I had a chance to look at the slides and they're very compelling, and I think very useful to our understanding.

So, with that, Commissioner Rosenfeld, do you have any opening comments?

ASSOCIATE MEMBER ROSENFELD: Just welcome, and I think it's going to be an interesting day.

PRESIDING MEMBER PFANNENSTIEL: Thank you. Commissioner Chong.

COMMISSIONER CHONG: Thank you. I really appreciate being invited here today by the

Energy Commission, and participating in this workshop. I'm very pleased that the Energy Commission is devoting today to discussing smart grid.

The merging of information technology, telecommunications and the electric grid is going to create some very interesting and exciting opportunities.

We've been pushing hard to increase energy efficiency, demand response and renewables in the state. But in many ways the state energy policies are leading to a more complex electric grid.

At one end of the grid we're seeing an expansion of intermittent renewable energy sources like wind and solar. These resources create certain challenges for the system operator.

At the other end we're seeing commercial and industrial customers putting in advanced energy management systems. Further, we'll soon be seeing residential customers using home area networks to enable smart appliances in their smart homes. With these changes, demand is becoming more and more dynamic.

While managing the grid is becoming more complicated, we need to make sure the system functions as efficiently as possible, especially because we do have to meet greenhouse gas goals; and we always are concerned about insuring system reliability. Perhaps a smarter electric grid will help us get there.

I think the Energy Commission can play an important role by helping develop a California smart grid. For example, we need a common definition of a smart grid. We need to develop milestones for the utilities and the industry to meet in order to make progress towards developing a smart grid.

So I think it's important that the establishment of an industry-generated standard will promote interoperability so that new products and services can be smoothly incorporated into a smart grid. We don't want another VHS or Beta-type situation, do we?

Interoperability standards that are followed within California, perhaps later spreading across the country, can prevent customer confusion and could lower costs for devices and services for consumers.

As we discuss advancing the smart grid

in California, it's important, though, to keep in mind very aggressive schedules for the utilities' advanced metering projects. Advanced metering will enable the state to significantly expand energy efficiency and demand response. It is important that the smart grid initiatives build upon and do not delay advanced metering.

There's recently been a flurry of activity throughout the country on the smart grid. But I wanted to make sure everybody was aware of one particular initiative. The National Association of Regulatory Utility Commissioners, otherwise known as NARUC, and the Federal Energy Regulatory Commission has established a new smart grid collaborative. And I've been honored by being asked to serve on this FERC/NARUC collaborative, along with 15 other state commissioners.

I expect we will be looking at issues around standards development and interoperability, also on a national basis.

California is a leader in this area, particularly due to our efforts around advanced metering. So I will be recruiting, I hope, some of the people around this room to contribute to our discussions at NARUC. The meeting is scheduled for the middle of July up in Portland, a lovely scenic area. So, I'm sure you'd all be happy to come.

The first meeting -- do we have an exact date for that, Andy? Didn't we look that up? I think it's maybe the 21st, something like that. But I do look forward to hearing from today's presenters and learning as much as I can about it.

Thank you.

PRESIDING MEMBER PFANNENSTIEL: Thank you, Commissioner Chong.

I think at this point I'm going to turn it over to David Hungerford, who will walk us through the agenda. And then I think hand it off to Mike Gravely to begin. David.

MR. HUNGERFORD: Thank you, Commissioner Pfannenstiel. Welcome to everyone, thank you for coming, and thank you for those of you who are going to be presenting for putting together your presentations for us today.

ASSOCIATE MEMBER ROSENFELD: David, I don't think your mike's on.

MR. HUNGERFORD: It is, I'm just typically a little bit too far from it.

There are a few housekeeping items. If you're not familiar with the building, there are restrooms just on the other side of those glass panels. And you can get to them by going out either of the exits in the back of the room. One to my right, which you probably came in; and then there's another one on the other end of that glass panel.

And in case of a fire alarm or an emergency, those are the exits you would leave from. The doors out to the outside right over here behind this panel are alarmed, so you shouldn't go out them under normal circumstances, but certainly in an emergency that's what you would do.

There's also a snack bar up the central stairs off the patio under an awning that you can use if you need.

And if there's an evacuation we will meet at the park across the street.

Let me change this so that you can see the agenda, the order of things on the agenda. We're going to first go through an overview, look at the national overview of the smart grid issues. Move to a national perspective. Get some perspectives from the Independent System Operator. And look at what's going on internationally.

And then we'll have discussions from the investor-owned and publicly owned utilities. And at the end of the day there will be public comment.

We ask that you reserve major comments or major questions for the public comment section at the end of the day. However, we do have enough time in the agenda today for specific clarifying questions to the presenters. And so if we could keep those questions to narrow questions specifically about that presentation, and leave more broad discussions for the end of the day.

And many of you have your green visitor tags. At the table where you picked up those tags there is a sign-in sheet which will be the basis for the mailing list for this docket. And so if you have not already added your name to that list with your email address and your other information, please do so before you leave today.

All right, just a brief background on what we're doing here today and what this load management standards proceeding is about.

The Commission opened an order

instituting investigation and an order instituting rulemaking the first part of this year. And its purpose is to assess which rates, tariffs, equipment, software and protocols and other measures would be most effective in achieving demand response; and two, to adopt regulations and take other appropriate actions to achieve a responsive electricity market.

The purpose of this proceeding is to gain public input on the possible formation of new load management standards. We want to also explore the potential peak load reduction and load shifting strategies. And we want to coordinate with other regulators in the state, the Public Utilities Commission and with the Independent System Operator, and with the other utilities on trying to work together to make this work seamlessly and effectively.

The workshop schedule is rather aggressive. We're meeting today on smart grid. And comments will be due from the public on May 6th, written comments on this workshop.

On May 27th there will be a workshop on advanced metering infrastructure. On June 10th there will be a workshop on rate design, incentives and market integration.

On June 19th we will take up the topic of enabling technologies and communication systems. On July 10th we'll be working on customer education and needs.

And following those workshops there will be a staff report developed that makes recommendations for the development of load management standards. And we will develop a more specific schedule on that process for the adoption of specific standards that come from this process at that time.

The objectives of today's workshop are to discuss the current smart grid technologies and initiatives; understand smart grid plans of the California utilities; and to obtain public input.

And with that I'm going to pass it over to Mike Gravely who has our first presentation. Thanks, Mike.

MR. GRAVELY: Good morning. I am Mike Gravely from the Energy Commission's R&D division. Particularly, I am the Office Manager for the energy systems research office.

I'm checking my computer here because one of our speakers, Mr. Eric Lightner from the

Department of Energy, is actually going to participate through WebEx for us. We have a little bit of a technical challenge here, but he wasn't able to make it, but he did want to provide for us the national view.

So we're going to work out the deal, so it may take a second to get him online after my presentation. We may defer his one or two if we have some problems. He's coming in from the east coast, so even though he wasn't able to make it, he wanted to be able to provide us that view of the world.

Also, just a quick update to cover here, is in addition to this particular workshop, which is focusing quite a bit on the technology that we've done some research on, there's also the enabling technology one where there'll be a considerable amount of information on advanced research efforts that we're doing here at the Commission.

And also just a quick review, again, that when we arranged the speakers today, we tried to have everybody talk about what they're doing today and what they see in the future. So there will be some duplication, but I don't think there's a lot. Plus I think different perspectives, as we said.

So, one of the things that came to our attention in the research office is I have the fortunate ability of being involved with the whole perspective, transmission, distribution, renewable integration, energy storage, demand response and those types of technologies in the PIER, Public Interest Energy Research, area.

And we actually began to recognize smart grid coming out a lot in different areas, and different programs were calling themselves smart. And my analogy was smart was becoming the new green, where if it touched the grid it had to be smart or it wasn't sexy, so they would change it. But all of them, I don't think, met that definition.

But what we did find out was there's a lot of activity going on. There's a lot of technologies coming. And a real potential for us to go in many directions with that.

So, we actually initiated a Public Interest Energy Research program project to actually assess what is the current state of smart grid; who are all the players. This report has been completed and it's in the publishing process. So at the end -- and also you have my information here -- if you want a copy of it, it will be posted. But if you send me an email we'll send it out as soon as it's available. We expect it to be published within the next 30 to 45 days, if not sooner, with all this research.

So, one of the things we looked at, our case, was what are the new and emerging technologies that are impacting the smart grid of the future. How can we avoid legacy or incompatible systems. We don't want to get into today if you have a laptop that will read a CD which not too long ago was a great deal. But now if you put a DVD in there it doesn't work.

And so we just looked at those concepts and where is the right way to interface. If you have a system that reads it and you plug it into your laptop it works fine, so you can use any of those devices on a laptop. But you don't have to have a particular one. So we want to look at that approach to the world as to where are the interfaces that are critical so that many customers in California and the nation can benefit from many technologies and not be limited by a particular technology.

So, fostering open competition and commercial growth is an area we have to think a little bit about. I don't think it's going to be natural because there are different speeds of things. And normally the first one out the door is not the one that you end up with. But it gives you a lot of ideas.

And also being in the government there's some cases where government can help. And we had a large workshop on the 13th of March and we asked those kind of questions to over 100 attendees from all over the industry and the nation. It was how can we help the process and where should we stay out. Sometimes the government tries to help and it makes it more cumbersome. So we asked those questions and addressed those issues.

And a question in my office in particular, we work infrastructure resource. So we're trying to find some of the short-term, mid-term and long-term smart grid infrastructure issues so we can address those in the appropriate level of research.

So, just for quick discussion of what is smart grid. You will hear later today from the

Department of Energy, but there was the Energy Independent and Security Act of 2007 specifically addresses smart grid, and specifically addresses these elements. I'm not going to cover them all in detail, but it's a broad definition.

But even this definition has lots of ways to be implemented. So I think everybody's beginning to realize this, and everybody's moving in the right direction, but we just haven't come up with a comprehensive definition that everybody can agree with yet.

From our research that we did one way of showing this analogy was discussed by Commissioner Chong, also, is the fact that we're merging the electrical infrastructure from markets to control to generation to transmission to distribution to the end customer into an intelligent communications infrastructure, which includes landlines and cellphones communications, new technologies, everything from large operating systems down to the individual consumer.

And so when you look at that, the smart grid of the future, the two of them begin to merge. And when you look at things like renewables and plug-in hybrid vehicles and different technologies, they have to all work together cohesively as a system if we're going to reap the benefits we want in the future.

And it's pretty fair to assume that that won't happen by accident. It'll have to happen by direction.

I think it's also important to understand from the research that we've done why smart grid is important, why are we here and why are we pursuing this.

I think, one, is it has the potential of significantly improving our grid reliability. The amount of time -- the number of outages we have, shorten the amount of outages, and smarter decisions to understand how to recover, how fast and those types of things.

More options for grid reliability. More generation, more end-use options to keep that system. So we want, everyone dislikes the system down, and so we want to be able to find ways to keep our system working.

We want cleaner, lower greenhouse gases; we want lower costs; we want more efficiency. And so what happens is if you have new technologies and you look at the merging of the two systems, you have one, the ability to use the existing systems better. In other words, using your assets more efficiently, more productively at a higher efficiency factor. And you have the ability to add new technologies, new options. Whether it's distributed resources, whether it's renewables, however it may be, you have the ability to do that. And we have the ability to integrate more preferred options.

Utilization rate here in California is interesting because we have great peaking demands in the summer and very low demands in the evening and in the winter. So that's not necessarily one. And using technology and using smart grid, we believe, in the future, will allow us to level out that high-peak -- reduce the peak and raise the lower part to where we get much more efficient use out of our systems, and a much lower cost.

Also, the consumer, it's very important, as we mentioned earlier, home area networks are becoming a very popular element now. People -- entertainment systems, plug-in hybrids, renewables in your home. Your home's becoming net energy zero, or net energy positive producing homes. These are things people in California certainly are interested in, and people in the nation are interested in.

Dynamic rates allow customers to take the benefit of saving money when rates are high, and using energy when rates are low. And those types of technologies allow them to do that. It especially provides us a much easier way to do the demand side management.

We also learned in our research that a smart grid for California is not necessarily the same as a smart grid for other states. California has some very unique policies and unique activities that we think, and unique circumstances, we think, for us, different desire for what the smart grid in California should be.

If you look at some of our defined policy, whether it's greenhouse gases, whether it's efficiency, to include efficiency reductions and net zero energy homes and buildings, the use of demand response for load side management, the increased use of renewables, all these policy directives have impact on the grid. And all of those things are desires that California has been clear that they want to go to.

And we want to do this by not reducing

our grid reliability, by not substantially increasing our costs, hopefully reducing our costs, and ending up with a system in the future that's better than we have today.

Also, we mentioned there's a, I'll call it the train has left the station in California. We're deploying advanced metering infrastructure meters in the three investor-owned utilities. You'll hear today from public utilities. So, I'll defer the specific questions here later, other than you'll hear from each of the utilities that speak today.

The point is that we are moving forward with this, and we want to be sure the two merge as opposed to two running into a block wall. So, the timing is critical for us to address this now, as opposed to waiting two or three years and then addressing it.

So we look at California versus other states. It's important to say that our energy policy and our activities are very defined and important to address. California has been an area of growth and we envision continuing to be an area of growth. And California has very unique energy use profiles. And so we think for all those things we have to include those factors in the smart grid of the future as we operate.

We did have some discussions at our large workshop about research in California and Energy Commission research, in general, and Public Interest Energy Research. And that was what can we do in the future to help.

And a clear -- and we'll hear this a lot today, I think -- a clear effort was defining smart grid in enough detail for people to understand how to go forward. And so one of the areas where PIER, in the past, has been very successful and the Commissions have been, is bringing people together and joining consensus. It's not unlikely to say that it'll come natural.

So, resolving the issues and coming up with a unified approach, developing a coordinated, integrated definition that is in sufficient detail to provide the guidance we need, but not in so much detail that it limits new technologies and new answers.

It also is conducive to where the utilities are able to operate within their desires, but they're also able to operate in an environment where the state gets the needs it has.

The other area that we've had -- and so we left that meeting with a clear understanding. And we're actually continuing research in this area, so we're continuing to do more research in the area of helping California define what smart grid is. And so we envision going to our Commission for approval of future resource to help that area, to specifically look at defining what smart grid is for California.

The second area that we've learned a lot is that we can help sponsor and bring together demonstrations. For example, we've been doing some work and are doing some work with the utilities in California on microgrids. And microgrids can be, in this case, perceived like a small smart grid.

So you can look at different elements of smart grids, whether it becomes an interface of an AMI with the system, how do you use renewables, how do you use distributed generation, how do you integrate these different pieces. Smart grids allow us to take small chunks and work out these different regulations and interface documents at a smaller level and a more controlled level so that when it expands to a bigger level we'll get what we want, as opposed to running into problems.

There's other things like distribution automation and new technologies that are there, open architecture. So, the other thing that came out of here was for us to take a serious look at demonstrations where we can bring parties together and sponsor demonstrations.

We typically like to have heavily co-funded projects, so we don't like to fund the whole project because we want the customer, other people to have buy-in. But what happens is sometimes our piece of the pie is enough to bring everybody together. So we envision continuing to do that. But we don't really envision a lot of research where we will fund the whole thing, because then the people that are doing it, we're looking to bring people together as opposed to just push a particular solution.

Just an example right here for purposes of illustration. As we mentioned in the definition, one element of the definition will have to be communications or regulations, controls, standards or reference designs, however you want to talk about it.

So, we used this analogy in one of our

technical workshops where you talk about a meter and there's certain data coming from the meter. And you want to transmit that data. And the object is not to have 15 different protocols that you have to pick one of 15. But the final way data can be communicated, not prohibit competition, but at the same time limit what we do.

So we come up, for example, with the data package where we define the addressable and what's in the data. So it's like an envelope. We define how you address it; we define some basic bounds of what's in the envelope. And we leave the rest to the industry and the utilities and other players. But it gives us a standard package and then we know how to communicate.

So, what you end up with is the ability to have different solutions at the meter side, for example, different ways of communicating, whether it's wireless or wired or fiberoptics; and it all come together with a useful document at the end, as opposed to having three parallel lines where you have all the same information, but they can't share.

The object here in smart grid is to

communicate together and jointly share information. So part of the smart grid definition, as we go forward, has got to identify these areas of where we think this commonality needs to be. And then define what those are.

And, again, that gets to a situation where we also have that fine line of being specific enough to help, but not so specific that we would eliminate, for example, the bottom two options. That's a challenge that we see going forward, and that's a challenge that we see addressing in the research area, as well as working with the utilities further.

So, again, this is my contact information. Those of you who are interested in seeing the final report, we'll make it available as soon as possible. And feel free to contact me direct if it's not posted on the web; or my project manager here, Dave Michel, and we'll be glad to answer any questions from there.

Commissioner.

PRESIDING MEMBER PFANNENSTIEL: Thanks, Mike. No questions. Rachelle, Art? Thank you.

MR. GRAVELY: We'll see if Eric is online; if not, we'll just skip him and go to the next.

Okay, he hasn't logged on, so why don't we go ahead and go to the next. Fortunately we have a backup. If Eric doesn't, we'll have someone else speak for him.

(Pause.)

MR. JOHNSON: Good morning, Commissioners, and thank you for having us from the ISO on your agenda today. My name is Walt Johnson. I am with the California ISO. My title is Principal for Technology Strategies. What you have in front of you is a technologist, and I work in the IT department. So my interest in this, to the point Mike made in his presentation about the merger of the electrical grid with the information technology end of things, I approach it from, I think, the less common side, which is the information technology side.

But I've been involved in the California ISO's demand response work and some of the other areas of smart grid work for the last couple of years. And I drew the straw for being up here today.

My intention today is to address the question of what the smart grid can mean for the

ISO. But at the same time, present, I think, a bit of a challenge in terms of the scope and breadth of what a smart grid might represent. With that I'll proceed and we'll see where the questions lie.

As Mike mentioned, and as we've heard before, the question of just what a smart grid is, is still somewhat up in the air. And we're all, I think, pulling from a variety of sources. I don't go -- our national perspective because they seem to be owners of a list of adjectives that describe a smart grid. And the attitude seems to be, for the most part, that the smart grid is characterized by its behaviors not by what it's made out of, not by how it's constructed.

But if you look through the list, and whether the list that Mike had, or the list that I've presented here, I think that what it really comes down to is that an awful lot of the technology we're talking about is simply about better measurement and better communication.

I think that in the first round of the smart grid, at least, that's going to be the focus. I think it's a little bit longer term vision to look at actual intelligence in the grid, itself.

For example, I think a grid that is, for instance, self healing, something beyond the level of reclosers or something that we currently have, would be interesting, but would it be sufficient adaptive to be able to redispatch generation in the event of an outage. I don't think that's in the current vision of the near term, for example.

We talk about the system being interactive with consumers. Are we talking about interactivity on the level of a day-ahead price, or peak-day call? Or are we talking about being able to provide four-second AGC from plug-in hybrid vehicles? It has significant impact on the structure of the communications that are put in place, which of those two you're trying to target.

The system is described as being optimized. Once again, I don't expect the system to be redeploying assets. It's going to be collecting information, recording that information in a much more granular fashion and more quickly. But the actual optimization is it's still going to likely involve some kind of central control, or at least regional control, that makes decisions about how best to redeploy the assets.

So, those are just some of the aspects. I'm not going to go through all of these. But those are some of the aspects that I think where the danger of a definition of the smart grid in terms of these kinds of adjectives is that it is in the eye of the beholder. It's in the eye of the user just how far you push the meaning of each of these.

Among the things that from my perspective, and there's a little bit of personal stuff in this, the smart grid is not -- it's really not very smart. And I'm comparing that to my experience with such things as the internet or computer networks and things like that.

In its early versions the smart grid, as I understand it, is primarily, like I said, a much higher speed data collection device. Whether it's collecting much more granular information from smart meters down to individual load points; whether it's getting much more granular time data from synchrophasers throughout the network, it's still collecting information.

Now, relative to where we are today that's a lot smarter. But relative to where we could be with distributed intelligence, with intelligent agents, with automated adjustment of line ratings on the fly, perhaps other adjustments of the demand or generation portfolio on the fly, independent of a central operations group, I think we've got a long, long way that we could be going toward.

As I mentioned, the grid is maybe self healing in the sense that it can attempt to route around some problems. Of course, the electronics, unlike a computer network where intelligence has to be built in to cause the rerouting to occur, in the electric grid physics takes care of that for us. The electrons go where they're going to go.

But the grid, itself, inherently, as the smart grid is seen, is not really self-operating or self-dispatching in any near-term kind of vision.

Again, I mentioned the question of optimization and control structures, and control algorithms that will be needed are going to be, I think for a long time are going to be done outside of the scope of the grid, itself.

And taking a longer term view, most of the folks of the smart grid activities are around near-term operational events. Identifying quickly outages when they occur, that sort of thing, doesn't really speak to the planning side of things, the longer term intelligence. What do we do with this information about how the grid is evolving, or how it should evolve, and what an optimal evolution path might be.

