THE BROOKINGS INSTITUTION

THE ROLE OF DISTRIBUTED POWER SYSTEMS IN THE U.S. ELECTRICITY SECTOR

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PANEL 1: POLICY ISSUES:

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P R O C E E D I N G S

MR. EBINGER: Good morning, ladies and gentlemen. I'm Charlie Ebinger, the director of the Energy Security Initiative. And it was our program that had the opportunity and the good fortune to collaborate with Hoover on this project. Those are two hard acts to follow. I must say I wish I had a little prop here to show you that but it's truly remarkable what the secretary showed us. And we particularly want to thank all our friends from California who came here from so far away.

Let me just quickly -- the secretary mentioned it but let me just quickly say how this all came about. As Secretary Schultz noted, I was out at a conference where they were releasing a report that their institution and the secretary made a clarion call that it was time, long past time for people to realize that energy is not a partisan issue and that it was important for groups that might disagree in other areas to come together. And so I followed up with that and he kindly invited me out again and that's what led to us deciding to do this join report between our two organizations.

The objective of the report was to assess the case for distributed power from an economic, environmental, and security perspective, and to look very hard at the institutional and regulatory obstacles that might be in the way, that if we eliminated those we could have distributed power play a much more vital part in our overall energy situation. One of the first things we discovered as we embarked on the research is there is even not any agreement on what distributed power is. So we made our definition. Some of you may disagree with this. But we take the tact that distributed power is selected electric generation systems at distribution level voltages or lower located obviously close to the load, obviating the need for long distance transmission lines. And we also included in our definition distributed storage of power.

We basically pick eight technologies that in our definition constitute distributed power systems, and those are solar, wind, combustion engines, fuel cells, combined heat and power system storage, micro turbines, and micro hydropower.

Let me just quickly say what our methodology is. We worked with a very

distinguished economic consultancy, E3, who ran a cost comparison to evaluate the DPS technologies relative to centralized fossil fuel generation. To conduct the policy analysis part of the report we devised a survey which we sent out to all 51 public utility commission in the country, including the District of Columbia, which is ably represented here today. That's why we have 51. And we got about 20 responses. We conducted other in-depth interviews with public and private sector stakeholders at both the federal and state governments with investor-owned utilities, industrial associations, and NGOs. Overall, we got input from stakeholders from around 80 organizations and institutions, and the results are reflected in our report.

We have many findings and conclusions, but let me just highlight a few of those. Because when you read the whole report you'll be able to see a lot of other things as well. The first major finding was that from a cost comparison perspective most distributed power technologies are not currently competitive with centralized grid generation. But some are getting very close, and in certain circumstances are already competitive. The benefits of distributed power systems relative to central generation are very dependent on the particular time and location of those systems. The current economic assessment -- this is an important point -- is a snapshot in time and doesn't account for the rate at which the technologies of distributed power systems are coming down in cost and down dramatically. And this is especially true for solar power.

There are many benefits from distributed power systems that are not being captured in the economic models that look at their cost competitiveness. And some of these include the potential avoided costs of transmission and distribution and sometimes even generation capacity. Security, both in terms of the vulnerability of the civilian grid and for the offensive and defensive operations of the U.S. military which Secretary Schultz so amply demonstrated, the whole issue of reliability of power. And finally, the whole question of land use and environmental externalities which distributed power avoids, again, because we don't have to have long distance transmission lines and other parts of the electrical system inundating the landscape.

It is our main conclusion that there need to be policies in place to capture these

benefits that currently are not recognized in the cost of distributed power. We have recommendations for federal and state policymakers at how we think they can achieve this, and we encourage everyone to read the report. Hard copies of the report are available today, and we will have an online version available by the end of the week.

Now it is my pleasure to introduce a very distinguished panel to commence today's discussion. Can I get our panelists to come up?

The way we'll do this today is I will commence by asking individual panelists a question. The other panelists will then have an opportunity to respond to the answer that was given by the panelist addressed, and then we'll open it up for -- I'll field questions for the entire panel and then we'll make sure we save at least a half hour, if not a little bit more, for questions from the floor. And we encourage you to participate.

I'm not, in the interest of time, going to read extensive biographies, but let me just introduce our very distinguished panel. And we are truly thankful for all these people taking time from their busy schedules to join us today.

Jim Rogers, I think, doesn't need an introduction, being one of the most dynamic CEOs in the utility industry in our country today. But he became chairman and president and CEO of Duke Energy in 2007, having served as president and CEO of Synergy since 2007, and he served as chairman and -- I'm sorry, I'm having problems with my reading -- CEO of Duke Energy in 2007, having served as chairman and CEO of Synergy since 1994 and PSI Energy since 1988.

Rick Morgan began a second four-year term as head of the District of Columbia's Public Service Commission in July 2007.