So, from the ISO's perspective, looking at the end to end holistic view of things, and I'll speak more to that in a moment, we think that the smart grid, while it provides a lot of information that will be useful, still leaves a lot to be done in a longer term timeframe.

And I would remind people, and I think in this room it's maybe unnecessary, but looking at how much press there is around this, there's a lot more to the smart grid, at least as we see it, its value for the system operator than just in the AMI investment. But that's a start.

In terms of the role of the ISO, and in terms of the focus that much of the smart grid technology has had on the distribution side of the grid, I want to elevate the discussion for a moment and speak to the end-to-end energy supply chain.

If we look at that in terms of

traditional supply chain management the objective is to reduce the end-to-end variability that you experience in the delivery of a product. In this case electricity to the consumer. And at the same time you want to streamline that, reduce costs, improve the efficiency and the productivity, or the productivity of that process.

For electric power we've historically been at the mercy of the demand comes from the point of use, the requirements for reliability, for amount of power delivered and all that, are set by the end-use consumer, historically. Demand response is trying to address some of that.

But in reality, in today's system it's a combination of both what the demand requests, in essence, and what the system transmission operator is able to provide. We are in the middle, we're the balancing authority, that's why we have this responsibility. Someone has to do that.

For load-serving entities their focus is clearly on distribution level grid reliaBility and on providing the best service they can to their customers through all sorts of conditions.

From the ISO's perspective, we're a little more focused typically on the upstream wholesale markets. But at the same time we can't be oblivious to the downstream demands that are emanating from the load-serving entities.

It puts the ISO in a Janus-like two-headed kind of position looking in both directions, what I would call upstream and downstream here, trying to optimize this end-to-end process.

So, for us, if the smart grid is going to have significant value it needs to help us in this end-to-end integrated sort of fashion, and manage this system throughout that entire delivery cycle throughout the entire supply chain.

In today's system reliability is actually a two-tiered function, the LSE providing responsibilities at the distribution level, while the ISO focuses on the larger network.

We're focusing on somewhat different sorts of things. We have been focused most recently by some recent compliance rulings and things that focuses us very much on meeting national reliability standards. That's our goal.

Your goal, or the goal of the distribution grids is much more on the customer service and service that you're providing to the end users. It's a somewhat different kind of thing. It's a different set of objectives.

We have to somehow bring those two together. And to the extent that we can meet both those objectives through a more robust and a smarter grid, we'll all be better off.

There are three issues that I think come up when we think about how the smart grid then can work for us. One is the matter of information integration. As the central point through which most all the information about the performance of the grid on both the supply and demand side flows, the ISO is right in the middle of this information integration role.

And to the extent that better information is available through the smart grid technologies that will be deployed and through the information that will be available through that, that's going to be a help for us.

Because, as I mentioned, also we have to deal with this planning and forecasting kind of activity, we all do at different levels of the grid. To the extent that the information is provided and collected by the new technologies that are deployed in the smart grid, give us better data for that purpose; finer granularity, more accurate data, better shapes of curves and things, we should be better off in that area.

And, of course, we also have to be aware of the deployment of new technologies. Here I mean new energy technologies. Most of those are going into the distribution side of the grid, and I'm referring to, you know, distributed resources of various sorts. Whether it's a demand resource, or whether it's a distributed renewable storage, things like that. A lot of that is, we believe, going to show up in the distribution side below the visibility traditionally of the transmission grid that the ISO is working with.

Let me illustrate here the integration. This is a high-level summary of the integration of the various information flows that are involved in the end-to-end energy supply chain; from the generation side on the left, through the ISO's domain and transmission, through the distribution grid, and finally to the end-use customer.

All of these different information sources and systems will need to be pulled together. There will be advantages to the extent that we can pull these together and produce a more holistic picture of the end-to-end electricity supply chain. Putting more intelligence into the system at any point is going to be an improvement and something that we would heartily endorse.

I think it's going to be critical to optimally managing or approaching some optimal management of these new distributed resources in particular. That is a domain that we're going to need to do. As more resources shift from the central locations that we currently see in traditional central generating stations, and move out into the distribution grid, integration across this chain is going to be very important.

We think there will be other technologies that are going to be interesting. I just mentioned the fact that as the volume shifts that's going to be an important thing for us. We're still looking, in fact, for some forecasts of the rate with which that shift might be occurring.

To the extent that resources move into the distribution grid and out of the traditional management domain of the ISO, while we remain the balancing authority, could be an interesting challenge for us without sufficient integration of systems and information.

So, as we look toward the future, and as we see this gradual evolution in the source of power, I think we're going to see more need for us, as an industry, to manage the planning process around the end-to-end system so that we can all understand better what the impacts are going to be. And I think the smart grid will be a step in that direction.

Last week the ISO RTO Council hosted a technical conference in Washington, D.C. on the subject of lowering barriers to entry for small demand resources. The next couple of slides which I've taken from that presentation help, I think, focus the value that we see in the smart grid in terms of enabling some of these distributed resources.

We characterized the demand resource functions into four categories shown on the left. I'm not going to repeat the material from that presentation in general, but I wanted to indicate that the ISO RTO, for a variety of these kinds of programs, would like to have control and response signals provided all the way down to some reasonable level of granularity of resource.

Carrying that over the communication overlay, that is the part of the smart grid that we're looking at, can be a significant advantage to us.

For example, in the current world the ISO, the System Operator, exchanges information with dispatchable resources; there are a variety of types. Offers come from the resource. We control the resource. We've got telemetry feedback from the resource. And then ultimately there's some kind of a meter reading that occurs that's for the settlement process.

As we reach down into the distribution grid, we lose this kind of visibility. We don't have this type of telemetry except with the largest resources in the state, whether they're the generators or the large participating loads.

Instead we have some kind of an intermediary here. I've indicated aggregator here, but this could be an IOU, it could be someone else, anyone who has a set of smaller resources. And, again, demand resources are indicated here, but it could be distributed forms of renewable generation or other sorts of things.

From the ISO RTO perspective we'd like

to have the same kind of information flow, but we know that we can't reach all the way down to those small resources. If we're designing something, as I said, that tries to get an AGC signal, or even a ten-minute signal for ancillary services down to those resources, the AMI infrastructure designed for a once-a-day meter read is probably not going to have the bandwidth and wherewithal to provide that information.

Will that mean that we should have some kind of an overlaid system in addition to that? Should we look at building up the capability of those systems? Someone mentioned the problem of betamax and VHS. We can think of blue-ray and the DVD formats and things. Do we need to keep building parallel systems? Mike alluded to this.

Would parallel communication paths make sense, or should we look at trying to actually reduce that number and carry more different kinds of information over a small set of -- a smaller infrastructure?

These are important questions in terms of the cost and in terms of the ultimate value of the information exchanges that are being made at this level of the grid.

So, in conclusion, from our perspective, the smart grid is a beginning. It's a good beginning, but it is just a beginning. In order to be ultimately valuable to the system as we perceive it, an end-to-end view of the supply chain is going to be critical to maximizing both the return on the investment on smart grid, as well as maximizing the efficiency and ultimately consumer satisfaction with the electrical system.

There are other opportunities as we look beyond some of the initial smart grid initiatives to take this to another level. And here I'm thinking about terms, things like intelligent agents in substations. I know there's some work being done. We have some folks here who are involved in some research in that area.

Putting real intelligence into the grid. As I say, right now providing more and better information is certainly a good start. But until we can start to decentralize and actually distribute intelligence and action that we trust into autonomous devices in the grid, which is the same kind of direction that computer networks and what's called utility computing is happening, same kind of a thing, automatic optimization and deployment of assets to meet the need in real time. That's where we'd like to head.

That's a big, big order. And it has a lot of currently unsolved issues, I think, associated with it. But it will keep us moving toward a smarter grid for a long time to come.

With that, I think I will conclude, simply saying that with that vision I believe that we can achieve an outcome for the state that will allow us to meet our energy efficiency goals and our energy policy goals of integrating more and more demand response, renewables, storage, et cetera, et cetera, whatever's coming in the future, all under an integrated smart grid that will be a benefit to all of us.

Thank you, Commissioners.

PRESIDING MEMBER PFANNENSTIEL: Thank you, Mr. Johnson. Questions? No. Thank you very much.

MR. JOHNSON: You're welcome.

(Pause.)

MR. TAYLOR: Looks like Eric's not online yet, so I'd like to introduce Richard Schomberg from EDF.

MR. SCHOMBERG: Thank you. I will speak

today with different hats. Well, first, I am responsible for R&D activities of my company, which is Electricitie de France. I am a Gridwise Architecture Council Member, the USDOE organization. And I am IC Chair President Elect of the Technical Committee developing standards on system aspects for energy development.

Today actually 20 minutes, 25 minutes, it's very difficult to choose what take-away you want to make. And purposely I will try to stay away from technical aspects of technology.

Here is the outline of the presentation. I will go very quickly around the world, make a few comments. What about smart grid around the world. I will stop in Europe, before, and zooming, in France I can give a bit more flavor. But the main points of the presentation is really outlining common challenges to actually may happen smart grid. And I will conclude with four different keys that I guess are the keys to succeed. And those are common keys. And we can do things around those keys.

Okay, so now going around the world, while I still don't know at what time of the day this picture has been taken, but okay, I will --

(Laughter.)

MR. SCHOMBERG: -- I will just use it as a background to show that, of course, it's no surprise that it's in the area where you see the most energy intensity that you see the most smart grid discussions or activities almost.

Because if you look at Japan, we don't see much people discussing about this. But they are doing a lot of things. And I will make at the end a specific comment on why, in my view, they don't speak that much about smart grid.

And the surprise could be in Korea where you don't see much light here on this picture, but they have a compelling plan and investing a lot on what they call information technology for energy. And I'm not going to tell much more now because I'm going there next month. So after the visit I could certainly tell you more.

The different part of the world have different drivers. Definitely the U.S., smart grid started with the reliability issues, and that was end of 2001. And I think EPRI at that time was a precursor starting discussions and doing for several years the heavy lifting until really the smart grid trend exploded. And that was something around 05.

In Europe smart grid discussions have been starting for different drivers, which have been from the very beginning, actually, the integration and penetration of distributed generation and high level of renewables.

And it's interesting to see that now progressively in Europe we are considering that smart grid would do good also for reliability, because we have had very interesting blackouts. And one of the most recent was actually due to some renewable generation in Germany that even that had impact down in Spain.

And now in the U.S., even if discussion started with reliability, now we hear a lot about renewables and enabling actually energy efficiency.

So, I can see different drivers that started actually smart grids in different part of the world, but different part of the world are looking for the same type of solutions. And now even the drivers are converging.

Looking at what's going on in Europe, Europe has been setting up the smart grid platform as two years ago, to just brainstorm about what the European Commission could do and fund as projects on smart grids.

And it's interesting to see that on this slide, it's an extract of the presentation at the European Commission, the European Commission has been just re-using the intelligrid vision, which actually doesn't mean that there is one and only one vision, and the winning vision.

But, as has been mentioned already this morning, there are different visions. But there is a lot of consistency between the visions. The visions can be through different angles, but now we see that there is a real consistency, whatever vision, whatever label the people are using.

And I'm not going to comment again, but this slide looks very much like the one that has just been presented before by Cal-ISO.

Now, this slide is interesting because it showed the rational and what is expected in Europe on actually implementing smart grids. Now, on the first bar graph here you have, well, I'm not sure you can see it from far in the distance. So I would say you have central generation and on top of that today, a bit of distributed generation and renewables.

Now, if we do nothing specific we're going to augment the central generation, we're going to augment renewable generation, and we are going to expand and add a lot of systems, new systems and new -- systems to control all that.

Now, moving to so-called smart grid should allow to have distributed control over the entire chain, which finally, for the same needs, would need less central generation, which means maybe more efficiency and less CO_2; and also allow a large part of renewables. So it's a conceptual graph that the key point here is to see the merging and integration even of transmission and distribution somehow, and not keeping them in silos.

And the European Union has issued a request for a proposal last year. And contracts will be awarded shortly for $3.6 billion over the 2008/2013 period. And those projects will be in the categories I'm showing now on the screen, which is mainly having more interactive distribution networks, and even what is called active networks. It's not just passive devices or passive part of the grid, but the grid is -- well, you inject power actually in those part of the grid. It was not designed for that at the very beginning.

And, of course, most of the challenge here are developing control strategies and appropriate architectures to be able to do that.

Now, the real technical challenge that everyone has is to be able to model and simulate state estimation and behavior of the grid. And here, this is where maybe there is still a scientific and technical challenge. Even in modeling techniques. Because the key is to be able to have a very high granularity knowledge of a lot of information, but using actually a few measurements, which means that then the systems has to calculate what you cannot measure, because you cannot have measures everywhere.

And for transmission this has been mastered already. We can still do some improvements, but on distribution nothing really exists or you stop and find some products, but this is where a major technical challenge relies. And that's worldwide.

Modeling and simulation of state estimation on the electrical point of view, state estimation which is current voltage and then reactive aspects of the current voltage everywhere in your circuit. And when you have this actually you augment the observation points that you have. And, of course, if you have more observation points and that they are more reliable, then you can think about adding intelligence using this.

Okay, so this is really distribution oriented; this is really how to augment observability. And a key goal actually is the asset management. In Europe the people wants to make the most of existing assets. And actually augment the lifespan. And using more observable, more information, more observable points to be able even to anticipate and actually increase the performance of operations and extend the life of the equipment.

And the last point on which projects are going to be funded is really storage, the storage -- technologies that may actually make a huge difference for small networks. So, in a nutshell, here are just the areas on which some technical work is going to be performed.

And now in France, just at a glance, to give an idea of the territory we are dealing with, our distribution network is for more than 300 terawatt hour per year, and we serve more than 30 million customers. We have more than 2000 high voltage, primary substations. And more than 700,000 medium/low voltage secondary substations.

Now, what is EDF doing? Actually, as I said, I don't want to answer in the technical detail of the projects. And mainly what we're doing is represented by the stars on the right side of the slide. And I start from the bottom.

We want to augment what we can observe, observe actually the entire infrastructure. And we want to control a bit more those infrastructure. We want to optimize the operations and ultimately we want to be able to anticipate. And this is really where the intelligence can bring most of the value.

Because as it was mentioned earlier, we don't know yet if we can completely rely on machines to make decisions on how to operate the grid. But you can actually get suggestions -- suggested by machines a lot of things. So you can help the operator, okay. And so somehow you can optimize.

But the real value of the intelligence is where we can anticipate. Where you can actually simulate faster than real time on any situation; you can assess data very quickly. And then you can simulate, from that set of data, what is going on. And even try to simulate scenarios, actions of the operator.

And you do that so quickly with computers that nothing happened yet. But the computer has been able to test maybe ten scenarios. And the computer is able to display to the operators maybe one, two or three pathways recommended; things that the operator might not have figured out.

And, of course, you can even, if you're confident and closed loop, and even let the system operate, but this is where I think worldwide -- while it's not yet there, but that's the ultimate.

And what we're doing, actually the blue boxes on the left side of the slides are some projects listed. And at the very bottom I listed the AMI project, an energy box project for the unregulated business part of the company. But definitely smart grid is much more than this.

We have a collection of projects going on. And even each box is a huge box with a lot of technical activities and a lot of stakeholders.

But smart grid is not just a collection of pockets. Because we have been running projects like this for a long time already. And not just EDF, many companies have been running projects like this.

So, why calling something smart grid now? Why didn't we call that smart grid earlier? What is new calling this smart grid? So I'm not going to answer now. At the end, I guess that's the kind of answer I'd like to propose.

But I will stop there, drilling in the technical projects of EDF which I get. It's very consistent with what we can see in other companies and other part of the world.

And I want to actually, using very simple images, try to summarize where I think we are tackling the same challenges throughout the world with that smart grid concept.

Maybe you noticed from the very beginning this morning there have been several attempts to define the smart grid. And each time it was the smart grid is -- no, actually the smart grid includes. But, well, -- so, actually if you want to do something, let's say an AMI system.

Well, here on this slide is showing what happens naturally. Naturally is you can buy sub-systems; you can buy meters, for example; you can buy communication; you can buy a meter that has a management system, et cetera. And you choose from different vendors. And you put that all together. And that's it. You get an AMI system. And that's called the bottom-up approach, which is most natural approach. Which is, well, like playing with Lego bricks or, in my case I've been raised with Mechano.

And it's very interesting because it shows also the way our brain operate naturally. Naturally we immediately jump on trying to identify some bridge of some parts, and try to create something from those parts. And that's okay.

But, you end up with many different pockets because then I describe the process where you can buy the meters, the communication, et cetera, you have an AMI system.

Then now you want to add some management functions in your distribution system, then you do the same. You're going to buy some equipment and some automation, some cabinets for your distribution substations. And you can choose also a network technology; and you're going to choose communication protocols. And that's it. You can assemble all this, and it works.

Then you end up with many of pockets actually where those pockets are assemblage of maybe best of the kind from the market. But those are different pockets and they don't really -- there is no way they can actually even interact between themselves because they were not designed to do that. And there are no bridge, no standard bridge to put between those pockets to actually solve this.

Now, this is what happens. I'm not saying it's not the right way to do it. This is what happens most of the time everywhere. And the smart grid, over time, will actually augment by a succession of steps where you add a new pocket in your company, and you say, with our grid is becoming smarter, which is true and not.

But which is true is that you have more parts or more applications with more intelligence, okay. So, definitely also we realize that no one is starting from scratch, everyone has some legacy. And we cannot just think the standard way with engineering methods where a lot of time those engineering methods are there -- to address starting from scratch. So, that's an important point where it will happen progressively, and no one is starting from scratch.

Now, actually I go back here, you see I have represented a kind of ideal level where even today when discussed with people, even when they have sound ideas on what kind of intelligence they want to add in their grid, no one is describing what kind of target they have. Or even in what amount of time they want to reach what level.

So, that slide is conceptual, but because the ideal is not described, or not easy to describe, or even the ideal over time might evolve. But how can the people actually manage different pockets that are going to develop in their company if they don't have a target. I mean you can keep developing pockets, and that's fine, because you're going to increase the intelligence for some time. But at one point actually you're going to be stuck with many pockets that are detached.

And this is where the concept of urban planning makes a lot of sense for smart grid. So that the metaphor here is not to look at new cities to find out what all the electrical needs of the new cities. No, the metaphor here is that a smart grid is finally like a city that has old parts, that might have new parts going to be added, that have parts that can be actually removed. But the city is operating 24/7.

And actually the balance, the harmony of all this is due to the fact that there is some kind of planning. And there is someone somewhere who is setting goals or even can be more prescriptive. And like cities, the grid has legacy and is going to be what we call a never-ending system, which is 24/7, and that you're going to have this for 50 years. You don't say it's the grid, even in 100 years. But many parts of it will have been replaced, removed and still 24/7 in operation.

So now if you have, if someone is doing some urban planning for smart grids, which is maybe defining some goals, some end points, some rules, let's say some generic requirements, then you may think about a different approach than the bottom-up approach that I described.

You can think about the top-down approach which is not natural, which is trying to think about the needs only, just what you need. Don't think about how you're going to do it, just think about the needs. And then distillate this to actually design the entire systems into subsystems. And then go down and refine the subsystems.

So, it's really a mastermind approach. And it has also pros and cons. But the real winning approach is the combination of actually refining system requirements that can drive from some kind of urban planning that each player cannot do on its own. You need someone a coordinator. You need the conductor of the orchestra of the different stakeholders.

So, if you have this, then you have system requirements. Then you can actually do a combined approach which is starting to have the first design in subsystems using standard building blocks coming from the market.

And actually when you go to those existing building blocks you see that it's not exactly what you need, so you have to go back to your system requirements to see that even if you accept to use something that is existing, that you can accept within your system requirements.

So, it's a very simple drawing that actually if you don't do that, or if you're not in control of the situation -- of your own situation when you run the projects, actually you run very quickly into trouble.

And the system approach here is, this graph shows that it costs more at the development stage, the very left bar graph. You see the green is the system approach, green and smart. And it costs much more at the beginning.

But actually in the deployment and operation and maintenance it costs really less because you can master what's going on. If you just have pockets of interconnected things that you've been grabbing on the market, then you end up having -- paying a high price over time, over 10, 20, 30 years. And that's proven experience.

And also it's a proven experience that if the complexity, you see these graphics showing on the X axis complexity of the systems you want to build; and on the Y axis the cost. And actually when you just use the bottom-up approach, you see cost much less at the beginning. That's the red curve.

But if you cross a threshold level of

complexity, as complexity increases, then actually the system approach is the only way to be able to control what's going on.

I have put here several examples of industries that have been experiencing this. That's the aerospace industry, the nuclear industry for actually the instrumentation and control part of the nuclear industry, and the air traffic control industry.

And all those industries have been paying the high price of the lessons, which is they all have burnt their fingers on the exact point I tried to make in the earlier slides. And that was the only way. And those are all very clever people. But those are things that happen in real projects.

And now when we talk about smart grids that would be given beyond just being nice pockets, then we reach levels of complexity that requires to make sure that they're not going to be new lessons learned at a high price.

But the hope is that the industry succeeded to do it. So there is no reason this industry cannot do it. But if this industry knew about this, actually everyone would not be talking about smart grid and all this. It could already be implemented.

Now, I want to end up with some conclusions and highlight four international keys to succeed. While the first point is definitely AMI; AMI, that's already fantastic. But it might be a very first step towards smart grids, that is not smart grids.

Now, smart grids must be much more than a collection of detached advance applications. And those different pockets, they are not going to coalesce by themselves, you see. Likewise, energy markets, you see energy markets, California has given lessons to the world on energy markets. And energy markets cannot create their own conditions of existence, so they have to be designed. And we can make a parallel there where the smart grid, even if we put in place processes so that they can grow by themselves, they're not going to grow naturally in the right directions all together.

So this is where the urban planning of smart grid is necessary one way or the other to actually set common directions. But even suggest reference designs. And that's reference designs at different level. It can be reference design definitely at the meter, and any devices that has to be tracked to the meter. But it can be at higher levels, also, on the architecture of the networks or how the different pockets of applications have to communicate.

And California is doing a lot in many of those aspects. And is still, I think, quite ahead. But there is still a long way in the different things that California is doing there.

And California has also a nice thing which is the IEPR, that's why not having an IE, well, an integrated smart grid policy report that would actually bridge the IEPR plans specifically to do that urban planning for smart grids. And that's the take-away number one.

Now, smart grids will be a never-ending evolution. The level of complexity requires a thorough system approach from requirements. That's the take-away from number two.

Now, to do that and succeed in concrete, and involving the vendors and the integrators, then standards are still needed. And interoperable building blocks are needed on the market and necessary for the physical ability of whatever you can think of -- urban planning, even if you have some specific goals, well, if you don't have those standards and the building blocks, then you can still do it. But it's going to cost a lot, and it might end up to be specific systems where you're going to be stranded for years. So that's the take-aways number three and four.

And early in presentation was said that, well, what can do, the CEC, is bring together the people and try to build a consensus, which is great. But actually the question you can have is can all this, all the urban planning or the goals, comes just from the consensus. And somewhere there is maybe a need for the conductor of the orchestra where if some directions or some goals, some directions are not set, then it can be forever expecting things to happen.

And the worst enemy in that situation is the time. Because over time the people are doing things. They are doing things. And the more you wait and the more chance you have to end up with really pockets that will never, never, never, ever can communicate, share data and actually have some intelligence on top of that.

Thank you for your attention.

PRESIDING MEMBER PFANNENSTIEL: Richard, just one quick question. I just want to make sure ultimately your presentation was very helpful in organizing our thinking on what we need to do here.

But I want to make sure I understand that what you're really saying is the reason people are having trouble defining what a smart grid is, is that a smart grid is whatever you want it to be. And you need to define that first.

And somebody defines that, and then the rest are the building blocks to make that happen. And so it can include various things, or it can not include various things, but it has certain goals that someone, and in our case the State of California, would define as this is what we need it to do. We need it to integrate more quantities of renewables, we need it to meet demand response goals, we need it to integrate distributed generation. And then we build up to how we get there.

Is that ultimately trying to apply your lessons to us?

MR. SCHOMBERG: Yeah, I think that's the points I tried to make. And I asked the question earlier, I did not answer it. I'm going to answer it now.

So, what is a smart grid. That's really the sense of your point. Finally, the smart grid is not something you can take a picture of. It's much more a new way to think about the infrastructure, and processes you're going to put in place. And some management aspects that you have to add to do something which is new.

The new thing is to make sure that from the very beginning, well, you have many stakeholders with many different interests. But whatever they're going to do, it's going to be a one common thing, or contribute to one common thing.

And it's difficult to imagine. You can imagine processes, and I have a passion for that, to imagine some self-growing processes. And we've been talking a lot about for use cases, for example, put in place, that kind of process.

But it's not enough. And, well, we could think about the human beings, themselves. We are programmed to produce ourselves, and we don't know -- we don't know what's the end point.

So we could think of why smart grids would not be like this.

Then maybe given the state of the art, or what the -- the limits of the human intelligence today maybe it would be more -- to actually, well, close the loop, have some goals, and actually eat the banana from both ends at the same time. Which is certainly encouraged, having more and more projects developed and definitely, I think, more and more pockets developed.

That from the very beginning when develop a pocket, you have to know -- we, everyone has to know how these pocket fits, regarding the existing pockets or regarding other pockets that we know are needed.

And this is the new part. This is what's new to me. That's the answer to the question I asked myself earlier, which is a what's new. Because the people have been developing new projects -- forever. What's new is really this.

PRESIDING MEMBER PFANNENSTIEL: Thank you. Rachelle, Art, do you have questions?

ASSOCIATE MEMBER ROSENFELD: No.

PRESIDING MEMBER PFANNENSTIEL: Thank you.

MR. GRAVELY: I think we have Eric

Lightner online now, if we can get the operator to allow him to speak. And Eric is the Director of the Federal Smart Grid Task Force; has been working the federal side of this. And he's going to provide us a presentation on what's happening there. And if this works right. And then since he probably will not be available for the 3:00 session, there may be some questions you want with him before he logs off.

So, Eric, are you on?

MR. LIGHTNER: Yes, I am. Can you hear me?

MR. GRAVELY: We can. So you should --

MR. LIGHTNER: Amazing.

MR. GRAVELY: Okay, you have control so you can go ahead and we'll see if it works right.

MR. LIGHTNER: Okay. Well, you know, I want to thank you for the opportunity to present to you today, and let you know about what we're doing at the federal level. I apologize for not being there today, but it's amazing how busy you can get when they have legislation going on, on something you're working on. So it's just been enormously busy the last few months since December.

Anyway, hopefully the information I can give is a little bit of an indication of the immensity of the problem we're working on, and exactly what the federal government is pursuing in this area.

So, again, I've been asked to be the Director of this task force by Assistant Secretary here in our office, the Office of Electricity Delivery and Energy Reliability. So, with that I'll just get right into it.

What I hope to cover today is really taking a look at the EISA Act that was passed in December. And pull out what requirements, what provisions that our office here will be responsible for.

Now, I want to get into a little bit more specifics on the task force, and give you an update on those provisions and what we're actually doing in those areas. And then just very very briefly talk about the research and development that's ongoing here at DOE that hopefully is helping to enable some of the smart grid functionality that we're pursuing.

So, requirements of that are in the Energy Independent Security Act that was passed in

December for our office, basically the first thing that we've been asked to do is pull together an advisory committee. And what we're doing here is we've put together an electricity advisory committee, at a very high level, to inform the Secretary, as well as the Assistant Secretary, on any issues concerning electricity delivery.

So that could be security related, it could be transmission related, it could be right-of-way related, could be policy related, technology development related. A whole host of issues surrounding the security of electricity supply that this group will be advising the Secretary on.

A subgroup of that will be a smart grid advisory committee -- subcommittee, if you will, which will be composed of probably eight to 12 individuals that are also on the advisory committee, which is about a 30-individual group.

In conjunction with that we have to form a smart grid task force, and the task force is -- the way I like to look at it is the advisory committee sort of gives the overall direction and advice to them on different issues; whereas the task force is the career federal employees who actually have to do everything. So we're going to be the ones that have to look at the provisions very closely in Federal 13, and act on them, and deliver on them.

So, I'll give you more information on the task force in the presentation. But basically, you know, it consists of several federal agencies, NIST being one, the EPA, FERC, Department of Homeland Security, DOD, and I believe that's the bulk of them.

And so, all those committees, both the advisory committee as well as the task force, were to be put together within 90 days. And I believe that the task force did make our 90 days; the advisory committee was a little bit behind their requirement. But their first meeting is going to take place in May, May 20th, I believe, here in D.C.

Anyway, what else is in the EISA, Title 13. There's several reports that we have to produce and deliver to Congress. Two of them are the end of this year; one by the summer of '09. One of those reports is basically the overall, you know, status of implementation of the smart grid, so whatever that means, Congress wants to hear every other year on where we stand on implementing the smart grid. So I can give you more slides on that in a minute.

But, another report is really taking a look at what laws and regulations are in place which affect siting of privately owned electricity distribution wires on public rights-of-way. So, this is really aimed at the individuals that own private generation and how they can compete and participate in utilizing public rights-of-way, so utilizing the utility infrastructure, if you will. Or competing with the utility infrastructure.

So, we have to take a really good look at why those laws are in place; what the regulations are; what the benefits are of those. More of a baseline kind of report to educate the legislators here in Washington.

The third report that we have to do is one that has to do with the security implications of enabling the smart grid. So, you know, once we -- if we are successful at transitioning to and implementing some of the increased functionality that we all envision for the smart grid, is that going to make us more vulnerable or less vulnerable from a security standpoint.

Is it going to make it easier to recover from man-made and natural disasters, or is it going to make it more difficult. So I think they want really some analysis on the implications as far as energy security goes, with this increased functionality. So we hope to deliver that. That's one that's due next summer.

Some of the things that we're on the hook to do, we have to carry out an R&D program in smart grid technology, so technology development effort. So we'll be putting together, you know, a roadmap, an R&D portfolio, if you would, to attract the different smart grid functionality that we hope to enable.

We have to assemble and implement a smart grid regional demonstration. So that the first step there is, of course, to define what that means. And then to move forward on, you know, soliciting for some regional projects to demonstrate the different functionalities of a smart infrastructure.

Now, that currently is unfunded, so that's something that, if we receive funding in the next budget cycle, we'll go ahead and implement that. That, as well as the federal matching funds program, which is a little bit undefined. The way it's defined in the legislation is pretty much anything you do the federal government's going to co-share it with you as far as upgrading your infrastructure.

And I really don't see that as realistically receiving funds in the next budget cycle unless they really narrowly define what it is we're going to cost share. Otherwise it will just be enormously expensive.

So, those two things are unfunded at this point. But what we'll do over the next several months here is really try to put in place a mechanism for implementing those programs if, in fact, they are funded.

So, with that, I'd like to get into a little bit more about the task force. Again, I mentioned that the task force is really going to be the implementers, if you will. So, one of the first things on our plate, as a makeup of several different federal agencies, is to really start to get a good grip on what each of our different agencies are doing that is related to the smart grid. What kind of R&D is going on; what kind of initiatives are ongoing.

So that we can better coordinate across the federal government; so we're not stepping on each other's toes, so we're not duplicating efforts. This is actually going to be quite difficult, I believe. I mean it's pretty difficult coordinating just within DOE, I can tell you that right now. And coordinating across the different agencies is really going to be challenging. But that's our first activity that we've been pursuing.

So we had our first meeting in March; and we're just starting to educate each other to find where those areas at this point might be that we can really leverage each other and start the coordination.

The task force is also going to oversee those reports that I mentioned, so over the next few months we'll be putting in place statements of work; we'll be reviewing drafts; we'll be getting those reports ready to submit to Congress by the end of the year and next summer, as well.

We'll oversee the development of the R&D plan, so over the next several months we will be looking at current R&D plans for the agencies. We'll be looking at what the needs are in the industry. And trying to assemble some sort of R&D plan between now and the next fiscal year.

So that, when all the agencies get their funding we'll have a better idea of how best to spend that money.

Again, the task force is going to be the guiding force, if you will, for the regional demonstrations, as far as content, what specifically are we going to be looking for. So it'll be up to the task force to really craft what that content is going to be in that solicitation.

We're going to be involved with NIST on the interoperability framework. So they've been tasked to lead on putting together what that architecture framework will be for interoperability and the interoperability standards. And we'll be working very closely with them on the task force, as well as other organizations.

Again, we'll put the definition behind the structure in place to implement matching fund program, if that is funded. We also feel that it's necessary for us to coordinate with the states, obviously. I mean if you want to implement anything, you know, at the state level you really need to work with the state and state organizations and their regulators and legislators to educate on what it is that's ongoing at the federal level. So that they can be making informed decisions at the state level.

We're going to -- and, then, of course, the last bullet there is work very closely with the electricity advisory committee. They'll be the ones, again, I think, that set our overall direction, and help us on some key issues, and will be the ones that actually make sure that that gets done.

So, again, task force. We formed in late March; we had our first meeting then. We have our next meeting at the end of this month, so we'll be basically meeting four or five times a year to coordinate the efforts and try to accomplish what we've been tasked by Congress to do.

Here's the composition of the task force that I briefly mentioned earlier. Myself, I'll be the Director of the task force. Also Hank Kenchington, Larry Mansueti and Phil Overholt from my office here, that represent different aspects of the electricity delivery system. We'll be members of the task force.

Another organization here at DOE, energy efficiency and renewable energy, will be represented on the task force, as well.

Also the National Engineering Technology Laboratory in West Virginia is represented on the task force. As well as the Department of Homeland Security, the Environmental Protection Agency, Federal Energy Regulatory Commission, National Institute of Standards and Technology, UNDA and DOD have been invited, but they have not appointed someone yet to participate in that task force. But I do believe that's forthcoming.

So, what are some of the activities that we feel that are very important to accomplish and to tackle as we embark on trying to do these things. And I briefly heard, maybe the last 15 minutes of Richard's talk, but some of the things he was mentioning, you know, ring very clear with me and what we're trying to accomplish here at the federal level.

And the first thing is, you know, what is the definition of smart grid. I know he mentioned that, and I've heard that mentioned in a couple of the questions. That's something we have struggled with for years, as you can imagine.

We've put a lot of money into an effort for the last year and a half with -- through the National Engineering Technology Laboratory. And their modern grid strategy, their modern grid initiatives. And what we've asked them to do was really not to out unless tried in a consensus fashion with many many stakeholders. Come up with an agreed-upon definition. What is a smart grid; what kind of increased functionality are we envisioning; what kind is realistic to really try and strive for.

And they held regional meetings throughout the country over the last, you know, 18, 24 months, again to arrive at a fairly consistent, agreed-upon, very high-level now, definition of what smart grid is.

So, now we feel we have a pretty good buy-in on what that definition is, what the functionality is that we're all trying to accomplish here. We really felt that the next step was to then again reach out to all the stakeholder communities and say, okay, if, in fact, this is the definition of -- if this is the kind of functionality we're trying to enable here, what does that mean as far as how do we know if we're making any progress towards getting there.

So, what kind of indicators, or what kind of metrics can we hope to establish that would help us monitor enabling the functionality. So, you know, progressing, transitioning to the smart grid, what are those metrics.

So we're going to hold a workshop on June 19th and 20th, where we're really trying to get at this issue, what are the metrics, what are the challenges that go with the metrics, are they even measurable. What are the challenges with collecting that information, that data.

So we feel if we have a definition in place, and we have a way of monitoring measure of our progress, that we'll be making some progress, ourselves. For one, just far as, you know, our requirement to report to Congress the status of implementing the smart grid every other year, we're really going to need this kind of information in order to be able to report to them on these metrics, on these indicators, on that status of implementation of smart grid.

So, we really thought that was, you know, the first two steps we're going to need to take before we started doing too much else, before we really get into the demonstrations and the R&D, we really need to first come to agreement as to what the definition is, and how do we measure progress towards enabling that definition.

So, again, that'll be June 19th and 20th here in Washington, D.C. And, of course, results of all this stuff will be made -- will be put up on a website and made publicly available for anyone and everyone to utilize as they wish.

So, here basically is the definition, in short. That I would say we've pretty much agreed upon in a very broad sense with many stakeholder groups. And I'll just briefly, you know, read them to you. And you can see that they're high level and pretty general in nature. But, they do touch on some of the things I heard, you know, demand response and distributed generation, these sort of things.

So enabling active participation by the consumers, so empowering the consumer, including the consumer in the solution rather than just at the problem. So how do we utilize end-use devices; how do we balance the system better. So that's what that one's about.

Accommodating all generation -- so, let's look at how to better integrate renewables; let's look at how to better accommodate both customer-owned and utility-owned generation and distribution voltages. So, there's markets that potentially we could open up and enable by, you know, putting in place this kind of infrastructure.

Optimizing assets and operating efficiency. Obviously we want to figure out a way to, you know, flatten the load curve, utilize what we have. The existing infrastructure, utilize it better, utilize it more than we currently do. Not just, you know, build the current model where we build to peak, utilize, you know, our assets with very short-run hours on a yearly basis. There's got to be a better way to operate the system.

Anticipate and respond to disturbances in a self-healing manner. So this is the self-healing characteristic, the -- reconfiguration. You might have heard some people speak to, mention that we'd really like to see that increased functionality in the grid.

More resilient to those physical and cyber attacks. I mentioned that earlier. And offering, you know, providing power quality for a range of things. So, in terms of our tailored power quality, if you will.

These are really the overall -- again, they're kind of high level and general areas. But you can see, you know, aspects of increased functionality in each of these things that would really, I believe, add value to the system.

So, again, the workshop is that next step on finding out, number one it's an opportunity, I believe, to get agreement on yes, these are the characteristics we're talking about. This is the definition we're talking about.

Then let's start talking about metrics, measuring progress towards that smart grid. Get some brainstorming around, get some ideas, get some consensus around how we're going to all measure ourselves. And then how we scope the measuring verification.

And, again, I think those are the first two steps the task force will need to take, the definition and the metrics, so that we can use this information to feed into, again, the report to Congress that we are on the hook to produce. What our R&D plan is; what the regional demonstrations might consist of.

If we know what we're trying to enable and how we're going to monitor it, we can start to build and put together some fairly large-scale regional demonstrations.

And when I say regional demonstrations, let me just give you an idea of the magnitude of this. I think we're talking somewhere in the order of, you know, three- to five-year kind of demonstrations; $20- to $30-million range per demonstration.

To give you an idea, these are the groups that -- I just thought I'd throw this up to show you that we're partnering with many different stakeholder groups, but these particular ones here on this slide are the ones that are involved in pulling together the workshop that I mentioned on June 19th and 20th.

So, I thought I'd give you a little bit of an update on where we're going with some of these things: The report to Congress that talks about implementing the smart grid; where are we; some of the requirements for this report is, again, what's the current status, so where are we now.

What are some of the regulatory or government barriers that might be in place to implementing the smart grid. Are there any recommendations potentially that we could give to state or federal policies or actions that might help enable the smart grid.

And, really, do we need to look, consider things on a regional basis. You know, how might things be measured or monitored differently depending on what region of the country you're in.

So, again, what our approach is, we're going to leverage highly the work that's been previously done, as well as the workshop coming up next month. We've been talking a little bit with a group called APQC on their maturity model.

They've done some work with a utility group that's really looked at the smart grid question and said, okay, how would we measure ourselves, you know. What are the different levels of maturity in reaching a smart grid, and how do we define those.

They've already done some work amongst themselves, and we thought we could really leverage not only in the workshop, but moving forward on implementing the smart grid in general.

And, of course, we're working with FERC and NARUC to form their smart grid collaborative. And they've just announced, two weeks ago, on the regulatory policy aspect of this.

So, this report, pretty much we have a statement of work in place with Pacific Northwest National Lab to help us gather this information and assemble the information in a report. And I believe we're pretty much on schedule for delivery this December.

The technical report is one that looks at the effect of private wire laws. And we have negotiated a statement of work with Navigant Consulting to help us, again, really do an analysis and a study of the regulations that are in place, what will be the impact on potentially changing some of these, or if there are any recommendations for changing them. Why are they in place; what's the benefit of having them.

The approach we thought we'd take is let's look at a few key states and really do a deep dive on what their laws and policies are and why they're in place. So that we can paint a pretty good picture for Congress as far as what the current status is out there.

From that, you know, potentially you could extrapolate for the different areas of the country, on what the impacts would be of changing things, or not changing things.

So that report, again, I think we're well positioned to deliver that in December, as well.

The third report, however, on the security of the smart grid, we haven't really done anything at this point. We've been concentrating predominately on the definition of smart grid and the workshop, as well as this report.

And we haven't started tackling this report yet. So, you know, any guidance or suggestions that anyone might want to add to this area would be greatly appreciated. Obviously we're going to work closely with DHS on this one, as well as NERC and FERC, to really find what approach we should follow in order to really get, you know, the best information we can to prepare this report for Congress. And this one, again, is due next June of 09.

So, the other area that we have focused on in the past, and I believe we'll continue to focus on, that I heard Richard also mention, is this idea of interoperability.

NIST has been given the daunting task of looking at the interoperability landscape, if you will, what are the, you know, what's in place now. What kind of standards are out there now as far as interoperability. Where are the holes; where might standards be needed that they could identify.

So they're really taking a broad look at the status quo right now. And they need to recommend to Congress what path to pursue in order to develop and implement an interoperability framework in the electric sector.

So they're working with groups that we have funded in the past, the Gridwise Architectural Council, as well as several other groups that we're working with, -- and IEEE and NERC and FEMA and federal and state agencies. And I know that FERC and NARUC are both very interested in these kinds of things.

So, they're in a fact-finding mode right now. I believe one of the things they are going to do within the next few weeks here is pull together what they call a stakeholder outreach group that, you know, is more of a formalized group for getting that guidance and input on where they need to go, and the directions they need to follow.

I think they're also planning on putting up a website on what they are doing in the interoperability architectural framework. And what all the different groups are doing; and how they plan to proceed to help them facilitate and guide them. So they really seem themselves as more of a conductor of this rather than a creator of anything. So, the task force will be assisting them on that.