Robert Weisenmiller -- Dr. Weisenmiller was appointed by Governor Jerry Brown in January 2011, as chair of the California Energy Commission.

Kevin Fox is a partner at the law firm of Keyes and Fox, LLP, which has represented clients and regulatory proceedings before nearly 40 state public utility commissions as well as the Federal Energy Regulatory Commission.

And Andy Karsner is executive chairman of Manifest Energy, a firm committed to

energy development, investment, and financing.

If you would join me in welcoming the panel. (Applause)

MR. EBINGER: Jim, if I could begin with you. The following question, how does Duke Energy and investor-owned utilities in general regard the potential distributed generation and distributed storage? Do you see them as a challenge to the current utility business model or something that is complementary to your existing portfolio?

MR. ROGERS: Charlie, thank you very much. And let me say that I am really delighted to be here this morning. I thought it was important that Charlie started with a stodgy regulated utility addressing the issue of distributed generation. But I'd like to start by putting this discussion in a context that I think is very important to the future of distributed generation in our country.

And the context is this. First you're going to see the real price of electricity in this country rise over the next several decades in stark contrast to the past 50 years where the real price of electricity has been flat. The second thing that you're going to see is increasing threats of cyber attacks and the need to island your systems, particularly around critical facilities will be increasingly important. Already the Department of Defense has started a program where there are islanding their facilities because of this fear of cyber attack. And the third important trend is the trend that basically where you see the cost of distributed generation declining, you see the evolution of new battery technologies evolving and subsequently the costs there declining. So with those three trends you can easily see how distributed generation will play a greater role in the future.

The role that it plays, there's really several different models. The utility, if we're smart about it, we can adopt it, incorporate it. It's a disruptive technology, particularly in comparison to our central station plants, how we developed in the 20th century. So the question is can we adopt it into our system? There will be other models. There will be energy independent, I mean, independent producers that will do it. Customers will embrace distributed generation.

What we have chosen to do is basically incorporate it in our model. In North

Carolina, we took solar on the rooftop. We went to our regulator. We asked for permission to basically put 10 megawatts in on the rooftops of some of our commercial businesses, as well as some of the homes in our area. And we got permission to do that. And we did the installation. We tried to cut that 50 percent cost. Not as cheaply as you did, Secretary Schultz, with your exhibit. But we did cut that cost and we have a very low cost to capital. But the reason we did it is to, one, to establish the precedent that we could be in that business, in a sense extending our business model. But secondly, we wanted to learn how to operate in a world where you have distributed intermittent power across your system.

And so there have been learnings that have come from that. That is, we see distributed generation evolve that we'll be better positioned to be able to do that, to handle it in the future. I think distributed generation in some senses of the word is the same threat to central station, not a complete threat, as you see tablets and smartphones being a threat to the PC. And then I think that will continue to evolve. Your need for PC will still be there, but nonetheless, the tablet, as well as the smartphone, will play an increasingly larger role relative to the PC in the future.

I think the other dynamic and best illustrated by Hawaii Electric, 17 percent of their load is military bases. They are working very closely there to try to work with the Department of the Navy and to work with them to basically develop and work with them to allow them to island their facilities. So it doesn't necessarily have to be a threat. It can be an extension of your business if you embrace it.

I think the other important point I would make is that while distributed generation will be incorporated in developed countries as the prices come down in the United States for distributed gen, I think the real application is outside the United States. I think that's where we'll learn. That's where the costs will come down. And let me just leave you with one example. There are 1.4 billion people in the world who have no access to electricity. And if you look in the countries -- if you look at Africa, sub-Saharan African, if you look at South America, in the rural areas there, in Indian, in China, the opportunity for distributed generation there is significant. And I think that's where it will be deployed first and where the costs will come down even faster.

For instance, we just started what we call the Bright Light Foundation. We just did our first installation in Rwanda. And basically, it's a solar panel with a battery technology that it drives, an LED light, and a cell phone. And we believe that that type of deployment, that the costs will come down over time. But again, in a lot of these regions people realize that access to electricity is really access to prosperity and to the modern world. So I believe the deployment of distributed generation in these regions is really quite critical to give them access to electricity and to the modern world.

So let me conclude with that, with this simple thought. I believe there will be increased adoption of distributed gen in the U.S., but the real scaling of these technologies may well occur outside developed countries, including the U.S., may well occur in other regions of the world. But at the end of the day, this will be an important part of the mix in the future.

Thank you very much. (Applause)

MR. EBINGER: Thank you, Jim. Did anyone want to comment? Rick?

MR. MORGAN: Yeah. Thank you very much. And again, I really appreciate the opportunity to meet with all of you today on this important topic. And I can't find anything I disagree with that Jim said, which is typical.

I want to add a little bit from my perspective as the utility regulator. One of the great challenges for distributed power systems is that the legacy electric grid was really built around the premise of centralized generation, which involves having transmission flows typically from generators to loads. Of course, there are exceptions to that. Distributed power systems don't necessarily fit well into that paradigm. But they do provide both opportunities and challenges and that's a lot of what we're going to be talking about today.

There are some utilities that are embracing distributed power systems; others are not so sure and they're moving more slowly. And I think we, as regulators, are finding ourselves needing to do some nudging in many cases to move the utilities toward, you know, a more modern expansive view of the electrical grid because there are so many potential benefits from doing that. You know, national security for one, but environmental benefits and reliability on the grid.

So PUCs have a very important role to play in making this happen. We've taken this very seriously here in the nation's capital. And in adopting rules for small generator interconnection standards that simplify the process for any customer that wants to hook up and generate power on the customer side of the meter, we have rules for net metering which allow the customer to basically sell excess power back to the utility at the same price that they pay for it. And then there are other issues involving standby rates and supplemental rates.

So that's just the beginning. I mean, there's a lot more detail that I won't get into but it's important to understand that this isn't something that can just be simply, you know, approved. It's taken us years to get through this process in our jurisdiction. I know there are other jurisdictions that are going through it as well and maybe some that have barely even started. So there's just a lot of work where we really need to just get down to the grindstone and figure out how to make this work. And of course, we have to give everybody their day in court. The utilities and all the other stakeholders in order to come out with reasonable policies to move in this direction.

MR. FOX: Thank you, Charlie. If I could just make a couple quick comments.

I generally agree with the comments that Jim and Commissioner Morgan just made. But let me try to frame this a little bit differently. I think we're really at the cusp of exciting times and the opportunity to really see a transformation in the way we interact with our energy supply. I think the task for utilities is to better engage customers in choices that increasingly I think customers are going to want, as technology does come down in price and new technologies enter the marketplace. Certainly, dynamic pricing, smart meters have -- hold open the opportunity to really increase customer awareness of their energy use, and also to encourage societal beneficial behaviors like moving energy use to times of the day where energy is going to be less expensive and also when energy production is going to be cleaner than sometimes it is with peaking units during peak times of the day and peak times of the year.

More than that, I see an opportunity for utilities through interfaces like smart grid to really increase customer options over their energy supply. Now, as many of you know, certainly there has been an introduction of retail competition in quite a number of states in the

United States. But really all this has meant for customers is what logo is going to be on your bill. The services that are provided by competitive providers are really not differentiated. They're not different. I think the challenge for utilities as we move forward is to become more like energy service providers that inform customers about their energy use, help customers to understand their energy options, and to be able to engage customers in options like energy efficiency programs, onsite generation, assistance with financing of energy efficiency upgrades and onsite generation, options for electrified vehicles and how those may be able to interact with a customer's onsite solar generation.

As we move forward in a nutshell let me just send this up by saying I think that the role of the utility is going to need to be more focused on facilitating customer choices and less about making choices on behalf of customers because technology is just at a point where we can do this.

MR. EBINGER: Thank you. I'll come back -- it relates to the point you -- several of you just raised. But one of the central messages we heard in our outreach to public utility commissions was a very strong sentiment that regulators are often not well informed about the benefits of distributed power systems. And clearly it sounds as if this is not the case with -- certainly with your two respective commissions. I wonder what do you think a PUC needs to know about distributed power to make intelligent choices on whether you promote it as part of the energy mix or not?

MR. MORGAN: That's for me?

MR. EBINGER: Yeah, or California. We can hear from California.

MR. MORGAN: I'll let California start first.

MR. WEISENMILLER: I think in terms of California, obviously under both Governor Brown and Governor Schwarzenegger we have a very strong commitment towards renewable, both utility scale and distributed generation. Very much motivated by climate change, very much motivated by jobs.

And so the interesting thing I can talk about is what some of our experience has been so far. I think our plan is to look at the barriers, you know, get some experience. Look at

the barriers and try to get the state ready for sort of a massive rollout as the costs come down. And I think when we look at the issues -- so I think fundamentally what we found, certainly with the legislature and certainly with the public and local officials, is a real ground swell of support. You know, the governor had a conference at UCLA, which we were trying to have 200 people there. It was sort of -- doors were locked at more like 400. So, I mean, and we're talking about a very broad range. And a lot of local communities, you know, last year we were citing plants in the desert, you know, we did 4,000 megawatts and we didn't find a lot of support for those, frankly, and for the transmission lines associated with those, although I think everyone realized that we needed to do those large solar projects to deal with climate change.