Communication and outreach and public awareness, things that we're doing. As you probably know, we had this event last year we called Grid Week, where the idea was to create some sort of national event around this new industry we're going to call the smart grid industry. It was very successful. Last year we had over 600 participants. We had many good speakers speaking about policy of something like this, the technologies needed, the hurdles we need to get over, both technologically and regulatorily. So I thought it went very well last year.

This year we have teamed up with the Gridwise Alliance to -- or partnered with them, I should say, to really start to develop the agenda. As well as other organizations. I believe IEEE and EEI are all on -- have been very engaged in helping us put together the agenda for next year. So, again, that Grid Week is going to be September -- is going to be September 23rd and 25th. Again, here in D.C.

And I just put up here some bullets on what the different tracks, sessions are going to be focused on. As you can see, it's all smart grid related activities.

We're also, as far as public awareness, we're supporting -- and again, I heard Richard mention some of this -- we're supporting the development of a smart grid book, if you will. I know I put guidebook up there but it's more of a smart grid educational piece, it's not really a guidebook, a smart grid book.

So, it's going to be a book that talks about, you know, why are we doing this; why do we need this as a nation. What's going to be the value of doing this. Who's involved in doing this; what are the different players. So it's more of a resource to help, for lack of a better term, you know, raise the awareness and rally the troops behind a common definition and a common idea of what the benefits and value is going to be for doing this.

So that book is under development and the idea is hopefully it'll be completed and ready to be rolled out at Grid Week in September. So we're diligently working to produce that book now.

So, again, any input and any participation that the State of California wishes to, at whatever level they wish to participate in producing what goes into this book, I think that will be more than welcome.

We also fund a smart grid newsletter. We're not the only founders of this, let me just say that upfront. We're one of the supporters of the newsletter. So it's not a DOE smart grid newsletter.

It's a smart grid newsletter, it's a private entity, but we do contribute to producing this report. And we hope that, again, it just raises the awareness, not just what DOE is doing, but what we're doing as a country, to move towards enabling, you know, a smarter infrastructure.

So, as more of a DOE-related activity, last year we came out with our R&D plan here at the Office of Electricity Delivery and Energy Reliability in which we identified four key strategic opportunity areas that we thought would be, you know, over the next five years the focus of our R&D.

One of those was smart grid; one was climate change; one was more emphasis on modeling analysis, especially at the distribution level. It was really our thought that, you know, that at the transmission level there's probably much higher fidelity models than exist at the distribution level. And that that was a ripe opportunity area for developing some higher order models that really can start to look at I would say technology impacts as far as implementing smart grid functionality.

So, is there a, you know, a way that we can simulate some of the value creation by some of the increased functionality that we're envisioning from the smart grid. If we can do it in a model first before we go out and try to spend a lot of money demonstrating or implementing some of these things, we thought it would be key to really look at some modeling.

As an example now that end-use technology is yet the whole idea of plug-in hybrid electric vehicles, and what impact potentially might they have on the electricity delivery system. So, that would be one example of a technology that we can really study and model to see what the effect might be.

And there's others, -- more appliances or whatever the other end-use technology is; whatever they are, whatever they are going to be, that we can really plug into the model and see, again, an indication of what the impact might be.

So, we identified that. And then, of course, continue to partner with outside organizations to enable the transition to a more modernized infrastructure.

So, this is my last slide, I believe, and just -- or, yeah, I'm going to have one more, but I just wanted to give a little bit of an indication of some of the R&D that's ongoing without getting to specifics, that are targeted at the different functions that are identified in the definition of a smart grid.

So, you know, as far as operational or system efficiency in making the system work more effectively and efficiently, we're doing research in superconducting cables and other advanced cables; we're looking at advanced grid components, substation automation. So the idea was just to give you a little flavor of the things we're doing.

And -- resiliency, we have real-time monitoring. You probably heard of some of the visualization research products; we have ongoing -- interconnect phaser project it used to be called, where we're looking at phaser measurement units and how to give a broader view of what's going on. So visualization is key there. Situation awareness, advanced control systems, and, again, I mentioned interoperability.

We're also looking at improved power quality through storage technologies, high voltage power electronics, and (inaudible). And then, asset optimization, generation diversity, consumer empowerment, which is a number of different functionalities or characteristics that I mentioned in the definition of a smart grid.

We're looking at integrating renewables, shaving peak load, looking at microgrids and different ways to do demand response. So, a number of things all ongoing.

Now, I don't want to give the impression that we're doing a lot in all these areas. We're doing a little bit in all these areas. I mean our funding is very much limited, as you can imagine. But we are doing a little bit in each of these areas. Just wanted to give you a flavor.

I believe, with that, if there's any questions or anything, I will thank you again for inviting me to give you an update on what we're doing here, and I look forward to collaborating with you in the future. Thank you.

PRESIDING MEMBER PFANNENSTIEL: Thank you, Eric. This is Jackie Pfannenstiel. Really appreciate your being willing to share this with us, a lot of very very useful information.

I believe Commissioner Rosenfeld has some questions.

ASSOCIATE MEMBER ROSENFELD: Eric, good afternoon.

MR. LIGHTNER: Good afternoon.

ASSOCIATE MEMBER ROSENFELD: I wanted to mention a couple of conflicts. We're very interested in your June 19th workshop. We have a workshop here called Enabling Technologies for Demand Response. So, I guess we can't send anybody from the CEC, or probably from the PUC.

But I talked to Joe Eto this morning and he's going, and he's pretty familiar with all the things we're trying to do, so I guess we'll get represented from him.

I wanted to make a tiny comment about demand response, which, from my personal point of view, is one of the first and big things we can work on.

We update our building and appliance standards every three years. So, I, at least, have done a little bit of thinking about not so much plug-in hybrids, it seems to me that more people are thinking in the country about plug-in hybrids, and there are going to be plug-in hybrids for the next foreseeable future.

Oh, dear, a ceiling tile just fell down.

(Parties speaking simultaneously.)

ASSOCIATE MEMBER ROSENFELD: But we -- a little distraction here -- we are in a position to think about having requirements that new buildings be able to respond to global temperature setups which would give you good demand response. And even thinking about controlling of lighting ballasts so you could do regulation up and regulation down with ballasts instead of having to wait for hybrids.

So, we're very interested in your remarks about that. Anyway, a jolly good talk, thank you.

MR. LIGHTNER: Well, thank you very much. I think one of our key stakeholder groups is, in fact, the building community. I mean I know the buildings program within EERE here in DOE has been very interested in participating in the smart grid research and development department activities through the task force. And is very interested on how we're going to tie in, and what that linkage point is, between, you know, smart building infrastructure and the smart grid, and the utilities. What is going to be that integration point; how that's to work together.

So, I know they are very interested in that. And we plan on, again, coordinating our efforts very closely, working with them to, you know, hopefully come up with a productive path forward as far as that goes.

Now, I know there's been some talk on pulling together some sort of initiative where we're looking at how really to plot a path forward on smart appliances. You know, what sort of standards potentially do we need to consider and look at in order to put that in place.

More intelligent appliances that can respond to different kinds of signals, whether it be a frequency signal or a market signal or a demand signal, whatever.

But I know that they have expressed a lot of interest in some sort of multi-agency collaborative in this area. So that's one thing that comes to mind.

PRESIDING MEMBER PFANNENSTIEL: Thank you, Eric. Again, we really appreciate your excellent talk, really good information.

Okay, back to the room here. We're about quarter after 12. I was going to suggest that we break for exactly an hour, and get back here at 1:15.

Any other logistics, David or Gabe, that we should alert people to?

MR. HUNGERFORD: No, just try to get back here by the hour, by 1:15, so that we can get through --

PRESIDING MEMBER PFANNENSTIEL: Get back and start --

MR. HUNGERFORD: -- the afternoon's work before 5:30 or so.

PRESIDING MEMBER PFANNENSTIEL: All right, thank you.

(Whereupon, at 12:15 p.m., the workshop was adjourned, to reconvene at 1:15 p.m., this same day.)

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AFTERNOON SESSION

1:22 p.m.

PRESIDING MEMBER PFANNENSTIEL: We're about ready to begin the afternoon session. So the afternoon panel, the first one, contains representatives from the investor-owned utilities. And we'll hear their perspectives on the smart grid.

I have one announcement about the sign-up. I guess the sign-in list has a place for people's email addresses; and please put your email addresses if you want to be on the docket for the future information for the next hearings, the next workshops we're going to have on this topic.

With that, Mr. Hungerford.

MR. HUNGERFORD: All right. With us today we have Terry Mohn, Mike Montoya and Andrew Tang from the investor-owned utilities. And they're going to give us each a short presentation on their smart grid related activities. And then we'll have a discussion which the Commissioners will lead.

And so with that I think the first, in no particular order, I think the first one we have here is already opened, and it happens to be SDG&E. Terry.

MR. MOHN: Good afternoon. Thank you for inviting us. I'm Terry Mohn; I'm a strategist with SDG&E. I'm also the Vice Chairman of the Gridwise Alliance. And I'm actually going to split this talk into two sections.

The first half of the presentation I'm going to focus on the activities that are occurring both in the utility and the vendor communities, kind of a corollary to what Eric Lightner was talking about at the federal level.

I'm going to kind of share my experience, what I've seen occurring at the national level. The slides here are actually pretty similar to the same slides that I gave last week at the national conference of the state legislators. It was a pretty well-attended conference.

So what I'm going to do is I'm going to try and give you a perspective of what I see happening from my position in an industry work group called the Gridwise Alliance.

So this is the overall outline of the presentation. I'm going to split it with my colleague, Tom Bialak. He's going to talk a little bit about what we're doing in San Diego that pairs nicely with what we're doing at the national level.

So, we've seen earlier this morning quite a bit of discussion about the requirements around smart grid. The fact that I think uniformly we're seeing the very same fundamental requirement that you need communications to enable the information flow, either from the edge of the network back to the back office, or the ability to enable the capability of sensing that events that are occurring.

That's one form of communication being able to collect the data. But we also want to be able to send control signals out to that certain sorts of devices.

So there's a necessity for ubiquitous communications. And this is one of the fundamental building blocks that we've seen, and we see occurring over and over in all the various implementations of early pilots of this smart grid technology.

We're also seeing quite a bit of evolution in the operational and information technologies. Now, those of you who have been in the internet space know the informational technologies are pretty well characterized. We've seen an enormous growth of capabilities that ten years ago nobody envisioned for the internet, but today just a wonderful wealth of opportunity for entrepreneurs.

On the operational side of technologies, what we're seeing is that there's an amazing growth of digital technology being embedded in what have been traditionally electromechanical devices. That creates some interesting opportunities and some challenges. And I'll get into that in just a little bit.

So, from a national perspective, the stakeholders that I'm talking about in the Gridwise Alliance is a composition of system integrators, of large manufacturers of equipment for utilities. It's venture capitalists. And, of course, utilities.

We see that the definition for smart grid is pretty well defined, at least from our perspective, by the Department of Energy. Eric Lightner, earlier this morning, talked about the modern grid initiative that they've funded. They did a lot of work in building consensus for all those participants over three years. And the results of that work then actually ended up in the Title 13. And we think that those are pretty accurate assessments of what reflects kind of a smart grid.

And I think that we've also found that I think one of the speakers said you really can't take a photograph of what a smart grid is. I think our belief is that it's more of a philosophy and a way in which we evolve toward an ever richer and richer future.

So, some of the attributes that we see at the national level are that a smart grid eventually will be able to detect and fix emerging problems. It's not that we expect all the devices to act on their own, but they'll be embedded with rules that can perform certain duties. It's still going to require somebody from an analytical perspective to embed those rules in those devices that are going to make those decisions.

Eventually, even though we have a centralized model today, where information flows to perhaps emission control, eventually a lot of those decisionmaking activities will occur closer and closer to the edge of the network. But today they're really focused in a more central environment.

One of the things that Eric Lightner talked about is his requirement to develop the metrics around characterizing the growth of smart grid. And we think that's absolutely important.

Being able to reroute flow, power flow in real time based on events that are occurring, whether they're perturbations or whether they're economic decisions, is something that we need to incorporate.

We've talked very heavily about -- when you talk about the utilities that are involved in the Gridwise Alliance, we have a representative cross-mix of every state, just about every state in the United States. Some are deregulated; some are regulated. But they all have different requirements for what generation requirements are, and what their ability to serve their end customers.

So we really need a rich array of different generation capabilities. And so we want to incorporate that into our overall design.

And then finally, the use of modern

tools. This is the perspective that getting back to the topic of the internet where, you know, the basic infrastructure was laid out for us 15 to 20 years ago. And we've built upon that year after year.

All of this innovation has arisen because we've developed tools that were essentially standardized. And so that's what we want to look for towards our future in the smart grid.

Looks like we have a problem with -- we're cut off here, but one of the areas that we've talked quite a bit about is how do we incorporate new generation and new ability to reduce the greenhouse gas effects.

And we think that through the use of smart grid technologies we'll be able to reach that goal. So it's a matter of designing the system in such a way that we can incorporate new generation, or new generation capacity.

So, if this were a snapshot of the state of the art today, we're still very much very focused on electromechanical devices. We have a lot of manual processes. Almost every utility still is focused on being able to serve their customers with either clipboard, some utilities are moving towards modernization with mobile data terminals and some sort of electronics. But I don't think that that's the norm. I think that we're still really manually based in all of our processes.

A lot of the communication technologies are still pretty outdated in terms of what's available to the consumer. If you look at your cellphone and what you can do with your cellphone, you can have -- there's this new technology called mediaflow where you can actually see television shows right on your cellphone -- those are possible because the consumer space has really grown and flourished. And they've asked for new capabilities. And the suppliers of the technology is making it possible.

But we have technologies that are very ingrained in the utility sector that don't evolve as quickly as the consumer products do. To be able to sense the perturbations on the environment and the distribution grid and transmission grid we need more sensors. Today we really don't have that many.

And, again, because it's a manual-based

process, primarily we have very little automation.

So the utility of the future, what we see occurring is that we're moving rapidly toward a digital society. Not only do we have digital systems in our emission control, but we have digital systems in our operational elements, such as switching, relays, and then as we move down closer to the customer, into our metering systems.

We're looking more towards advanced communications. What this means is not only is it that you're sending a large volume of data in both directions, but this flow of data is occurring at a very fast speed.

There's different ways in which you can characterize it. You could say, well, we're going to go to full broadband to every end point. But the question is what are the economics of going to full broadband. Is there an economic balance where you don't have to have the same sort of broadband characteristics that consumers have in their home to actually achieve the goals that you're looking for in a smart grid. And I think there is a good balance.

As we go into a little bit deeper study that particularly what SDG&E is doing around our smart meter and so forth, you'll see that there is a good balance. And we figured out the economics.

The utility of the future is going to focus on the ability to recognize that events are occurring and to correct them in real time.

Correcting them in real time could occur in a number of ways. It could be just by using smart relays that change the direction of flow, or incorporating distributed generation that is owned by the consumer. And then start to island off sub-communities.

Lots of sensors is absolutely a fundamental requirement for us to be able to determine what's occurring in the power grid. A lot of the utilities that are deploying smart metering infrastructure, they're recognizing that their meters, being digital, have different characteristics than old electromechanical meters. And we are using those meters, actually, as sensors.

So, we can develop a portfolio of our power quality, either what we're providing to our customers, or what the customers are requiring of us, by just collecting information that we can characterize from our meters, themselves.

And then we're going to quite a bit more automation in our control systems. And my colleague, Tom, will talk about a little bit of what we're doing in that area.

So this is a slide that I'd like to talk about, about the three main categories that we see the utilities taking and moving towards a smart grid. The first one, this category is more or less business as usual. Knowing that as you make your investments in technology, eventually that technology that you procure will be embedded with some sort of digital capability. You'll install it; you'll use that technology in the way you've always used it, but some day in the future you'll be able to use that new feature that you didn't really request, but it was just provided to you by the manufacturers.

What we're seeing is that the definition for smart grid, particularly after listening to Richard speak, that this is a worldwide movement. And recognizing that event, the manufacturers that are selling into this market are global manufacturers.

So what we need to do is define the characteristics for the state that follow not only the national requirements, but also help transition change to the manufacturers that are serving the global market.

Recognizing that that's going to occur, as well, then as we start to procure those products from those global manufacturers, those products will have embedded characteristics.

This gets back to the whole point of business as usual. As we go out and continue to buy technologies that replace, you know, aged assets, those new products will have the capabilities that eventually will lead to a smart grid.

So that's one category that we see occurring just on its own without any momentum by a national or state direction.

The second category that I see occurring is the so-called utility of the future business case that some utilities are putting forward. A couple good examples are Duke, Austin Energy, Consumers Energy, and I'm sure there's a couple others, where they have described business cases. They've taken those business cases to their public utility commission for approval for a very large investment, and completely replacing major portions of their infrastructure.

If I could characterize the very first category as evolutionary, the utility of the future, I think, the so-called utility of the future is revolutionary. Because what these utilities are saying is they're taking a look at all their core systems, their operational systems and their information systems, and saying, how do we merge these together from a top-down, holistic view. I think this is what Richard was saying.

From a systems approach, look at how we put all these pieces together and then start building it. This is a very large investment. And like I said, a couple utilities are moving in that direction.

Another direction, and the third that I think is revolutionary, is the direction that a lot of utilities, particularly here in California, are taking, which is deploying smart meters.

We're seeing that a lot of the characteristics that you need in a smart grid are occurring in the technologies provided by the vendors in the smart meter community.

Two years ago when California first started looking at vendors in this space we found that there were very few that actually offered smart grid capabilities. But as we continued to ask them for the ability to evolve our infrastructure to take on new characteristics, they started coming to the table with more advanced technologies.

One of the things that we looked at from the very foundational element of smart metering, and this is very common for all the utilities that I've talked to, is they need to have a good communications infrastructure. This is what I said early on in one of my earlier slides, if we get the communications right, we can build upon that.

Getting communications right doesn't mean, though, it has to be internet-grade communications. It has to be economic and it has to perform according to the requirements that we have, and that we envision if we take a holistic view.

So those are the three kind of categories that I see most utilities progressing along the smart grid path.

This slide here, I don't know if you can all see it, because of how dark it is, but this is a slide that pretty well describes the participants in the national movements. The range on the left-hand side at the federal level, starting at FERC, working its way down to lower level, which are the implementations and pilots. Those are organizations focused in some degree on a direction for the country around smart grid.

In the state we have -- the CEC is probably the preeminent organization that's focused on this particular area. And there are a couple other agencies that are involved at the state level.

And then in the private area there are a number of organizations, one of which I mentioned, the Gridwise Alliance. Some of you may have heard about the Galvin initiative. EPRI intelligrid was discussed this morning. And there are a couple standards bodies that a lot of us utilities in California are working on, such as open AMI and utility AMI.

One of the things that I pointed out to the national conference of state legislators is there is still a gap here across the country about what every state needs to be looking at in uniform degree with the other states.

It's one thing for the federal government to take a position; it's another for one state to take a position. And then, of course, for the alliances to take a position. But how do we insure that all the decisions that occur across the 50 states are uniform. Because remember, this is a worldwide market. We want to make sure that the decisions we make, even at the state level, still adhere to some sort of direction that we can give to the vendors who actually sell us the products.

So this is where I'm going to transition to my colleague, Tom.

MR. BIALAK: Thank you, Terry. Tom Bialak, Chief Engineer, Electric -- Asset Management, SDG&E. It's kind of interesting, Terry and I sort of go back and forth. We work on these areas together. And Terry gets out there and gets through to the visioning stuff, and do other things, and then he comes back and he says, gee, what do you think.

And then off we go and say, well, okay, now we're the implementers; we need to put this into practice; what do we need to do; why do we need to do it. And now we're going to do it in a particular timeframe.

What this slide here shows in particular for SDG&E, some of the issues that we see with regards to drivers, some challenges with regards to smart grid.

Clearly we have an aging infrastructure issue in California, as well as do all the other utilities in the rest of the country. How are we going to handle that aging infrastructure. And we believe that ultimately the application of technologies and systems that the smart grid will bring into play will help us deal with that in a much more optimal fashion than what we would currently be doing otherwise.

We also have a maturing workforce. And that's also a big issue because all the skilled people are retiring, so now who gets to fill their shoes. And it gets real hard. I think every utility around will tell you they're trying to find an employ highly skilled workforce, and everybody is struggling to find the same people.

And so, again, applying technology, applying systems, trying to help leverage through the smart grid, help leverage that maturing workforce.

We also see that a driver is to help achieve and integrate policy goals into each of these operations. That includes things like the Energy Action Plan loading order, renewable portfolio standards, as well as empowering consumers. We believe that through smart grid and through smart grid applications, and through AMI, consumers will have a choice, they'll have opportunities to do something about their energy usage to minimize their bill impacts.

Potential challenges that we see. Clearly there's regulatory changes that arguably need to occur. How are we, as an IOU, going to move forward, get cost recovery for these types of technologies, given that in particular for some of the IT kinds of systems, the useful life is significantly less now than what would otherwise occur for normal wires or transformers.

The complexity. One of the things that seem -- Richard gave another interesting presentation at other conference, the prior EPRI CEC smart grid, when he talked about well, what is the sort of optimal path for intelligence. So what does that look like. And it actually becomes very sophisticated and very complicated problem to resolve.

And I think Eric Lightner also pointed that out, that it is a problem, it is a challenge, and how to best do that so that we optimize our expenditures as we go forward.

And then lastly, just the whole discussion of technology advances. Well, technology is advancing. As Terry mentioned, people are inventing more and more logic digital systems into products we are buying today.

But we also have to deal with the technology that we have currently in our system. Our legacy equipment, how are you going to interface with that. We clearly are not going to be going out and doing a wholesale replacement. That will be cost prohibitive.

And so the question is how do we get to those particular older systems, how do we get them to now play in the smart grid arena.

So, here's some of the major SDG&E's smart grid initiatives. SDG&E, we'll talk in the end, took a sort of falling along the lines of what Richard had mentioned, a top-down approach, particularly when it came to looking at technologies and improvement in operations. Tried to define requirements, and then now moving forward.

We have the our AMI filing. We have approval to install our AMI system. And recover our cost. That included in our settlement not only the meters, but also home area network and a remote disconnect for all residential customers. That will be incorporated as we move forward.

Technologies to improve operations. One of the keys clearly in doing this is being able to have systems in place that actually allow us to take advantage of the additional data and information that we, as a utility, will be provided with via smart grid and via AMI.

We see AMI providing us basically 1.4 million sensors on our system; helping us determine where things, where outages are occurring. And ultimately, down the road, with additional sensors, looking more at some of the predictive kind of analytics that would allow us to try to avoid outages.

Distribution automation. We'll talk a little bit about that. We, SDG&E, we're heavily automated already. One could argue it's foundational for smart grid applications. We have about 70 percent of our system has some level of SCADA on it. And it just becomes a question of now taking that the next step.

Distributed generation. We're looking at what we can do, both from a planning perspective, as well as looking at, you know, how do we empower consumers. We have our sustainable community program where we've looked at installing photovoltaics. We have a joint application with PG&E for an emerging renewables program, to look at what we can do, and on various types of new technologies.

And then lastly, we have a DOE and CEC funded market research programs, looking at grid design with utility-owned DG. And then looking at consumer-owned DG. And trying to incorporate all those in a streamlined fashion, including demand response, storage and energy efficiency programs.

So, at SDG&E our sort of business strategy is called OpEx2020. And it was in that OpEx2020 there's a vast majority of programs and projects that we are putting in place that are basically foundational IT systems in a certain case, and also will, we believe, empower the smart grid applications on our system.

So, you see the overlap of what we're calling smart grid applications and OpEx2020. We start in on the right with a GIS system, which will basically be our data model, data layer. Integrate it with -- and utilizing that will be your conditioned based maintenance, an OMS/DMS system. The OMS/DMS system. FAST, which stands for feeder automation system technology. And then smart meters.

Talk a little bit about these ultimately smart meters, I think pretty much everybody knows, and I know there's another meeting so I won't spend a lot of time there, but it's going to be the ultimately sort of the gateway to the customers, the gateway to provide information. And we see that as a necessary means to help move the smart grid forward.

Conditioned-based maintenance. So now we're talking here about installing in all of our -- primarily all of our distribution substations and transmission substations, equipment that will allow us to move from a reactive maintenance schedule to predictive maintenance schedule. And then also to use that information to be able to make decisions with regards to operating our system.

We see in the longer term that that's going to head down the real time rating path, another sort of arguably goal of some of the smart grid applications. As well as provide data and input into some of our asset investment strategy pieces.

OMS/DMS, we see this again as sort of another overlapping foundational system. It stands for outage management system/distribution management system. SDG&E has had, for many years, an outage management system that was home grown. We are looking now to take advantage of the AMI system, to leverage the metering information that we're going to get.

And to a new outage management system that will also take information relative to the health of transformers and breakers in the substations initially. And then move forward with a distribution management system where we can make sort of real time, sort of what-if kinds of applications. How do we actually operate the distribution system such that we can optimize perhaps losses or renewable generation or greenhouse gases, or just restoring service to our customers.

FAST or feeder automation system technology, this is really the whole self-healing grid concept. We are looking at both a centralized and decentralized solution. And talk about this a little bit more.

We talked about OpEx2020. We have here a grand total of about six major categories of initiatives. And these are all replacing existing IT systems and other how-we-do-business systems at SDG&E. You can see the time scale here, some of them have already started. Going out to 2016 for some of these initiatives.

But clearly in the 08 to end of '011, '012 timeframe. But we've got asset management initiatives, fuel-force initiatives, customer care, -- infrastructure, IT infrastructure and smart meters.

And we see that these are foundational back-office systems that we're going to need to move forward with, as far as implementing the smart grid.

So, to summarize. The industry, we believe, ultimately has a pretty good idea; certainly within SDG&E we accept that the smart grid vision that's sort of laid out by DOE, laid out by the Gridwise architecture, laid out by the (inaudible) is really sort of the vision that we have been pursing for many years.

We know what's there, there's various that exist including said here, risk, rates, patterns and security that have been talked about previously.

Clearly there's steps underway already, few large projects in various areas. However, clearly there's also much more work needed. Needs to be some additional demonstration projects. Need to be a sort of state regulatory approval. Buy-in vision of what this actually means for California.

And that at SDG&E that we believe that we have been making large strides for this, smart meter implementation, our OpEx2020 implementation, partnerships with industry groups, collaboration with many utilities.

And that our involvement also includes participation in standardization processes. These ultimately become key, how you get to integrate all these bits of equipment. As time goes on, how are you going to replace a circuit breaker that

has a control with a new circuit breaker that has
a different control, if you don't have open
architecture.

So there's the open AMI activities
gridwise and DR open -- price. And also we're
involved with IBM and their utility intelligent
network, as far as moving some of this forward.

So, with that, that concludes.

PRESIDING MEMBER PFANNENSTIEL: Thank
you, Tom. I think we'll take the questions from
all the panel together, although it does occur to
me that perhaps the other utilities ceded a lot of
their time to SDG&E. I'm sure SDG&E is
appreciative of that.

But with that said, shall we move on?

MR. HUNGERFORD: I think so. I think
next in line, in no particular order, is Mike
Montoya with Southern California Edison.

MR. MONTOYA: Good afternoon. My name's
Mike Montoya from Southern California Edison. And
this afternoon I'm going to talk a little bit
about our smart grid strategy and some of the
technologies that we've actually deployed on the
Edison system that will help us move forward with
the smart grid.

At Edison, from the top we believe that smart grid with a diverse supply of generation and a more informed consumer is going to be very critical in the future. And so we're working hard to incorporate smart grid technologies as we replace our aging infrastructure.

And so as we looked at that, we decided we needed to have a good strategy to insure that we were going to make prudent investments going forward.

So we put together a strategy that looks at the smart grid, and there's five major elements in the strategy. There's a sixth one that I don't have on this slide, but I'll talk a little bit about it, also.

There's the customer solutions area where you look at being able to have your customer be more informed about their energy utilization. There's the real time operations for the utility that looks at taking AMI type data and utilizing it for outage management. And also for transformer load management and other operational needs.

The other component is our DER and renewable integration. Lots of work needs to be done there. Interoperability comes into mind when you talk about many small generators and renewables out on the system, and being able to understand what they're doing to your system, how much resources are they, and being able to respond to different types of grid operations.

The next big area is grid control, being able to automatically reconfigure and monitor and assess the changing conditions of the electric grid, and actually down the road predict the strength of the electric grid through technologies like phaser measurement units.

And then asset and capital efficiencies. When you look at technologies like phaser measurement units, you can look at how well the grid is operating, and you can push it harder once you have that data in your control rooms. And down the road automatically do it with automatic controls.

And then the last one is workforce effectiveness. We look at how our workforce in the future is going to be utilizing technologies to monitor and look at the grid, and make them more effective as they go forward.

We have a lot of different objectives

that go along with those five different areas. I'm only going to talk about three. We've kind of categorized these as the most important for us to look at first.

And the first is to enable DER integration to improve our grid stability and for customer end-use requirements and improve power supply options for economic dispatch. And by that I mean the initiatives that we're going to look at is how can we utilize energy storage systems as a DER. Distributed generation, we've looked at a lot of microturbines and other distributed generation technologies.

As I mentioned earlier, DER integration and management systems are going to be crucial going forward, because we have to know what those generators are doing, and other storage devices are doing out there, so that we can adequately operate the grid.

And then really the DER strategy development, you know, what and who should play in that space. And what role does the utility have in that space.

And then tracking these generators. If you don't know where they are, you don't know how you're going to be able to plan for them. And so you really need to understand where they're being installed and keeping track of, you know, how big they are and where they're operating.

And then the other big issue, and I know it's way down the road, but plug-in electric vehicles. Those will produce another operating issue for us. We won't know where they are or we're going to have to know where they are if we're going to be successful in integrating them as a resource.

And then microgrids. Other people have mentioned microgrids. We're looking at a microgrid on Catalina Island, which is completely separated from the Edison system. We serve them with generators, diesel-fueled generators out on the island. And we're looking at ways to go with renewables and some storage devices out on the island, and also microgrids to see if we can improve reliability.

And then we have a lot of new loads that are coming on the system. We're seeing distribution harmonics. So, we're looking at the cause and ways to try and dampen those down.

And then universal plug-and-play, DER

interfaces. We're looking at how can we utilize DER to quickly move during emergencies and overload conditions on the distribution system. We've actually built two interface trailers where we can move the -- and roll them in and connect DER under emergency conditions.

The next strategic objective is really based around phaser measurement systems. Phaser measurement systems, I've heard people quote one of the gentleman who was a pioneer who works in my organization on phaser measurement systems, and he says that phaser measurement systems are the MRI of looking at the system where we used to look at x-rays in the past.

So you're sampling at 30 samples per second, so you have a lot of data. You really can look at the system and the condition of the system.

We have developed a software tool to look at the phaser measurement data and do postmortem analysis with our power system outlook software. We also developed a software tool that does real time analysis using phaser measurement data. And that real time analysis is in our control room at our grid control center.

We have a lot of training that needs to be done with the operators, but there's a lot of good data in there.

Voltage and VAR control. We are using phaser measurement data to help control static bar compensator on our 230 kV system. The PMU is about 75 miles away from the SVC. And we've seen tremendous improvement in voltage and VAR control up there.

And then phaser of wind penetration, the renewables integration using phaser data to look at our models so that we can have better models to integrate the wind and also to look at blackstart capabilities.

Then other protection using PMU data. We're looking at that type of application, also. And then dynamic voltage control, and dynamic nomograms, and by nomograms I mean the path ratings and utilizing phaser technology to move the nomograms dynamically.

And then we're also looking at a project and we're working on a centralized remedial action scheme that will use phaser measurement technology to help supervise it. When you know the strength of a system, and the system is strong enough to withstand the condition that the CRAS would operate, you can actually maybe prevent operation of that based on better data.

And we're moving the visualization of the PMU data onto our SCADA system that we're installing now. And then some more predictive grid control system work.

Now, the distribution system, we've been doing distribution automation for many years. We have about 1300 or 1400 of our 4200 distribution circuits that actually have automation with SCADA override. And we also are moving to a next generation substation automation. We have over 500 of our substations that are automated. And these are automated -- about half of those are automated with microprocessor-based IEDs and connected through a local area network. And we're moving to IP-addressable technology there.

For security reasons for years our energy management system and our distribution control and management system have been separated. The EMS handles circuit breakers on our system all the way down to the 4 kV system, and all the way up to the 500 kV.

So we've been a little reluctant to

bridge them. But we see for the smart grid in the future we're going to have to do something in that area. And so we're looking at ways to do that safely.

We also have the distribution automation is islanded from the substation automation. There is some coordination from a timing perspective, but for a smart grid perspective we're looking at how do we really integrate those two systems together. So we're working on a gateway to get those two systems put together. And I'll talk a little bit more about that as I go forward.

And then dynamic voltage control and doing some cable monitoring or overheating conditions.

In summary, on the transmission we're doing SCADA phaser measurement, CRAS, flexible AC transmission systems. We're looking at advanced conductors. We're doing a lot of substation automation and improving on that.

Distribution automation, and I'll talk a little bit about the distribution circuit of the future where we have a circuit that we're using as a test for new technologies. And the circuit is a live circuit; it's carrying over 1300 customers on it. But we're trying out new technologies on it.

And then, of course, our AMI and demand response and distributed resources on the distribution.

Typical distribution circuits. You look at the substation. They come out and they feed and have paralleling points between other circuits. What we're doing on the distribution circuit of the future is we're doing some research with DOE and CEC on fault, solid state fault current limiters. Short-circuit duty on the electric system is getting quite high, and we feel a need to do more research in that area and get control of that.

We're looking at vacuum instead of oil-type equipment, and fault interrupters instead of just pull switches for the automation. And with the DOE we're doing an advanced protection scheme where we've actually connected a centralized controller and microprocessor relays on the distribution ARs and fault indicator -- fault interrupters, excuse me.

And it automatically reconfigures the system and isolates the faults to very small pieces of the system, so you know you can dispatch your crews to the area where there's faults and you can also know, you know, just how many customers you have in the small section that is off.

And then we're doing fiberoptic duct temperature monitoring systems. Distributed generation, we have an actual connection point on the circuit of the future for DG. And multistate capacitor transmission technology for distribution use to help with power quality and other issues on the distribution system.

And then secondary networks to look at how do we maybe improve distribution reliability. And that's the circuit of the future. A lot of work will be going on on that circuit. We have a lot of other things that we want to do there, and we're going to continue to use that as our test.

Smart grid and smart connect, as our enabling technology. Our customers, you know, are going to have more choice, demand side management. They can choose how much they really want to pay and conserve power.

We have a new partner, our transportation, and I think down the road they may be a viable source of generation.

And then we have the advanced generation, both the renewables, energy storage, to help integrate the renewables. Nuclear. Clean coal, carbon capture and storage and distributed generation. And really the goal here is to lower costs and higher reliability for our customers.

Smart connect, I know there's going to be another meeting in a couple weeks on this, but this is kind of our technology map. And just how we're approaching this. We have integrated on/off switch so that we can remotely turn on and off service to customers. There's an interface to the home area network; got energy and voltage measurement.

Outage detection, which will help us with our customers and our customer communications. And be able to insure that we can give them good and timely information. And tamper detection, we won't have to go out and touch the meters again if we have to change any firmware, so it can all be done via the radio network.

This is very paramount to us, too, is robust security. It's very important to us here, as well as on the extra high voltage grid.

And then, you know, our network, telecom network is designed for flexibility and very secure; -- 900 megahertz RF lan. And Zigbee for the home area network. And cellular-based -- for flexibility, for technology changes.

And what a smarter grid means to customers. Enhanced utility service, reliability. A more stable, higher quality electric supply. Shorter customer outages, faster service restoration. What we keep calling as a self-healing grid. And new customer programs and service options. And increased customer control of energy costs.

And then our vision for a clean energy future. Integration of information technologies and energy technologies with renewable, clean generation, coupled with the smart grid, coupled with our smart connect system. Connected home, and other types of storage type resources will lower our carbon fuel mix and help our energy management and efficiency, which should reduce costs and rate pressures, and meeting customer expectations.

And with that, hopefully I made up a little of the time.

PRESIDING MEMBER PFANNENSTIEL: Thank

you, Mr. Montoya. Now, PG&E.

MR. TANG: Good afternoon. I am Andrew Tang, and I am the Senior Director of the Smart Energy Web at PG&E.

We've heard today from the CEC, from EDF, from the California ISO and from the DOE on everyone struggling to give us what the definition of the smart grid is. In putting this presentation together to talk to you guys about how do we define this, we took a slightly different tack. So I'll circle back on, you know, how we're looking at trying to define the smart grid.

But first, I wanted to talk about the path that we see from AMI to smart grid. I think it's been made clear by a lot of people that people do view that AMI is an enabling communications layer or a building block upon which we eventually get to the smart grid.

If you look at where we are today in the -- and this is really across the nation's utility space, what we really have to date is an energy infrastructure with very limited coms. Some have more coms than others, but in general, limited communications, limited sensors, limited knowledge of really what's going on, and relying on physics where electrons go to the point of least resistance. That's where we are today.

What AMI is serving to do, though, is serving to put in this next layer which is the communications infrastructure. So how do we actually find out data along our aging grid. How do we actually find that data and bring that data back.

Well, once that data comes back it's just bits and bytes of data; it's not very useful. So the element, and we've heard this from other people today, as well, but the element that you need to layer on top of that is the computing layer, the computational layer. You actually have to do something with the data.

What is the VAR data that you're collecting and you were talking about collecting something at 30 samples a second. Well, once you collect it you've got to interpret it, right. What's it telling you to do.

And then we would posit that the smart grid is really these sets of business applications that once you've done the computing and you've actually calculated something with the data, this is what you do with it, right. These are the applications that sit on top of that data. And this is how you benefit from that data.

So, again, this is a little bit repetitive. I'll go through this slide very quickly. But, you know, today we have capacitor banks, closers, switchers, transformers, meters. The communications layer that people are talking about, well, people are talking about -- power line, fiber-based networks, this new wireless technology called WiMax, the home area network, cellular networks and RF mesh. And I think that it's a pretty safe thing to say that the three California IOUs have really centered around RF Mesh as that great balance between what is the right amount of data capacity balanced by what is the right amount of costs to be passing on to our customers.

This computational layer is something that is, that, you know, we are in the midst of implementing with our smart meter program currently. We've got WebPresent is one of the key elements.

And then as we look at the applications we divide the applications really into three categories. And these three categories pretty much match the way we look at our business, right. If you look at the way -- I mean most utilities, if you look at the way they're divided they'll have groups that are focused on generation and supply; they'll have a group that's focused on the actual grid or the transmission and distribution portion. And then they'll have a group that's focused on usage, demand and really the customer-facing applications. So that's here on the right.

And so what we've done is kind of the opposite. Instead of trying to define and say what is the smart grid, we've kind of turned the problem upside down and said, okay, what are people calling the smart grid, right. And what are those applications that we're going to have to implement on top of our grid in order to deliver these things that people are calling for.

And so if you look at it, and you look at -- and I'll just highlight a couple of these -- but if you look at generation and supply. So, you know, California is a leader in the solar space, right, in home-based photovoltaic.

And, you know, one of the issues that we all have to confront with right now is -- and we all have solar net metering programs. Well, one of the issues that we need to start confronting is that right now we have net metering coming back, and we have power coming back onto the grid. It's small amounts of power, so it doesn't really create huge imbalances on the grid. It doesn't create problems for the ISO.

If we continue to believe, though, that this is the future, and that this will actually gain traction, and we continue to believe that other forms, like solar, of these kind of distributed microgenerators are coming onto our system, well, we have an issue.

And the issue is that we now suddenly need to track these 1 kilowatt, you know, 2 kilowatt, 3 kilowatt micro amounts of power that are coming onto our grid, we're going to need to be able to track that information and be able to process that information and get that information to the ISO so that we can really be looking at grid balancing, right. So that is a key element that we see on the generation and supply.

And then the other things like, you know, distributed generation i talked about, distributed storage. Well, if you think about the plug-in hybrid electric vehicle, what is it. It's a mobile distributed battery. It allows you to Tivo power, right. Users can basically charge it up overnight, and that power can be a usable, dispatchable resource in the daytime.

Now, that is a 15-year-away vision. I don't want to get anyone too excited about it, but given the utility planning cycle, and given the similarity that we have to other things like solar, that is an issue that I think the industry needs to confront now.

On the T&D section, you've heard a lot, and Mr. Montoya over here talked a lot about what SCE is doing with respect to grid automation. I mean I would echo a lot of what he's talking about with the circuit of the future, and the T&D automation in particular, distribution automation. You know, the need for us to move towards deploying FLISR scans, which is, you know, fault location isolation and service restoration.

The ability to take that information, to view and predict where we have vulnerabilities in our grid, to be able to send crews out in advance, to be able to do that. To be able to manage outage properly. To not leave a particular neighborhood until we know, through our smart meters, that every home in that neighborhood had been restored.

So not only do we gain customer satisfaction if we're able to achieve that, but we actually lower operating costs, which is good for everyone, because we lower the overall -- we lower overall rates, right.

It's the operating efficiency of going out to a neighborhood once; getting every person in that neighborhood back online before leaving that neighborhood.

The other point that I would bring out on that, as well, without outage management, is, you know, knowledge is just going to lead to reductions in SADE, SAFE and CADE (phonetic). It's just going to improve reliability. As long as we can collect that information and act upon that information.

The last area that I wanted to talk about in this slide is really the usage demand or the customer facing type applications. And this would be things like, you know, progressive rate schedules, like interval billing, time of use, load control like demand response programs.

And really the challenge on demand response programs, also, because we have, you know, the California utility space has been very good at pursuing demand response. The issue has been cost effectiveness. And the cost effectiveness factor has been driven by the fact that the communications to talk to those special meters that we now put in place at those customers' locations are very expensive. And the networks to get that data back are very expensive.