But I mean, there's a lot more enthusiasm for basically distributed gen in the load areas. Now, what we're finding though, and certainly I think what people have to be prepared to deal with is first the interconnection cues. You know, that basically you really can't do one by one. I mean, there's a fundamental change from trying to do one 1,000-megawatt project to try to do say 1,000 1-megawatt projects. And, you know, suddenly when you're doing the interconnection queue you have to look at the cluster. Otherwise, if you do one by one and then someone changes the location or their size, it has this ripple effect. So you have to really start looking at zones.

You also have to start looking at, as you said, the distribution system. In California, much of our distribution system was built in that post-Korean War era. It's sort of at the end of its string in many respects and it's time to really modernize that. It has really fundamental implications for us in terms of cost but it's the time to really modernize it, not to where -- the 21st century. Not to just replicate what we did in the 1950s. And that means to rethink it away from the central station to the customer meter, but to figure out how do you really, you know, put the communications technology out? How do you put the intelligence out in the system so you can deal with potentially reverse load flows? You know, we looked at -- certainly a German system, distribution system, is much better able to handle distributed gen than a lot of California legacy systems.

But, you know, cyber security, I mean, there's a whole series of issues that ripple

through that we need to deal with. Visibility, I mean, you can imagine Jim Rogers if he's looking, you know, and some of these loads are going up and down because the DG systems are going up and down. You need some degree of visibility out to what's going on on the production side to really understand the load side and trying to deal with the variations on your grid. We need to really figure out how to integrate this with energy efficiency and to really start looking at, you know, ways to package that and really address our existing buildings. You know, it's easy to start trying to figure out how to do this subdivision by subdivision, but most of our buildings are really the existing buildings.

And I think fundamentally, as you said, the military bases -- I know I've spent a lot of time at 29 Palms and at the Navy bases and they're really leading California in many respects into renewable. But in terms of trying to figure out the implications there and also trying to figure out national security, I know when we had our outage recently down in San Diego -- we had that confluence of the five balancing authorities -- when I talked to Major General Jackson, I mean, they were just sitting in the dark. Right? I mean, it took out the supplies at the military bases so they were really looking at microgrids and other ways to deal with the security implications there.

But when you do that you're going to start running into certainly rate and cost issues. One of the things we're finding, we have now about 3,000 megawatts of distributed gen in the California system. That's out of what's roughly a 60,000 megawatt system. And when you start looking at where -- so we're starting to get to the point of having real impacts on our system, certainly on our gas loads, starting to affect, you know, that -- what happens when you suddenly discover your loads in the afternoon are dropping off because of PV production, you know, what's the implications for that in terms of demand response programs? But also what are the rate implications? I mean, one of our utilities did a plot of basically where all the DG and EV installations are on their system. And basically the incomes associated with those households. And not surprisingly those tend to be higher income households that put this in. I mean, there's not -- they're not going on many rented houses, which means a lot of the $40,000 income households are not benefitting from the DG. But it's the $140,000. So you have to start saying

with net metering and other programs what are some of the rate impacts of that?

So again, I think the benefits are pretty clearly, although certainly, you know, there are a lot of things we can't quantify very well that are very important. I mean, how do you quantify national security benefits? How do you quantify, you know, air quality benefits? How do you quantify the job impacts, potentially providing jobs for our citizens doing the upgrades in the load centers as opposed to sending the dollars for the oil overseas. So we really need to do a better job on quantifying the impacts but we need to move now. And we also have to anticipate some of the issues that are coming up to try to deal with those.

MR. EBINGER: With your very ambitious plans in California -- I think we have the number right, to go up to 12,000 megawatts by 2020 of distributed power --

MR. WEISENMILLER: Yeah.

MR. EBINGER: -- when you talk about any possible fiscal incentives, I mean, is the state of California really, given its condition, able to provide any kind of incentives or are there other mechanisms you can use to get there?

MR. WEISENMILLER: We really have to think creatively about other mechanisms. As you say, our budget reality is such that, you know, we have to be smart about what we're doing. But, I mean, we do know things like the state is certainly one of the larger users of energy and certainly has a lot of property. So one of the things I started last year was to go through and do an inventory of state facilities, do an inventory of state lands, and start trying to identify opportunities for where the state can put its money where its policies are and really take a leadership role on distributed gen. And also looking for, again, if there is some way we can get some revenues for our state from, you know, looking at some of our extensive state land for energy development, for renewable or conversely some of our, you know, major energy facilities to use, to be buying green there, again, as a way to try to move things forward.

MR. EBINGER: Andy, can I ask you a question? In our outreach to power sector stakeholders we heard that renewable sources of distributed power, particularly small scale solar and wind, are often prioritized at the expense of fossil fuel sources of distributed power. Do you see fossil fuel sources of DPS as being overlooked? And if so, how should this

be corrected?