So if we are able to leverage, which we should be able to, but if we're able to leverage the smart meter investments that the three IOUs are making, we have a communications infrastructure that's being put in place. The marginal cost to be able to support these programs should be approaching zero.

And basically what that means is that really opens up the opportunity for demand response programs to go after much smaller loads.

The final area that I wanted to talk about here would be really the energy management systems. And, you know, really this is kind of the Jetsons-esque, you know, view of the future of inhome displays and computers actually dictating what appliances should be on or off, and how do you load shape the individual amount of power consumption at a particular home is actually using.

Now, the issue here is that, you know, the technology actually exists today. So I would posit that the stuff isn't really too pie-in-the-sky. And it really isn't very Jetsons-esque, okay. If you look at the developments that many people here refer to that's happened in the computer space, in the internet space, this stuff exists. The fundamental ability to control a washer and dryer, figure out when you should be running that, or to set a timer so that you run that at 2:00 a.m., as opposed to running that at 7:00 p.m., so that if the consumer closes the door on the washer and turns it on at 7:00 p.m., it doesn't go on until 2:00 a.m. All that technology exists. This is not rocket science, right.

The issues are how do we bring this to market, right. And one of the areas is, and a lot of people have talked about standardization and the importance of standards, and I would echo and completely agree on the importance of standards.

On the home area network, which is the

inhome network that we plan on using on this, you know, we plan on aligning with the other two utilities on the 2.4 gigahertz Zigbee standard. You know, there's an open -- there is a Zigbee Alliance Committee which is working towards standardizing that technology and making sure that the interoperability happens. That's the key, guys. It's the interoperability, right.

It's like, for instance, why do we take for granted now that we have a computer that we bring home into our home that hasn't been in our home before, but if we plug an ethernet jack into it, or if we turn on that wireless WiFi radio, it should find our network. And it should work. And it just does, right.

So I would argue another thing, too, is that, you know, as we struggle and talk about the need to define standards, let's also focus on the fact that we don't need t reinvent the wheel here, right. Let's take advantage of the billions of dollars of investment that have happened over the last 20 years on developing internet protocol technology.

Now, internet protocol technology does not mean that we need to have broadband to the meter. Internet protocol -- IP-based open standards technology can exist in a narrow band or medium band communications layer.

The last element that I think is a little bit of a stumbling block, though, in energy management systems is really the business model. We spend a lot of time talking to venture capitalists and entrepreneurs in Silicon Valley about these energy management systems and about how do you bring them to market.

And really the issue is, you know, there is a lot of excitement and a lot of opportunity and a lot of view that there is a huge opportunity here. But the issue that a lot of the entrepreneurs and a lot of VCs are stuck with is what is the business model.

Are they going to sell products and devices to the utilities and the utilities implement? That's a model. Or are they going to somehow have to be in a position where they sell the devices directly to consumers, and therefore they collect money from consumers. It's a tougher model.

But these are some of the issues that I think we need to sort through. And I think the way the demand response programs are structured, right, where we have third-party aggregation, but at the same time we also have utility-sponsored programs. I think that can serve as a model for where that space needs to go on the home area network.

So getting back to the grid and what is the smart grid. I mean, so this is our view or representation of today's grid, with very limited computing capability and very limited communications capability.

So obviously there's communications between the transmission operator or the ISO or the RTO, the distribution operator and the load-serving entity. And there's some communications to some switches. There's communication through SCADA to substations.

But generally what you'll note is that all of this element of our grid we can't communicate to, we don't communicate to.

So where do we need to get to? We need to get to a place where -- and I'm just going to try and bring these all on -- but where we have robust, vibrant communications between all layers of the network. We just start thinking of this as a computer network and all elements.

And we need sensors along the way, right. We need to be able to sense what's going on in that network, we need to be able to redirect power flows; we need to be able, in essence, to turn the grid from a one-way device that takes power from centralized generation down to an individual home. We need to turn that into more of a Mesh network, almost like the communications networks they were talking about.

But we need to turn it into a two-way robust Mesh network where things can flow bi-directionally and be switched on and off.

And my, I guess, next-to-last slide is I wanted to drill down a little bit more and talk about the home area network. And really, that's the opportunity of what we call distributed computing.

Again, taking a page out of the book of what happened in the computer industry, right. And this is one of the key points why we don't see the need to have a broadband network to that meter, okay. But taking a key page out of the page from the computer industry, if you think of what happened in the 70s, and really in the 80s and 90s, where the combination of Microsoft and Intel created a very very powerful personal computer, right.

And so you have all this processing power that used to be in the mainframe centralized in a computer -- centralized in a company somewhere in some location. And people had to schedule time of when they were going to talk to that mainframe computer.

Well, the distributing computing era basically moved that power to the very edge of the network, to people's desktops and allowed them to take advantage of that.

What we foresee for the smart grid and for the smart meter upgrade project, as well, is the exact same parallel movement, okay. The meters are becoming smart. And you've heard it from my colleagues here that we have unprecedented levels of sensing capability within the meters.

We're looking at deploying meters that have processing capability. We're looking at meters that can actually house little programs. And these little programs will tell the meter what -- will actually interact and say, tell what to do in the house if the utility sends a pricing signal, for instance.

So, if we create programs that are price-responsive, we send out a little pricing signal saying hey, the price has hit X. And once it hits X, there's a little, you know, the meter that sits on the side of the customer's house, goes ahead and executes a program.

So, that's our vision for the home area network. I think you see elements of this through demand response programs. They haven't been centrally coordinated, and I think the smart meter upgrade programs that the utilities are undertaking right now are our opportunity to coordinate this under kind of a centralized view.

And then the -- wanting to get us back on schedule -- the last slide I have here is really where we are today in deployment, and the benefits that we think we can achieve. And really where we want to get to. The near term is really the next five to ten years. And in the future is really kind of ten years and beyond.

But this is our view, kind of as we lay it out on a roadmap and try to apply time on that axis. This is kind of where we stand as far as what we'd like to do and what we'd like to see towards pursuing the smart grid.

Thanks for your time.

PRESIDING MEMBER PFANNENSTIEL: Thank you. Questions, Commissioner Rosenfeld, of the panel?

Commissioner Chong?

COMMISSIONER CHONG: Thank you. This question was for Andrew. I was curious what led the IOUs to decide on the Mesh, RF Mesh, as opposed to other communications infrastructure on your slide, I think it's 3, smart grid components?

MR. TANG: Yeah, absolutely. So, you know, we have existing cellular networks in the -- cellular data networks that exist in the world today.

As we had the discussions with those people that own those networks, the Verizons, the AT&Ts, and the Sprints of the world, we quickly came to the conclusion that it was just too expensive. Okay, it was on the order of -- we would have to spend several dollars a month per meter in order to be able to communicate with our meters. So we found that solution to be cost prohibitive.

The other issue on that space in

particular is that those companies have a very very fast cycle time where they spit out technologies. So what happens, we run a very significant risk of stranded assets by partnering with the cellular companies.

See, they're in a world where handsets actually, individual people switch out handsets every 18 months. So when they want to swap out a network technology, what they do is they deploy two parallel networks and they wait about two years and they run two parallel networks for two years.

At the end of two years they figure that most of the people have swapped out devices. And for those that haven't it's either such a small percentage -- it's such a small percentage that they decide to give them new, less-featured phones on that new network, right.

We don't have that luxury, right. I mean we have an issue here where we want to put a meter in, and we want that meter to be good for 15-plus years.

So that really quickly led to the cellular guys not being viewed in a very positive light.

WiMax we think is a very very promising technology, but the reality of the matter is it's just not deployed yet. And to have our schedule and our business cases be beholden to a third party's deployment schedule we felt was untenable.

The fiber and NPL route, if I had unlimited resources I would love to deploy fiber along every single one of my main lines, and I'd love to deploy fiber to every single home. I don't have unlimited resources.

You know, I think it's somewhere between a 5X to an order of magnitude difference in price to be looking at a fiber or BPL network.

And so that really left us with the RF Mesh networks.

COMMISSIONER CHONG: Well, will it achieve everything that you want to achieve in your future smart grid on page 5?

MR. TANG: We think, Commissioner Chong, from the -- to the home standpoint, we think it absolutely will achieve everything that we wanted to achieve. And one of the key drivers behind that is because of this constant thing, we're moving towards distributed computing. That the meter is actually a little computer at the home, and the meter can have resident programs, right, that can be run.

And to control that program in that home, it's very very like, you know, it's very very small packets of data that actually need to communicate with the meter, to actually make the meter do something, okay.

Now, there are elements. So, for instance, when you hear about what Michael's doing with the phaser thing, and that you're actually scanning that 30 times per second, where you're getting data inputs of the health of that circuit 30 times per second. The RF Mesh networks are not capable of doing that.

However, you're doing that at more of a distribution centralized level. So there's always the opportunity for us to go back in and replace our, what we call the WAN, the wide area network, or our take-out points for our RF Mesh network, to replace that with either fiber or broadband over power line for that isolated application.

COMMISSIONER CHONG: Well, you were using that very interesting computer analogy, Andrew, and I guess what I'm worried about is as time went on from the beginning computers, you know that pc's now have much more powerful computing capability, RAM, hard disks, et cetera, et cetera, speed, as time goes on because everything progressed. We didn't know 20 years ago that you'd be downloading video on demand.

So I guess I'm really concerned that we're truly thinking through what future applications we might truly want when we look at the ultimate future smart grid to make sure that we're building in appropriate upgradeable technologies, particularly in the meters. Because if you're telling me you want that meter to have a life of 15 years, then you'd darn well better be figuring out what you might need in the meter for 15 years, and make sure that it has that capability in it.

MR. TANG: So I think you'll never get there on 15-year future proofing. And I think the issue is that if that meter can also serve as a gateway and a pass-through.

A lot of the companies that we've talked to about energy management systems, they basically say, you know what, you talk about inhome displays and all these other things. And we've talked about whether or not we need to create refrigerator magnets or other, you know, forms of actual physical inhome displays.

A lot of guys in the, you know, in the Valley will say, guys, you have the ultimate inhome display already. It's the pc. Right. It's the computer, why not use it. You've got the processing capability --

COMMISSIONER CHONG: Well, we have it in some places, but not everybody has the ability to afford internet connections. That's the problem, Andrew, that's the other part of my job.

So, yes, in urban areas I'm pretty sure that 96 percent of the people will probably be able to get it. But in the rural areas right now 57 percent can't afford and don't have broadband. In 4 percent of my state nobody even has access to broadband.

So, yeah, ultimately we hope to get there, but we're not there yet.

MR. TANG: But on the HAN?

COMMISSIONER CHONG: Home area network?

MR. TANG: The home area -- sorry, the home area network --

COMMISSIONER CHONG: Yeah, if you guys could really take it easy on the acronyms I'd really appreciate that.

(Laughter.)

MR. TANG: On the home area network, so you would use the pc potentially as your inhome display. The pc does not need an internet connection, right. What we're talking about, and I know what Southern California Edison included in their case, as well, are these little, you know, these little devices, these little modems, essentially, that would look like a USB stick that would attach to your computer; that would then give you the ability to communicate with your meter.

We're trying to open up that communication with that meter --

COMMISSIONER CHONG: Okay, but you still have to have a computer, is that what you're saying? Or you'd have an inhome device in which the stick goes in?

MR. TANG: Well, I'm saying you could either have a really low priced inhome device or you could leverage the fact that a lot of people do have pc's. And the pc can communicate with that meter.

COMMISSIONER CHONG: Yeah, okay, I

follow you from a technology point of view. But, you know, you have to understand that I'm also concerned about our low-income consumers, so I think I'm just having a little bit of an issue here.

Okay, --

MR. MOHN: May I offer another perspective?

COMMISSIONER CHONG: Yes, of course.

MR. MOHN: The issue that you bring up and that Andrew has spoken to regarding the fact that devices will be digitally enabled, you talked about RAM and CPU requirements, central processing unit requirements.

This is an issue that doesn't strictly limit itself to the discussion of smart metering, AMI or electronic meters or home area networks. It's a fact that every device that we're going to be purchasing in the future on the distribution grid and the transmission grid will have some form of computing technology built in.

What's occurring is we're going through this major metamorphosis and the types of assets that we're procuring are going to have this capability of performing more duties. But because they do have software in them, they're going to want to evolve at a much quicker pace than they do today.

This is a regulatory hurdle that we're facing. Right now the assets that we procure typically are depreciated at 20, 30, 40 years. We know that the digital economy doesn't provide for that type of framework anymore.

What we're asking for legislators to think about is that a new form of depreciation is going to have to be considered.

Two things result from this. Number one is that we can incorporate lower costs computing capabilities in our core assets, whether that be the transmission distribution grid or smart home.

Also, though, if we are able to replace that technology at a much faster pace, as technologists build new capabilities into the future generations, we can incorporate that at a much faster pace.

So actually what happens is you start out with, you know, a seven-year lifecycle on an asset. In seven years you replace it with something even more capable than it has today.

So you become much smarter at a much

faster pace because you're incorporating this new technology at a faster pace.

COMMISSIONER CHONG: Okay, so you're suggesting that there's a regulatory problem having to do with the depreciation rates.

MR. MOHN: This is a consideration that -- yes. This is a concern that the entire United States is considering. And, as a matter of fact, this is one of the areas in the federal legislation that we're trying to get adopted right now.

PRESIDING MEMBER PFANNENSTIEL: I have a couple questions. The first one will follow on Commissioner Chong's whole question of the metering and whether the new meters going in now were selected in each utility to be compatible with a smart grid.

Then if they weren't selected that way, are they, in fact, compatible. Or are they in a very short, about the time they get put in, going to be considered one of the legacy systems that you just have to deal with because they're there, or try to depreciate them more quickly.

How are you thinking about, for each utility, your current AMI progress?

MR. TANG: On behalf of PG&E internet protocol was really a key, IP, end-to-end, was really a key determining factor in our smart meter upgrade evaluation. So, --

PRESIDING MEMBER PFANNENSTIEL: So your upgraded meters are compatible?

MR. TANG: Well, the meters that we want to deploy with the case that we have before the Commission --

PRESIDING MEMBER PFANNENSTIEL: I see, right.

MR. TANG: -- are compatible.

PRESIDING MEMBER PFANNENSTIEL: Edison?

MR. MONTOYA: We designed our meter infrastructure with the thought that we were going to take advantage of it for the smart grid. So, it's open architecture; it's open communications. And we had that in mind to take advantage of the communications.

PRESIDING MEMBER PFANNENSTIEL: And if it, following up for both, you're also thinking of a 15-year life for these meters. It's going to be -- how are you going to think about its compatibility by year ten, even, when things change a lot? Are you looking for a faster depreciation? Is that how you're going to deal with that?

MR. TANG: I think that we are all consistent on supporting federal legislation that does look for a faster depreciation of meters.

But, you know, absent that movement, I think also, you know, there is a belief that the ability to download software onto these meters without having to actually physically go out to each individual meter premises, or each person's home, is a really good hedge for us.

Because, as advancements come in technology, a lot of those advancements are in software. If we stick with open IP standards, the IP, internet protocol standard has been a standard for, you know, many many many years now, right. And evolutions of that always have to be backwards compatible. The standards body actually dictates that.

MR. MONTOYA: And when you think about the AMI program, you know, as my colleague here says, it's very true. And when you look at control systems for the grid, itself, many control systems out there have the same protocols and technology that they've used for years because of the small amount of communications that's necessary to operate a high voltage piece of equipment.

You're, you know, commanding an open, are you commanding a close, or are you taking a reading. It's, you know, so you have to look at it from both perspectives, the grid side and the AMI side.

PRESIDING MEMBER PFANNENSTIEL: Tom, Terry, anything additional?

MR. MOHN: When we talked to the vendors supplying us our smart metering infrastructure, we had some fundamental interoperability requirements. And Andrew articulated it very well in the fact that our lowest common denominator was the fact that we want to standardize.

If you look at the stacks of technology, the lowest level stack is how do the pieces of hardware connect to one another. In the radio system, how does one radio talk to another radio. We call that the link layer for communication.

The next layer above that is the transport layer, which is the internet protocol. And above that we have various layers of application space.

When we articulated our requirements to our vendor community we said we want to standardize on the transport layer. The economics of the meters, the economics of the radio systems are really based on the differentiators that the vendor community has for providing that core technology to us.

As long as they expose our minimum level of requirement, which is the internet protocol, they're free to choose any lower level technology that they want.

So how do we prevent that from stranding us into adopting their specific technology. The way that we chose, and I think the other utilities have chosen, we have a multi-tier environment. One tier is the backhaul communication from the Mesh takeout point to our back office, which we call our head-in system. That WAN communication system today could be metropolitan WiFi, it could be WiMax; it could be broadband over powerline.

From an economic perspective, we will look at every vendor's recommendation. And they will choose the technology that best suits their business model.

We'll compare that business model and

their proposal to us based on their economics and their ability to serve our fundamental requirements.

But when you get from that takeout point, some vendors call those collectors, that collector to all the various meters, that will be a static technology for the length, the lifespan of that electric meter.

So, how do we prevent vendor lock-in. What we do is we look at the collector technology. As long as it can communicate to those meters, we're safe. So we can change out that collector technology in three years, five years, 15 years.

So, as technologies advance, they become more capable, the cost effectiveness of higher through-put technologies come available, we can replace the collectors, which are far less expensive in quantity than replacing the electric meters.

So what we do then is we require then that the collectors always have the ability to connect to the electric meter, but the collectors, themselves, can be changed out. And so therefore the backhaul communication to the head-in could be changed out.

So we can take advantage of advances in technology. We can actually place additional, you know, multipliers of collectors in the same service territory that originally started with let's say one collector per 500 electric meters. We can double that and say one collector for 250 electric meters.

So we can add more capability in the choice of our design, the choice of our architecture, as those technologies advance.

So, I think that we're pretty safe in the way that we've designed our architecture.

MR. BIALAK: And I would just also add that as far as looking at sort of the future smart grid kind of technologies, those were functional requirements that were put into our bids for our metering and communication systems.

PRESIDING MEMBER PFANNENSTIEL: Thank you. One other point that's a little more, I think, conceptual. Richard Schomberg talked about the smart grid as really the system requirements for each party that thinks about it, what are your system requirements. And Andrew referred to PG&E's as sort of the business application, how do you use this, which I think is pretty comparable system as what Richard was talking about.

But then the question is if each of the utilities, which is the investor-owned utilities, each of the publicly owned utilities, has, in essence, defined its own smart grid according to its own requirements.

Are we assured that from an Independent System Operator standpoint, for example, that this is all compatible? The real question, I think, that we, as public policymakers, need to deal with is to make sure, you know, perhaps at Commissioner Chong's level, to make sure that each utility was using its resources efficiently. But I think at the larger level, to make sure that these are all compatible with the needs of the state and perhaps starting with the Independent System Operator.

So, how do we assure that each of your independent system requirements are -- they won't be the same as, but are certainly consistent with the requirements of the ISO?

MR. MONTOYA: I might take a shot at that. The technology I highlighted on the transmission system is the phaser measurement units. And we're working very closely with the ISO, and through the North American SynchroPhase

Initiative, as far as making sure that that technology is capable of providing the ISO the data that they need, and also all the needs that we have in trying to create standards and things like that.

So from a transmission perspective I think the collaboration and that technology is --

PRESIDING MEMBER PFANNENSTIEL: So you have built that into your system requirements?

MR. MONTOYA: For the phaser measurements we're developing those standards as we speak, yeah.

MR. TANG: And I would also add that, you know, the activities that we're doing, that all the utilities are doing with the MRTU, with the market redesign, with the ISO, you know, that is a big focus. Which is, you know, what type of information does the ISO need. And kind of in what sort of timeframes does it need that information.

So I think that's how we're trying to align on that level. Because the ISO's driving us, as far as this is the way we need information.

PRESIDING MEMBER PFANNENSTIEL: Okay. Thank you.

MR. BIALAK: And I would also add that I think if you look at some of the activities that have gone on today, the open HAN, open AMI, I think there's a general realization amongst the IOUs here that it doesn't do us any good to sit there and specify one particular type of technology for us, when the reality is we're looking at doing this within our service territory, but also doing it statewide.

` And so getting everybody on the same page, coming to some consensus as to what the functionality of those particular systems should be is a real important step to make sure that you don't get into that particular problem that you just suggested.

PRESIDING MEMBER PFANNENSTIEL: Thank you. That's the assurance I needed.

Anything further? Yes, Commissioner Chong.

COMMISSIONER CHONG: I guess to follow up on that point, I assume that in this process you're also keeping in mind the consumer interface. If you have somebody who moves from L.A. to San Francisco, you'll want to make sure that the interface of their devices are hopefully consistent, at least in a basic way. So that they don't end up with devices that are not interoperable when they change between utility service areas?

MR. TANG: We've all standardized on the Zigbee profile --

COMMISSIONER CHONG: Okay, so the Zigbee takes --

MR. TANG: -- over the HAN.

COMMISSIONER CHONG: -- care of that issue.

MR. TANG: Yes.