MR. KARSNER: Well, I suppose you could say it's being overlooked in the current environment but I think there will be its own market correction. I'm not sure that the government should be picking which technologies prevail and which ones fail. The question here is do you want distributed generation to succeed as opposed to do you want it to succeed with the stuff I'm selling? So I think you have to be quite careful there. And I think it's fair to say if I speak -- you know, by the way I'm very proud to speak for Manifest Energy and thank you for introducing me that way but in this context I'm even more proud to be a visiting fellow at Hoover and a part of the Schultz-Stephenson Task Force.

And I think that my colleagues at Hoover would agree that we would rather focus on an outcomes-based approach or an attributes-based approach as opposed to trying to say solar at the expense of micro turbines or vice versa. Really, what we're after is a reliable, resilient, redundant, affordable, agile, secure, clean energy, you know, as a matter of policy. And so distributed generation in almost any form can contribute to that mix and it's a growing part of that mix. But I think fossil will have its own comeback. I think natural gas probably will lead the way in terms of CHP applications. And I think that there's divergence going on amongst the technologies that are natural in the marketplace based on the intrinsic characteristics of those technologies' evolution and the site-specific characteristics that are needed wherever, as you pointed out in your opening remarks, distributed generation is called for and localized and there's some market pull for it.

So you put those two things together and you can't just sort of say, well, it's all technologies like peanut butter across the bread and everything can do okay. It really has got to be that the rancher in West Texas gets to choose a microturbine for his ranch and an industrialist CHP to back up his, you know, electric arc furnace if need be or his paper mill manufacturing process. And then solar has got a life of its own. Even I dare say here in Washington is substantially disconnected from the reality of what is going on in solar markets. You know, I know recently the administration, which has, you know, fancied itself as the biggest program in the administration is now suing to price up the cost of solar for American consumers because the

Chinese are making it too competitively uncheap on the back of U.S. exported nanotechnology.

So, I mean, we're somewhat sort of, you know, confused in the way that we're approaching the value chain of these things. Solar is on a Moore's Law curve that is crashing fast and the supply, the Chinese frankly, in what is really a bad business, you know, low margin, low value business, panel manufacturing. You know, the high value is in nanotechnology and the stuff being invented in California and the IP. You know, if you think Apple versus not caring about where an iPad is produced at factory number 17 in Yunnan, you know, we have on solar sort of said, well, in America we've got to have factory number 17. We don't care about Apple. You know, so we're a little bit confused about the value chain because Washington is trying to choose the winner. You've got to get away from that because this Moore's Law crashing of solar has meant that even solar -- we're thinking about these distributor generation, it's actually more of a demand side shaving device right now where jamming his grid, you know, has gotten regulatory authority to go put that on rooftops on his balance sheet. And go to a homeowner or go to a Safeway store or go somewhere else and say, well, we'll put this around our grid just to fortify it and make it stronger and take care of sag.

You know, over in Maryland, the stuff that they want to put on my roof goes direct to the grid. It doesn't go to my house. So there's all kinds of different models and merging. And I think you've got to be very careful that Washington not interfere with that. And so you can't talk about technology and isolation. You can't choose the winner. You've got to have the outcome secure, clean, reliable, resilient, affordable, redundant power as the priority for the nation. And you say how do you enable that? It's probably simpler than we think. I know there's regulatory pathways and byzantine incentives we can structure and lots of consultants we can hire to break down the incentives and all kinds of things you could do. But actually, if you just had sort of first year write-off or accelerated depreciation to allow people to make an intelligent decision, whether it's a CFO recommending to a CEO, whether it's a housewife because this makes sense for the household, whether it's a shopkeeper or a franchisee, we've really just got to make that simple empowering choice to let people do the right thing in their interests and kind of get to levelized costs quicker rather than kind of overthink the situation because this pays off now if you can

address this lifecycle cost question.

MR. EBINGER: Well, that certainly was provocative. (Laughter)

SPEAKER: Yeah, I didn't think enough people had coffee on this panel.

MR. EBINGER: Kevin, could I field a question your way? One of the recommendations in our report is that state government policies need to be more targeted to the size of a distributed project. Some policy tools such as renewable portfolio standards are appropriate perhaps for large scale renewable projects but they are seen as less effective for smaller scale projects such as residential rooftop solar.

Similarly, feed-in terrace for residential DPS can lead to a situation where homeowners sell power for more than the retail rate. Do you agree that policies need to be targeted to project size? And if so, what kinds of policies are most appropriate for different kinds of projects?

MR. FOX: Thank you, Charlie. And let me also start by saying here thank you to the Brookings Institute and Hoover for inviting me to have an opportunity to speak on this panel with such a distinguished group of very smart people.