MR. MOHN: Well, let's -- the fact is there's a broad list of vendors that are trying to approach this consumer market. So, it's great, and I agree that the three utilities here in California have agreed on a communications standard within the home. But that doesn't mean that the consumer already owns that. The consumer may have chosen a different internal communication building automation standard.

So we worked very closely with companies that recognize that there may be a gap that needs to be bridged. And that just so happens to be the name of the technology. There are bridging technologies between what we are offering and what consumers may choose to purchase on their own.

A good example of that is HomePlug. A lot of consumers, they want to move information around using their electric wires within their house. So, HomePlug was their chosen building automation technology. Companies are offering bridges between Zigbee and HomePlug today.

So we think that consumers have already been recognized in the way that we've chosen to adopt a communication vehicle with them. And we see that that particular area will continue to thrive.

COMMISSIONER CHONG: Richard talked about the need for a conductor in this smart grid area. Does your company agree that someone should be moving people towards a common definition or a common set of milestones and standards? Or do you not? Do you think it's happening by itself?

MR. MOHN: From my perspective, looking at what's occurring particularly through operating with the GridWise group, there's two GridWises, the GridWise Alliance and GridWise Architect Council, I think that the Department of Energy has really been a good steward of driving the industry in the same direction.

The GridWise Architect Council, last year, published their framework for interoperability. This was a seminal piece to begin the discussion about how all participants work within our future design and implementation strategy.

It talks about people, processes and technologies. It talks about how do we evolve as an industry to achieve the same level of agreement on every facet of interoperability, whether it be at the distribution level or at the consumer level.

So, from my perspective, and sharing the belief of the Alliance, we believe that that steward does exist, the conductor, if you will. The DOE has done a remarkable job. If I may say, five years ago they published their vision 2030. We're five years into that. So far we're on track.

So, through the visioning work that they did and the realization that they didn't do this on their own, they incorporated a wide array of stakeholders to make this recommendation to the industry. It looks like it's pretty much on track to achieve the goals.

So, in terms of a conductor, I think that we have one.

MR. TANG: Yeah, I would agree with that, with what he's saying. I think interoperability is going to be crucial, you know, with all these different sources of energy and different technologies. We're going to need to have some standards and some ways of having, you know, all the system being able to operate together in a cohesive manner. So I would agree with that.

MR. MONTOYA: And I would agree, as well. Interoperability is the key, right. Interoperability is absolutely key, and that's not an easy process.

PRESIDING MEMBER PFANNENSTIEL: Right, but I guess what Commissioner Chong was specifically asking is has that been assured, and what I'm hearing is that, yes, DOE has assured that interoperability.

MR. TANG: Well, I would state from what I heard this morning --

PRESIDING MEMBER PFANNENSTIEL: DOE process.

MR. TANG: -- from the DOE person that spoke to us on the phone, I think the interoperability and standards was one key area that they recognized and realized that they needed to take a leadership position in.

And I just -- I'm saying I welcome that.

COMMISSIONER CHONG: Yeah, I do, too. And I think that's the concern of the PUC and the CEC, speaking generally here on behalf of all of us, is that we want to make sure that these systems are interoperable. And that I mean that in the broadest sense of the term, you know. Not only between you and the California ISO, but between the POUs and the IOUs discussing it with the ISO; also between you and your consumer, and the consumers within the State of California.

Now, I want it to be as simple as possible for a consumer, for example, to understand what we're doing. And then, of course, we all want to make sure that we do everything possible to get the California ISO what they need.

You know, I see this grid becoming a much more complicated grid in the future with all these renewables coming online, people generating their own electricity in their home, you know, unbelievable complications.

And so part of what makes me feel better about it is that I believe we are on the right path to have much more sophisticated systems that will be able to talk to each other and manage this on a minute-by-minute kind of basis.

But I also want to be clear that in my view, anyway, it's very important that we push that intelligence as far out as we can, into every part of the network. And I personally have a lot of concern about what's going to go into the meter. I also have concerns about what systems you're using to make sure that we're always upgrading, from a communication standpoint, when you're talking about your collectors back to the head-in, and what you're using for backhaul.

I also have a big concern about security. You know, we are in an era of terrorism. And so I want to make sure that whatever you guys are doing is up to the highest quality in terms of cyber-security.

So I have a lot of concerns about this. And I don't want to just push it off and say, oh, DOE's got a great policy and so therefore let's just go with that process. You know, I want to make sure from California's standpoint that we are really looking at all this very hard, and that we're doing all the things that need to be done to make sure this is the very best kind of system that we can devise, together, in the state.

Okay, I'll get off my soapbox.

MR. MOHN: I think that we all agree with you, particularly that last statement regarding security being a major issue.

Recognizing that the three California IOUs were the founding members of open AMI, we were the founding members of the open HAN group, home area network. As a result of those discussions in open HAN -- open AMI, I'm sorry, we recognized that the whole issue around security for the metering systems was not well defined.

And so we created a group specifically focused on end-to-end security from the consumer's device all the way back through whatever number of gates, whatever number of tiers that exist, back to the head-in, that that security was in place.

So, we are very concerned like you are. And we're taking the measures, you know, uniformly as a collection to insure that we are stipulating to the vendor community what exactly we expect from them. And so we're helping them define what those requirements are.

COMMISSIONER CHONG: I promise this is my last question, Commissioner.

PRESIDING MEMBER PFANNENSTIEL: Go for it.

COMMISSIONER CHONG: My last question is about the regulatory barriers. A number of you referenced regulatory barriers. And one of them just says complexity, that was SDG&E, which seemed a little vague.

I also think that probably rate structures is an important barrier at present. We're working on that right now at the PUC. But I was wondering what complexity meant. This was page 5 of the SDG&E presentation on the regulatory challenges.

MR. BIALAK: Basically the complexity gets into we have all these issues; these are all long-term issues. The question becomes if you want a longer term sort of approach, longer term vision, there has to also be sort of that regulatory certainty, if you will, in insuring that we have recovery, that we can build the rates and structures in place, that we can move these things forward.

And that that's the vision, that's the longer term vision, and that everybody agrees and buys into that vision. And it's not something that changes out four or five years down the road.

So when something else, you know, a new technology or new system comes in place, that the vision still remains, the Commission's still supportive, the regulatory body -- legislators still supportive, and that we are heading down that path.

And from that perspective it's complicated because you're now sitting there, you know, there's always various things going on within the state. And so assuring that sort of regulatory certainty occurs ultimately reduces the complexity for us as far as how do we manage this. How do we manage these types of things moving forward.

COMMISSIONER CHONG: Do you believe that there is support in the State Legislature for smart grid initiatives? I am aware of a bill pending right now.

MR. BIALAK: Yes, I am aware of a bill, as well. I believe that there is. And it exists today. And the real question is will it continue to exist. That's really the genesis of my comment with regards to regulatory complexity.

PRESIDING MEMBER PFANNENSTIEL: Commissioner Rosenfeld, do you have a question?

ASSOCIATE MEMBER ROSENFELD: I have a question which is trivial compared to these global questions of security and so on.

But you made one phrase that I wanted to ask you about. In your discussion of the home you had a meter outside the home and you talked about it being a smart meter controlling things within the home, including -- well, I don't know if you mentioned it, but including the temperature. So you preprogram that.

We've actually talked about having that as a separate piece of intelligence called the communicating thermostat. Is there a conflict there between those two?

MR. TANG: No. Something, so in order to get to the programmable communicating thermostat in the home --

ASSOCIATE MEMBER ROSENFELD: Yeah.

MR. TANG: -- the utility would need to go from the meter and then from the meter into the home.

ASSOCIATE MEMBER ROSENFELD: Yeah.

MR. TANG: So it's just a hopping point.

ASSOCIATE MEMBER ROSENFELD: Okay.

PRESIDING MEMBER PFANNENSTIEL: I have really an observation rather than a question. And it was triggered earlier in somebody's comment.

But, as I see the smart grid, one of the capabilities is going to be this instantaneous ability to detect distributed generation, for example, or renewable energy. And I think that that's playing into the concern that we're hearing from the utilities now, and from the ISO, about, in essence, large quantities or even too much renewable. How can we integrate that much renewable energy into the system.

And there's work ongoing, work going on here, work going on at the ISO, I believe, at the PUC to answer that question, how do you integrate. It's going to be one of the questions we're going to ask in the Integrated Energy Policy Report this year, and probably next year, also.

But really trying to consider is there a limit to how much renewables our system can handle. And are we, you know, is it going to cause enormous disruptions or enormous costs to integrate large amounts of renewables.

And from what I heard actually this morning and then earlier, it sounds like the smart grid might be smart enough to help us through this, if not resolve the problem entirely.

So, I offer that as an observation. If anybody wants to respond, you might. Otherwise, I think we're going to find that is something that we will consider when we get to the discussion of integrating renewables.

MR. BIALAK: I'll give you a little bit of background. Today, depending upon how much renewables or distributed generation is interconnected to the distribution system or transmission system, ultimately at a certain level you will trigger capital upgrades necessary to accommodate the actual amount of generation.

So, let's say if you reconductor, for example, on a distribution line, if significant amounts of distributed generation were to be placed behind a small conductor, you may need to reconductor that.

Conceptually, as you move forward with a smart grid, you now have the ability, given the data and given the information, to be able to sit there and make some better decisions with regards to well, what can I do. If I have the right tariffs in place, maybe I'm able to sit there and do some other things that today I would not do.

For example, have some generators actually cut back on their generation and compensate them for that, so that we don't have to do an upgrade.

So, I think that those capabilities, as we move further out with better information, will come about. I think that then will help.

PRESIDING MEMBER PFANNENSTIEL: Thank you. And I want to thank the panel. This was -- oh, I'm sorry, do you have something else, Mr. Montoya?

MR. MONTOYA: Yeah, I just wanted to add to that is that I think the challenge will be in intermittent types of resources. The smart grid will give you the intelligence that they are no longer on or they are on, but we have to continue looking at things like storage and things like that, so that it can flatten out the intermittency of --

PRESIDING MEMBER PFANNENSTIEL: Sure, --

MR. MONTOYA: -- generation.

PRESIDING MEMBER PFANNENSTIEL: -- they will give you a lot more information quicker than today.

Thank you all very much. I think that we're way behind schedule and for which I take a fair amount of credit.

So I think we'd better move to the next panel.

MR. HUNGERFORD: Thank you, Commissioner. I'd ask that the public utility representatives who are here to give their talks to please come up. We have Jim Parks from SMUD, George Chen from LADWP and Craig Kuennen -- Kuennen from Glendale Water and Power.

And we're going to have Mr. Kuennen go first. He has a plane reservation to catch -- a plane to catch, and so we'll try to move that on fairly quickly.

And thanks in advance for coming, because I think you'll be rushing out before we get to say anything else.

MR. KUENNEN: Well, I'll stay until 3:30. And I should be able to do a good quick catch-up here because I only got about eight slides.

As far as Glendale Water and Power we serve the City of Glendale, California. We're located between L.A., Burbank and Pasadena. We have about 83,500 electric meters, 33,000 water meters.

Basically our electric department has been installing AMR meters; we've got about 6400 of those. And our water department, they're looking to replace all their 33,000 meters in the next five years. They're about 30 years old.

So when we're looking at AMI, we're looking at both water and electric, and the need to coordinate that activity. I saw there was somebody's going to talk about that later on. Found that paper and it was interesting.

Right now we're right at the very beginning. We're just picking up the blocks right now, we haven't even started. We contracted with KEMA in February to do a business case. Assuming the business case is positive, then we'll develop an RFP to select a system and start installing it within the next year. That's if the IOUs don't buy up all the inventory for the smart meters.

(Laughter.)

MR. KUENNEN: Basically we're just going to look at a technology plan for AMI; assess where we are; develop a vision of where we want to go. See what technologies we need to get us there. And we should have that plan done by July.

For the business case, same thing. We're going to assess the impact of AMI on our operations; look at the costs and benefits; develop some financial models. And conclude that in July, as well.

Assuming that the business case is positive then we'll develop an implementation strategy. We'll look at the risks and identify mitigating actions we'll need to take. And we'll do some testing.

And then basically we need to do the MDMS procurement before we even start installing the AMI system.

And phase four would be actually to select a vendor and evaluate their responses, and begin installation.

Our concerns, they've been expressed here already, is the communications between, you know, within the home or between the meter and the technologies that we want to put into the home;

and between the meter and back to the utility.

And our concern is we don't want to get locked into proprietary system. Most of the publicly owned utilities down in SCPPA have the same concerns. They don't want to be locked into a system that's not open-ended.

And we're worried that, you know, that failure to adopt a standard or set a standard quickly will delay us, you know, so that way our demand response programs, our energy efficiency programs -- we really see a great promise in the AMI and the smart grid as far as saving energy and peak shaving and load management.

So that's our presentation.

PRESIDING MEMBER PFANNENSTIEL: Thank you very much. You're going to be around for a few minutes?

MR. KUENNEN: Oh, yes, sure.

MR. HUNGERFORD: All right. George, do you have a plane, you need to go first, since Jim's in town?

MR. CHEN: Okay.

(Laughter.)

MR. HUNGERFORD: This is George Chen from Los Angeles Department of Water and Power.

We appreciate your coming up today.

MR. CHEN: Thank you. Thank you, Commissioners. Good afternoon. I'm the Rates Manager for Los Angeles Department of Water and Power. And I'm also the AMI Project Manager for the last five, six years.

So actually the state help us study AMI initiatives, -- one give us a pretty good size of grant to get us started so we keep on doing that AMI.

Okay. Here's our strategy. We studied all different utilities in the state, outside the state and in the country. So, we looking to the (inaudible) that open, nonproprietary communications with easy, interchangeable components throughout the AMI system. That applies to power, water and the gas meters. Also the collectors and the backhaul communication systems.

The second item we looking for that plug-and-play, a new device. Want to be able to register itself upon installation; immediately begin to communicate with neighbor systems. So, you know, the installation we want it to be easy and not a lot of paperwork and get lost on the system.

And also we like to see the minimized impact of communication technologies change by installing a scalable RF Mesh and IP backbone network using public communication network system. That similar to PG&E just talk about; I think the same kind of approach. We want just one collector, a number of devices so that we don't have to do a lot of, you know, changes due to the communications technology change in the future.

Also we like to implement a system that provides access to home premises for high energy residential consumers. We stress that high energy residential consumers to monitor and control (inaudible) with off-the-shelf network devices such as thermostats, water heaters and the lightings so that hopefully they can find those devices off the shelf. Home Depot can sell these and they can, you know, adopt it in their homes.

Also we like to design a flexible AMI smart grid foundation for future technology standards, system interface and the regulatory requirements.

Okay, our goal is the (inaudible) support; multiple co-functions. The ARM meter reading, including distribution operations, system reliability, energy efficiency and customer service. And the current goal is to minimize operation and maintenance costs, we'd like to automate meter reading, improve customer service, automate outage management. That's a big issue for us. Lately we, you know, have a lot of outage happening in our area due to the aging infrastructure system there.

And also we like to use the system to improve our rate design and the analysis capabilities.

The metering plan we putting is a very aggressive five-year plan. We just put it together a couple weeks ago. You know, we have not really goes to the Board, but we will put it to the Board, and hopefully we can get it passed.

Implement a flexible AMI plan that can work with any communication medium. We pretty much by now we're looking at a two technologies. One is the two-way wireless using public network communication meters. And we tried to cover all the large and medium commercial and industrial customers.

And this meter equipped with TOU power

quality, outage notification and, you know, we also can web present the data the next day. Those are cover all the meters in over 30 kW for the medium and large commercial customers.

The next we looking at residential homes; about 64,000 homes that we like to have some kind of home energy management system through Zigbee protocol. Everybody talk about it. And hopefully that will, you know, come through because we heard the product come online probably by the end of the year. So we tried, you know, plan on that.

And those customers, we have about -- area have about 1.2 million residential customers. And we target that 64,000 because their monthly usage is over 1200 kWh. So we think there's some room for them to do energy efficiency. And a lot of them, over more than half of them their usage basically is about 300 kWh. And we think that, you know, the high technology may not be getting the benefit at this moment. So we just target small group.

And also we plan to install 10,000 the disconnect, you know, turn-on/turn-off meters on this high turnover places. So we already -- we have the database to study where those customers at, with dormitory and apartments that have high turnover ratios. So we try to install these 10,000 meters there.

And also we identified that 2500 are critical care residential customers. We like to have outage notification system on them. And that's important because if there's a outage we like to notify paramedic, the fire department to help these, you know, people there.

And for the rest of the customer we looking at a walk-by, drive-by IF system. But that system can later on upgrade to a fixed network of RF Mesh network configurations. So we look at about 180,000 small commercial and 1.1 million residential customers, and about water meters close to 700,000.

This is my presentation. All these other slides are benefits -- but I like to share with you my -- what we like to see from the CEC, the Commissioners here, that setting a policy that, you know, AMI, we been doing these -- I been working this area over 15 years; and working the metering engineering and also the regs area.

So we see a lot of different versions.

But from our view that probably the best way to do is that we can use public network, communication network. And, you know, that can help a lot of the issues, the proprietary issues, solve that issue.

Because once you have the big networks that decide, okay, if it's public, open and all these devices can work with that, these, you know, big communication providers. Then will, I think, hopefully we can, you know, share those technologies and make it standardized.

And think about these electrical vehicles. If I have in area drive to San Francisco and I try to charge over there, how do we resolve these if we don't have a public system somehow we can meter, count usage and do some kind of connection there.

Just like Commissioner Chong just mentioned. If I move to San Francisco I have to return all my devices. So, if we can use some kind of public communication network that's one key.

And the second key we look at the cost. ARA has a lot of targeted implementation. We look at the data. Hopefully we don't use, you know, a one-size-fits-all. We have everybody disconnect, everybody has the power quality. We should target it. Look at your data and target those areas so that we reduce overall costs.

And I think that's about it in what we asking for and hopefully gets your consideration. Thank you for your time.

PRESIDING MEMBER PFANNENSTIEL: Thank you.

MR. HUNGERFORD: All right, now we'll move on to Sacramento Municipal Utility District. Jim Parks is going to be giving their presentation. Thanks, George.

MR. PARKS: Well, I can wade through this pretty quickly because I think most of it has already been said.

From our perspective we haven't really defined the smart grid, but we kind of chose this diagram as kind of our temporary definition, if you will. And I think I saw something very similar from PG&E.

The five elements that we're working on right now are basically distribution system smartening, advanced metering infrastructure, demand response, distributed generation, which also includes the plug-in hybrids and energy storage, and then zero energy smart homes.

We're basically upgrading our distribution system with SCADA. You know, we built the system some 60 years ago. SCADA wasn't really an option. For the past ten years we've been installing it as just normal procedure. And then we've upgraded the existing system so that at least one-third of it is rewired to date. And we expect to expand that to the full system.

We're automating some critical 69 kV switches. And we're automating some of the capacitor control. And all that needs to tie together with our AMI system, which is soon to come.

We have our own transmission control areas, so we're not tied to the ISO. And we want to get down to the circuit level at some point in time so that we can have better control of outages and things like that.

Our distribution system losses are about 9 percent. That's an area of concern. When I look out to 2050 and see our greenhouse gas requirements are supposed to be reduced by 80 percent, and we're losing 9 percent right here in the distribution system, that's an area that we need to look at. Can we get some efficiencies out of that.

We've specified high efficiency transformers. You can also monitor individual circuits to see if they're out of bounds and you can identify power theft.

We have a contract with the National Renewable Energy Lab to look at the benefits of wide-scale deployment of PV. So basically we have subdivisions that are being built in our service territory. And all the rooftops have photovoltaic systems. Well, is there an opportunity for us to downsize our distribution system as a result of that, if we know that we're going to have whole pockets that are going to have distributed generation on a widescale format.

And we talked to our distribution engineers. Their concern is what if we have another ten-day heat storm and suddenly you need the, you know, the more robust system. And those are some of the things that we'll look at.

We just put our AMI RFP on the streets, I think, last week. And so the responses are due in June. We're looking at full-scale deployment between 2009 and 2012. So we're going to be selecting a vendor this year. We're going to be installing, I guess what I'd call a pilot project. And then we'll go full deployment after that.

We're developing a lot of load control strategies. One of the changes that we're hoping to do over time, we have an air conditioner load management program that uses a radio signal. We'd like to have the programmable communicating thermostats in place such that we can just say, up the temperature a few degrees on a hot summer day, and have more control. And develop our programs.

Out actual goal is to have 400 megawatts within ten years of controllable demand response.

And we're also in the process with the AMI we'll do some TOU and critical peak pricing rates down to the residential level.

On the distributed generation side we're looking at several combined heating, cooling and power projects. And we have three of them that we are entering into a memorandum of understanding to kind of move to the next step.

We've done feasibility studies. And so I think that we'll actually have a few of those in our service territory. We have potential of something like 375 megawatts if we go all out on this. And from my own perspective it's almost moving too quickly because, you know, you kind of want to do one project and see how it goes before you do the second and the third. We've got several of them in the hopper right now.

Plug-in hybrids. We've heard a lot of talk about that. We're going to be looking at the vehicle-to-grid, vehicle-to-home idea. And then energy storage is another area that we're working with.

And then, of course, we have 4000 homes signed up on our solar smart program, which is basically 2 kW PV. And with respect to our solar smart homes, we started out looking at the zero energy home program that was adopted by the DOE and the National Action Plan for Energy Efficiency.

The CPUC also has this goal of zero energy homes by 2020. And we kind of did the first stage of homes. It was basically a 60 percent efficient home. And that was so successful that that is now what our program is.

So any home entering our new construction program will be at that 60 percent level. And we've got over one-third of the homes that are going to be built over the next few years will be those homes.

And I expect that that will go up, because we're finding, even in this tight economy, the homes that are selling most are those homes.

And then we're doing the next generation home now, which is basically an 80 percent reduction. And we've got a single home under construction in Folsom right now. And then we also have a project that we're working on with San Diego Gas and Electric and the Energy Commission PIER program.

So that's it in a nutshell.

PRESIDING MEMBER PFANNENSTIEL: Wow. That's a lot going on to do it so fast. Thank you, Jim.

Questions for this panel? Commissioner Rosenfeld.

ASSOCIATE MEMBER ROSENFELD: I have a trivial one, again, for George Chen. You talked, I think, about the words, you want to plug it in, the thermostat or the gateway, and have it identify itself. And you sort of assumed no human intervention.

But somebody has to connect the meter information with the customer. That's certainly going to require a call to a phone center or something, isn't it?

MR. CHEN: Yeah. Right now with our new generation meters that once you plug into the socket, and the identification numbers will come back to our server. And with all the information that link to that ID will automatically register to our CIS system.

I know we have that technology. So hopefully we can, you know, use that.

ASSOCIATE MEMBER ROSENFELD: Okay.

PRESIDING MEMBER PFANNENSTIEL: Jim, just let me make sure I caught it all because you went pretty fast.

Your decision to put in AMI or where you are now with going forward with that, is that based on a business case that you did?

MR. PARKS: Yes, it is. And actually we started out with widescale deployment of AMR, which is really a drive-by system and only allowed really one-way communication. And we stopped at mid-deployment because we felt that the benefits of AMI would far exceed what we could get from just the AMR system.

And so we relooked at the business case that we had done that originally headed us for AMR. And decided we would just stop AMR. And now we're going full deployment on the AMI.

PRESIDING MEMBER PFANNENSTIEL: And then once you, or as part of that business case analysis, are you going to the further business applications such as we've been talking about as defined as a smart grid?

MR. PARKS: Absolutely.

PRESIDING MEMBER PFANNENSTIEL: So you will tie these all together?

MR. PARKS: Yes.

PRESIDING MEMBER PFANNENSTIEL: Thanks. Other questions for this panel? Thank you all very much, very helpful.

We have now come to the part where we're seeking, soliciting public comment. We have a couple blue cards from people who desire to speak.

MR. HUNGERFORD: And there are others that were asking --

PRESIDING MEMBER PFANNENSTIEL: Right. And we're open -- we have an open mike for anybody who wants to speak for some period of time. But let's start with the blue cards, start with Lon House from ACWA.

MR. HUNGERFORD: Right. And we're asking people to keep their comments to five minutes if possible. And there are a couple of people who have had -- giving us presentations, and they're going to try to adhere to that.

PRESIDING MEMBER PFANNENSTIEL: Yeah, I would ask that people with presentations, they do tend to go long, so we'll try to hold them to the five-minute ruling. Thank you.

DR. HOUSE: Good afternoon. I'm going to give you something that I find kind of interesting, but all of the activity and the work that's being done on the electric side has ramifications in the water side. And that's what I'm going to talk about today.

There's a lot of the same operational benefits with reduced metering costs, and reduced field visits and billing and things like that. And there's actually several -- you've heard Glendale and L.A. talk about what they're doing with some of their water systems. But there's several other water agencies that are actually installing, changing out all of their meters to the new smart meters to achieve some of these benefits.

But in addition, what the smart meters will do, you know, within the water system is it will allow you to track water consumption and flow patterns. It will allow you to identify leaks and the study that I'm going to talk about at the last is an Energy Commission study that will allow you to determine how to shift water consumption and the corresponding electric consumption to different parts of the day.

And this is one of the first things that was the use of the water meters. Because remember the water meters in the past have always been volumetric. Sort of think of the old residential electric meters. We would check and we would know how much water somebody would use during a month. We didn't know what time of the day; we didn't know what happened to the different days.

And so this is just an example. You can see here, and this is a toilet in a shopping center, and you can see, it's very easy to spot where a leak occurred. If you don't have that time differentiated information you don't know. All you know is that the water volume has gone up, but you don't know why. So that's one of the first things, one of the things that the water community is really interested in doing.

The other thing that they're interested in doing is, again, we know the water send-out on a month, but we don't necessarily know, because we don't have time-of-use water meters, what the corresponding water send-out is based upon temperature.

And you can see in this example, you can see there's no leaks in this particular example. But you can see that the water agency could have a much better job of predicting how much water would be sent out because they could correlate the water consumption being sent out with the temperature, which we don't have the ability to do until this.

And so some of the main reasons are it allows us to detect size and locations of leaks in water mains which we don't necessarily know now.

We can remotely identify the location of main water main breaks. So you would know with a smart meter system where the break occurred on your system, instead of having to have somebody calling up and say that their street is flooded.

And several of the municipalities --

ASSOCIATE MEMBER ROSENFELD: Lon?

DR. HOUSE: Yes.

ASSOCIATE MEMBER ROSENFELD: I didn't understand. You're measuring individual meters, so if there's a leak which isn't metered in the main pipe somewhere, I haven't understood how you --

DR. HOUSE: Well, this is -- that's a good clarification. What the main focus of what I'm talking about today is smart meters on individual consumption units.

But what's happening is as these smart meters are going in, SCADA systems that the water agencies are looking out there and they're saying, you know, there's a lot more that we can do because we're developing this infrastructure to bring this information back from the end user. We can put it at different parts of our system, the same kind of information. And be able to sense different things. Be able to sense residual disinfection; be able to sense water flows; be able to sense things like this.

So this right here, this slide right here is actually about a grid development on a water system, not just the smart meters.

ASSOCIATE MEMBER ROSENFELD: Okay.

DR. HOUSE: And you can see reduced theft detection and everything. Okay.

This last one, the first point up here needs to be corrected, because this was funded by DGS on Friday. But I had to have this in and I didn't know that. So this study, the aqua smart meter case study, is a study in which what we're doing is we're putting in smart water meters in the City of Palm Desert. It's funded by the Energy Commission.

And you can see that the -- some of the things that we're supposed to produce as part of that. But, this was originally set up as just sort of time-of-use water meters and looking at how we could shift, if we could shift water use out of the onpeak, how it would correspond to reduction in electricity use by the water agency.

But things are happening so rapidly, as part of what you've heard today, in the smart meter and the smart grid, that the changes happening, that we're looking a little bit more carefully at the use and the implementation of smart meters, and the use and development of a smart grid in the system.

And I think I've done it in five minutes.

PRESIDING MEMBER PFANNENSTIEL: Thank you very much. Yes, Commissioner Rosenfeld has a question.

ASSOCIATE MEMBER ROSENFELD: I'm a little -- could you elaborate a little bit. Up to now and listening to you I've thought of water meter information as being mainly sort of piggyback information. That is the home water meter would relay information to PG&E or SMUD or whatever.

But you're talking about direct.

DR. HOUSE: No. And actually that's one of the issues is that with the electric side you have power at your meter. The water meters are out at the street.

So one of the issues has been in the development of smart meters is we don't have power at the meter sites. And so you saw some slides previously where they -- and they're looking at various things like batteries and solar and things like that.

But the water systems are metered and processed completely independently, have been completely independently of the energy systems.

ASSOCIATE MEMBER ROSENFELD: So the piggybacking was gas to electric, but not --

DR. HOUSE: Yes, not water.

ASSOCIATE MEMBER ROSENFELD: Thank you.

PRESIDING MEMBER PFANNENSTIEL: Thank you, Lon.

Mark McGranaghan from EPRI.

MR. McGRANAGHAN: Thank you very much. I'll try to be brief, also. I'm Mark McGranaghan from the Electric Power Research Institute. Glad to be back here.

My purpose is to say reinforce or complement some of the information that we got this morning from Mike Gravely and Richard Schomberg, and also Eric Lightner.

I'm very excited to see consistency between both the IOUs and the munis in the approaches that are being taken. It's actually a big change from say a year and a half ago when I was here working on distribution automation and talking to you. So, it's very exciting and I think it's actually in a much better position right now to position us for the future in the direction that the utilities are taking.

We did a project with the Commission that we're just finishing up, as Mike mentioned, looking at really the technologies for the smart grid and where we are and what needs to be done. And that's my point and I'm going to kind of jump quickly to the last point, which is our recommended approach going forward.

This has been emphasized a couple of times. You heard it from the utilities and others, that the benefits from the smart grid are the applications, the things that take advantage of the communication and information infrastructure.

We need a communication and information infrastructure that will enable those applications. But the applications are where the advantages are. And those advantages are, as we've heard, reliability and increased efficiency, being able to implement demand response and demand management and so on. And integration of renewables and distributed resources.

And we think that the key is looking ahead and really understanding those applications. And what the requirements are for those applications. This is not a controversial point after listening today to everyone who has presented, understanding those requirements is key.

The questions from the Commissioners were right on target, and it was very impressive, the discussion that we had from the first panel was very enlightening.

So, coming up with those requirements is an ongoing process. The individual utilities in California have done these use cases. You heard about open AMI and open HAN, and have arrived at the requirements for their own infrastructures, especially advanced metering, but moving forward from there to other aspects of the smart grid.

There is a need to collaborate. California is out ahead. You guys are in front in terms of the deployment of advanced metering. You heard where the utilities already have a lot of their distribution systems automated. That's a good position to be in. It's a little bit of a dangerous position, but it's an opportunity, as well, especially if we take advantage of that and share that knowledge so that the standards that are developed are consistent with what we're doing, with what we're learning and what we're doing in California, so that we don't end up with standards for the country and international standards that are not consistent with these deployments.

And we have a group in IEEE, which is the Institute of Electronic and Electrical Engineers, that writes standards and coordinates standards, that is a real opportunity to share some of the information that's being developed in California and in other places regarding the smart grid.

And I wanted to also mention that, you know, as an example of what other utilities are doing, First Energy is hosting a workshop in June for information sharing of utilities that are developing smart grid roadmaps and working on these use cases; where we'll start to share some of those. And then we're going to use that IEEE organization as a repository for these requirements across the whole industry.

So with that, we want to enable all of these applications. I'm going to jump right to the last slide. There's a lot of stakeholders involved and the recommendation is that we use an approach in California that kind of takes another look at these use cases, these applications and what the requirements are for these applications.

But involving as many of these stakeholders as we can. We had some good questions about have we considered the requirements of the ISO in developing the use cases and the requirements for our AMI, for our distribution automation applications.

The information models for these applications have to come all the way from the top in terms of the information requirements. So we need to make sure that we've done due diligence in these application definitions. And I think it's worthwhile.

And so the recommendation is that we take a statewide look at these applications and the requirements that are derived from these applications, and make sure that the infrastructures that we're putting in place will support these future applications as we develop the intelligent technologies to do it.

And I think that's a job that involves some workshops with technical representatives from these different stakeholders, and going through the applications in more detail and making sure that we've got the requirements hammered.

The utilities involved know what's involved in this, but I think there's still an opportunity to make sure that we have the whole industry involved in the process.

So, that's the main message that I wanted to present in my five minutes. Thank you.

PRESIDING MEMBER PFANNENSTIEL: Thank you very much. Are there others here who'd like to make some comments, provide some information or insights to us?

Yes, please come forward. Come up to the mike and give your name for the record. Either one.

ASSOCIATE MEMBER ROSENFELD: Well, it's better that you go to this one.

MR. GALICER: My name is Harold Galicer and I'm with SeaKay. SeaKay is a community networking organization. And we primarily work with under-served and unserved low-income communities.

And I just want to say that over the last year or so we have been working and very interested in smart grid, because we think it's going to have a profound impact on the low-income communities where we have presence.

Besides working with kids on how to get onto MySpace, we're looking forward to working with seniors and low-income families that are very challenged to pay their electric bills.

And we think that the kind of applications and developments that will come out of smart grid will really help these communities that we're looking at.

Our main concerns moving forward in this is that the attention and the resources actually are also dedicated to the home area networks. And the enabling opportunity to let the ultimate consumers and users take advantage of smart grid.

It's a concern, and I think one we heard from DOE this morning, one of their main priorities for smart grid was reaching out and actively engaging consumers, and actually having consumers then be able to interact with utilities.

And it's our wish or our encouragement, both the utilities and both Commissions, that the proper engagement and attention and pilots get rolled out with the resources to give people the ability to interact with the utilities and home area networks.

And I can assure you, too, from the community based organizations that we work with, and the community technology centers that we represent, that I think that you'll see a very outpouring and a lot of good will and effort on behalf of the community to work with the Commissions and the utilities to make sure that smart grid is successful.

PRESIDING MEMBER PFANNENSTIEL: Thank you. We really appreciate those comments and your being here. It's encouraging to think that what we think is a really good thing, that you're already looking at applications on the consumers' side, because that, I think as Commissioner Chong pointed out earlier, is ultimately what we have to be concerned about.

So, in these communities, the low-income communities, I think, especially, to know that you're looking for how this can help your constituents.

MR. GALICER: Well, I think one point that can be made is that an analogy was used to the Tivo of applications, that not everybody in California has Tivo. And, again, as Commissioner Chong says, not everybody has computers. We will have to have access devices to reach out to these folks.

And also in the technology that's deployed and the architecture that's deployed, we really have to take into consideration that not every environment in California, as Commissioner Chong says, is accessible or readily available to deploy data collection unit to collect from the smart meters.

And that in some of the under-served areas in California and the unserved areas, that we may need to push out the internet technologies to the meters just to be able to enable smart grid.

PRESIDING MEMBER PFANNENSTIEL: Right, and you can help us, advise us on that. Commissioner Rosenfeld.

ASSOCIATE MEMBER ROSENFELD: Another point. No, stay there. I just want to say I encourage what you're making us think. Several of the utilities today have said they're going to do pilots. And somehow or other you ought to make sure they have your business cards and you'll help them design those pilots.

MR. GALICER: Oh, absolutely. They

already do.

ASSOCIATE MEMBER ROSENFELD: All right.

PRESIDING MEMBER PFANNENSTIEL: Okay. Others?

MR. HUNGERFORD: There is one other that I know of. Erich Gunther has a presentation. And I'm not sure which one it is here, Erich. Maybe you can look at this screen rather than that one.

(Laughter.)

ASSOCIATE MEMBER ROSENFELD: I'm -- have trouble seeing that damn screen.

(Pause.)

MR. GUNTHER: -- where Mike put it. You can let someone else go ahead while I bring it to you on a stick. Go ahead and have someone else go ahead, and I'll bring it --

PRESIDING MEMBER PFANNENSTIEL: Is there anyone on the phone who wants to speak? If not, and nobody else in the room. So we'll just wait for Erich.

MR. GUNTHER: I'll do it without any slides.

(Laughter.)

COMMISSIONER CHONG: You can do it, Erich.

MR. GUNTHER: I can do that. I don't know where you put it, Mike, it was on --

(Pause.)

MR. GUNTHER: Erich Gunther with EnerNex Corporation, in this case representing a few of the hats I wear. Chairing several organizations working in the smart grid area. I Chair the utility AMI organization, open HAN. I'm with Richard on the Gridwise Architecture Council.

Basically what I wanted to point out is that there are a variety of organizations who are working in this space. And California doesn't have to do it alone. However, California has been taking the lead in inspiring a number of entities and organizations to implement smart grid.

Taking the first step with AMI, which has been a leader towards putting infrastructure in place to enable smart grid.

These various organizations have taken the lead that the Energy Commission's PIER program has done in the areas of systems architecture, reference designs and the like. And has taken that effort to heart and working to try and standardize it as much as possible.

So, starting in California with the

reference design for demand response, the report which was released a few years ago, some of the work done on thermostat reference designs and other activities, that California centric work has now led to a much larger community of people working to address these problems that will open the market for vendors to provide product to a much larger audience.

So I encourage California to continue and the Energy Commission, in particular, to continue with that activity.

The other thing to note is that even though there are a multitude of organizations working in this area, some people get concerned that there's a multitude of organizations working in this area. Which one should they support.

The core message that I would like to deliver is don't worry about which one or ones. There's, in this particular case, no one organization is going to become a betamax or VHS.

There are too many -- this is too large of a problem requiring a number of people to have to look at it from a variety of different points of view in order to, quote, solve it. Really it's more like evolve it over time.

And so if EPRI intelligrid happens to be working on areas of smart grid that cover things that are important to you, go ahead and support that. If the Modern Grid Initiative is implementing some technology in an area that you're interested in, you know, go ahead and support that.

If open HAN is doing some work in an area, defining standards for end -- inhome devices, you know, support that. All of these things are important and complementary.

And in the presentation that I can leave with you, or include for the record, has a more comprehensive list of those activities.

Thank you.

PRESIDING MEMBER PFANNENSTIEL: Thank you, Erich.

ASSOCIATE MEMBER ROSENFELD: I just want to compliment you publicly. Practically every talk today mentioned either open HAN or open AMI, all favorably, I think. And we're very much indebted to your coordination. So, thank you.

MR. GUNTHER: Thank you.

PRESIDING MEMBER PFANNENSTIEL: Thank you, Erich.

Are there no other comments in the room? Concluding comment, Commissioners? Yes, Commissioner Chong.

COMMISSIONER CHONG: Thank you. I want to thank everybody for coming today and helping enlighten me. I think I learned at least 20 new acronyms today.

(Laughter.)

COMMISSIONER CHONG: Particularly from Mr. Montoya.

In reference to the last speaker, Erich I believe it was, I just wanted to say, you know, it's part of my job to be concerned that we don't have a betamax or a VHS on our hands. Because the consumer groups are very united in letting me know all the time that anything that the ratepayers are going to fund better be a darn good choice by the utility, because the ratepayer's paying for it.

So, I must beg to differ from Erich in that one very small area, that it is important, in my view, for the Commission and the Energy Commission to insure that what is being put into these utilities are something that is going to serve the interests of all people of California. And they should be the very best choice that we can make as a state.

So, this is why I think today is a very important step forward. It seems to me that things are going relatively well, but I think we could maybe do a few things to help accelerate it in the right directions.

I commend all the players for apparently working very well together in many different fora. And I would like to encourage them to continue to do that. And to be sure to keep all of us here in the policymaker roles well informed of how it's going, where it needs some help, and whether you think we need to do more at the federal level.

I'm, of course, particularly interested in the regulatory issues. So, if anyone would like to have follow-up meetings with me with very specific suggestions on regulatory barriers, I would be very interested in taking those meetings.

Thank you very much for having me here, again.

PRESIDING MEMBER PFANNENSTIEL: Thank you for being here.

Commissioner Rosenfeld.

ASSOCIATE MEMBER ROSENFELD: No, I'm just very happy with the day.

PRESIDING MEMBER PFANNENSTIEL: I also want to thank all the participants. It was very very enlightening. I learned a lot. Been trying to keep up on what was happening in this area, and I think that I didn't do a very good job, because I learned so much more today than I knew was going on.

I'm a little uncomfortable, I think, with the total agreement I heard. It seemed like everything is working, everything is on track, all systems are compatible with each other, everybody understands each other, everybody has the same basic vision of where we're going and how we're going to get there.

And somehow I have a feeling that maybe as it plays out it might not be -- there may be some bumps in the road. And I want to know if there are. I'd like some way of coming back to us and keeping us informed.

Because this whole question of smart grid is a real mainstay of what we, at the Energy Commission, are thinking about in terms of the next decade or two of California's energy situation. It's very important.

And it's important at the consumer

level, and it's also important at the system level, as everybody here has been telling me all day.

So we need to make sure that, you know, if there are barriers that haven't been identified yet, or haven't been publicly identified, that you come forward and make sure that we know about them. Whether it is serving low-income communities, or certain metering constraints, whatever they might be, I think we need to build those into our plans.

Now, with that, let me say that we welcome written comments from today. I did notice that the notice gave two different dates for submitting written comments. In one place it says May 6th, and the other place it says May 10th. So, given that, I'd say May 10th it will be. And we look forward to your written comments.

So, with that, if there's nothing further, we'll be adjourned. Thank you, all.

(Whereupon, at 3:52 p.m., the Committee Workshop was adjourned.)

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CERTIFICATE OF REPORTER

I, PETER PETTY, an Electronic Reporter, do hereby certify that I am a disinterested person herein; that I recorded the foregoing California Energy Commission Electricity Committee Workshop; that it was thereafter transcribed into typewriting.

I further certify that I am not of counsel or attorney for any of the parties to said workshop, nor in any way interested in outcome of said workshop.

IN WITNESS WHEREOF, I have hereunto set my hand this 10th day of May, 2008.