When Charlie did the introduction he introduced me as being a partner with the law firm Keyes and Fox, and that is indeed true. But as is often the case for an attorney I am not here to speak on my own behalf. I really am here to speak on behalf of one of my clients, which is the Interstate Renewable Energy Council. And I'm curious how many people here may have heard of the Interstate Renewable Energy Council. Oh, okay. A surprising number.

The work we do oftentimes flies under the radar because it's not the most glamorous work but it is critically important work. IREC is a 501(c) nonprofit. It's been in existence for about 30 years. And the focus for IREC is on expanding customer access to distributed power systems. IREC has worked in 40 states helping to implement policies that directly impact the size of these markets. In particular, IREC has done a lot of work on net metering rules, interconnection procedures, community solar and renewable program rules. We do provide model rules for each of those different topic areas. Those are available through IREC's website. Increasingly, we are also working on wholesale market design, integration of

distributed storage, PEVs -- plug-in electric vehicles -- and smart grid technology and integration of those technologies into distributed grid. And also addressing land use permitting and environmental review considerations associated with various aspects of distributed power systems.

Going directly to the question that Charlie asked, you know, policy, should it be designed in order to facilitate systems of different sizes coming online? I would say that that probably is the result of putting in place different policies. But I'm not sure that it really should be the goal. I think when you take a look at distributed power systems there's really, I think, four key variables to look at -- size, location, functionality, and fuel source. I would say that primarily what policies should target isn't so much size as much as it is functionality, which is very closely related to location.

And let me talk about four policies that I think are well suited to different locations and functionality. Forty-three states plus the District of Columbia and Puerto Rico now have net metering standards in place. Net metering is a great policy that helps customers self generate their own power supply. It's a simple, intuitive billing mechanism that really gives customers exactly what it is that they want, which is the ability to use their onsite power system to offset all of the electricity that they would otherwise purchase from a utility. Most customers don't offset all of their power supply, and in fact, I would argue it probably is not economically rational to do so. If you're in a location with tiered rates it probably makes sense to shave your highest tiered rates. Lower tiered rates for utilities are usually pretty inexpensive. And so it probably makes more sense to buy your energy from the utility. A lot of customers want to be net zero. Net metering offers them an opportunity to do that. So really this is a policy tool that promotes self sufficiency for those who are in a position to be able to host an onsite system, whatever the fuel source happens to be.

Not all customers are able to host an onsite system though. There was an Enrail report that came out several years ago that said only about 22 percent of residential customers are in a position to host an onsite system. There's a variety of reasons for this. A lot of people are renters so they don't have sufficient control over their property. There may be challenges

associated with inadequate roof support, shading considerations, credit. There's a whole list of reasons why a customer may not be able to install solar on their roof.

What IREC has been working on in order to open up solar opportunities to a broader group of customers are community solar programs and community renewable programs. These programs allow for customers to co-invest in solar systems that may be located off from their site but somewhere nearby that allow for them to get their power supply from a particular system that they are choosing to invest in. This goes back to the customer choice point that I made earlier.

Now, when you move beyond these sort of policies that are focused on direct customer engagement and we start looking at wholesale supply, I'm a firm believer that utilities really are experienced and well positioned to be able to procure power for their customers at the lowest cost, taking into account what is going to be the best fit within their resource needs. In California we call this least cost, best fit. I would simply call it lowest cost consistent with state policy goals.

So I think that there are a range of policies that are needed in order to be able to fully facilitate the sorts of investments that we need and I think that customers want in distributed power systems. But I don't think that these policies should really be about trying to bring on systems of particular sizes but rather about engaging customers in a way that allows them greater control over their power use and the renewable energy content of their power supply.

MR. EBINGER: Could I follow that? And to anybody who would like to address it. What do you think is the appropriate -- where a customer is actually allowed to sell power back to the grid, how do you think the prices of that power should be done? Should it be on average cost of power? If they're selling power back in at peak time should they get a peak price? That was the subject we found a lot of our stakeholders very in contention about. I wondered if anybody had any pinion. Jim, do you?

MR. ROGERS: No. I always defer to the Commission.

SPEAKER: Always a smart thing to do.

MR. MORGAN: It's really not necessary but I do have a comment. And there's

actually a couple of issues. One is the peak price and being able to -- well, there is, in fact, typically a strong coincidence between the time when peak output from photovoltaics is available and when power is most valuable. So you can see an obvious advantage to solar. The problem is unless you have dynamic pricing in place or some kind of hourly pricing or time of use pricing, the utility actually has no way of knowing because they read the meter at the end of the month. They don't know when that power was generated. So having dynamic pricing in place is really a precursor to being able to do that well.

There's another question though about what price to pay for power from what we call a behind-the-meter generator. If the generator is producing less than their full load, the effect of that is that -- it's the same as if they were just conserving energy. And they're conserving energy -- what they're saving is at the retail rate that the utility is charging them. But what happens when their generation starts to exceed their load at any given moment? They're actually feeding power out onto the grid. And should they be earning the full retail rate or perhaps just the energy portion? Because they shouldn't necessarily get credit for the transmission and distribution that the company is supplying.

And that's a question that a lot of commissions have grappled with when we adopt net metering rules. What we did in the District of Columbia, and this is typical of a lot of states, is that we did sort of a two-tier system. We decided that for simplicity the really small customers, it would be much easier to not have to worry about having these two tiers which, in fact, requires you to have two different meters. And just keep it simple and there's not really very much power that they're going to sell back to the grid anyway. So anybody who is under 100 kilowatts of load in the District is able to do net metering and get the full retail rate for what they sell back to the grid.

But if you're larger than 100 kilowatts, and now you're talking about some -- anybody bigger than a residential or a small commercial customer -- when they sell back to the grid they get only the energy portion of the bill, which in an economic sense is really what they are saving the system. So we're upfront about the fact that for the small customers there is a subsidy but in fact it's a way of promoting distributed generation to small customers and that the

difference is not very large. And it really makes it a lot simpler.

MR. EBINGER: Andy.

MR. KARSNER: I better let Jim respond to that first.

MR. ROGERS: No, I mean, Andy, you should because you can put more adjectives in one sentence than I can. (Laughter) Plus, I'm from the South and I go a little slower.

But I guess the important point here is that I actually agree with most of the things that Andy was saying. But on this specific point, Commissioner Morgan was right. I mean, using the energy as a way to price it is the right thing because if you think about our role as utilities, in the 21st century we're going to be in one sense of the word a battery in a distributed generation world. In another sense of the word our mission is going to be optimize the use of electricity on the entire grid which incorporates distributed gen.

And so if you start to think in terms of our role as optimizer, our role as battery, in addition to providing kilowatt hours which we will continue to do, then you start to frame the issues in a different way. And then the question is how do we get paid for being an optimizer on the grid? And that's kind of one of the unanswered questions as we go into the 21st century.

I think the other important point is that I started out saying this and this really goes to whether we ought to have federal policy or state policy or the subsidies,, neither our state governments or federal government can really afford subsidies. We're not in that period in history. There is adequate public-private capital that can go to work in these areas if the incentives are right.

Let me just be clear about an important point. When I made the simple point that the price of electricity is going to go up in the future, it's going to go up rather dramatically rather fast, primarily driven by the facts that we'll retire, replace virtually every power plant by 2050 except our hydro facilities. We're modernizing our grid. We're putting in new smart or two-way communication meters. All of that is going to drive the price up so the economics of distributed generation is going to be -- it's going to be clear that there's going to be a better market for it in the future.

So to have any policies, I think the natural economics of what's going to occur over the next several decades will create a huge opportunity for distributed generation in the U.S. and we need to embrace it as a utility company. And I do think that we can both compete in terms of building distributed gen within the homes and businesses of our customers or we can cooperate with those who have lower cost to capital. I dare say we have a lower cost to capital than virtually all our customers because we're the most capital intensive industry in the world. But I'm open to competing with anybody that can bring cheaper capital to the table.

MR. EBINGER: Andy?

MR. KARSNER: I'm glad I don't compete with Jim on any given day.

So Charlie, I would say you've asked the key question to the game, which is how do you price and incent market-based penetration of the resource? And the very fact that you've got to ask it in the report and every report that's ever come out on this has got to stretch around and go, well, the District of Columbia does it this way, California does it this way. So if there ever was a hodgepodge quilt, state laboratory for something it would be this. This is the furthest thing from uniform national policy that we probably have in the energy domain to talk about.

So the question is is there virtue in that? There is a lot of time, virtue in leaving these things to the states but in this case, based on some of the things that Jim opened up with in terms of the security question which I think is a fundamental driver here, there is a national security imperative. And I don't just mean external attack and project Aurora and spinning the turbines backwards and this kind of thing, although that's certainly out there. But you know, they just discovered a derivative of the Stuxnet today that's coming out of India that they think is headed our way.

And so we don't -- you've got critical businesses, not just air bases and naval bases and islanding across this country, but you've got critical businesses for economic support and continuance that if interrupted for a sufficient period of time is massive economic disruption. Just think about ATM machines out for 72 hours and what the homeland security impact of that would be.

So I think you do need to move towards a coherent national strategy, and I don't

think that the issues have yet been tabled in terms of pricing. We know pricing mechanisms and we know interested parties will argue about them, that the advocates will say, gosh, give me the avoided cost of peak power on the most day of acute security you need and reimburse me for that 365 days of the year. And there are utilities not as forward leaning or as visionary as led by guys like Jim who basically say, you know, you might convince me to get out of the way. You know, I have a policy of deliberately frustrating you and ensuring that you don't have distributed generation on my grid but you might convince me to reduce the level of frustration.

So we've got those two poles across the country competing and you actually need somebody in Washington to assess the attributes and outcomes and the value for the nation of having a more redundant, resilient, reliable, affordable, secure, clean, localized supply. Did I get it in? Yeah. I think I missed one. So I had taken a stab at this. My former boss, Sam Bogman had said, well, you know, what would you do? And I, you know, greeted it with a classical shrug before coming back with a PowerPoint deck and the rest of it and, you know, one idea, and it's an idea that's not popular on either of those two poles, where we just take the retail price of power and guarantee a minimum percentage of it back. You know, 30, 40 percent because if the retailers can't make money on some certain major discount, well, then they're probably not in the money making business. Of course, they are. And give a bar for the technology providers, the vendors, the advocates, and everything else to go for.

And then if states want to layer competitive incentives or whatever on top of this minimum bar, then so be it. But what you don't want to have happen is when the next hurricane happens in the Gulf of Mexico that Mississippi or Louisiana is completely out, but Texas and Alabama are completely online because a couple of different regulators understood the attributes and the other ones didn't. And so you do have a national security imperative and economic continuance imperative that begs some creativity and imagination that has been lacking on pricing here in Washington.

MR. WEISENMILLER: Let me just make an observation following onto that. As I mentioned before, I view our role in the 21st century as more of an optimizer and where a distributed generation is an important component of the optimization of the grid. I'll go a step

further. We have spent the 20th century not only providing universal access but having an integrated grid. I actually think in the 21st century we're going to start working in a way to create microgrids. And the analogy I would use is basically it's like an old-fashioned southern quilt where we basically have the ability to seal off parts of our entire grid. That will help us in terms of reliability when storms roll through and we need to seal off part of it. But it also will help us if there is a cyber attack in some region. Then we can protect other parts of our entire grid.

But this notion of microgrids requires battery technology. It requires smart grids so you can send the communications to send off. But it also requires distributed gen to really make it work. And so I actually believe that we have more of an imperative than it may appear on the face of it to move in that direction given the future we face.

MR. EBINGER: Kevin?

MR. FOX: Thank you, Charlie.

There are a couple of quick things that I wanted to follow up on. This is a very interesting discussion.

With regard to that metering and the way the economics of that metering work, I want to just peel away one additional layer of the onion here and make two points. First of all, most customers, you know, larger commercial customers which represent the vast majority of installed distributed generation systems in the United States are on what are called demand charge rates, which means that the rates are charged on two components. One is volumetric kilowatt hour charge, which is usually the generation cost recovery. And the other is a demand charge that's based on highest instantaneous demand usually measured within a 15-minute increment within a billing period. And that demand charge is typically designed to help a utility recover the cost of putting in place and maintaining distribution and transmission system assets.

Customers who are net metered who are on demand charges are only getting a credit that is equivalent to the generation-only portion of that, the volumetric portion of that. Essentially, what happens for most customers in the United States that are on that rate structure is more or less what Commissioner Morgan had said that they put in place in the District of Columbia. So I just want to challenge the notion that everybody who is on that metering is getting

a full retail rate credit because I don't think that's actually the case.

The second point I want to point out here, and I think this is critically important, is if a customer is only getting a generation portion credit in the rate for the energy they put on the grid, those generation costs are based on large central power station generated power. Right? And so if you read through this fantastic Brookings and Hoover report that talks about the various benefits of distributed generation, I think one needs to ask oneself are those benefits incorporated into that generation cost that's not based on distributed power systems? I would argue that distributed power systems provide benefits that go beyond that and that those benefits should be reflected in the value that these net metered customers who install systems on their home are able to provide to the grid.

On behalf of IREC, we've participated in a number of states addressing these sort of economic concerns and we've been able to show when you really drill down on this issue that oftentimes the subsidy does not flow from nonparticipating rate pairs to customers who install distributed generation but it actually flows back the opposite way. And in fact, one of the states where we were able to show that based on information that was provided by utility was in North Carolina. And actually, that utility was Duke.

MR. EBINGER: Robert?

MR. WEISENMILLER: Yeah, I was going to make the observation that I think it's very important to be providing pricing signals, particularly time reduced pricing signals. One of the things which we found in California, and a lot -- more on the somewhat larger scale -- but it is amazing the amount of proposals you're going to get. For example, in California, in the interconnection cues this year on the wholesale side, we got 75,000 megawatts of renewable. And that's for, again, a 60,000 megawatt system. And so -- and in terms of the utility solicitations, the ratio again is 10 to 20 to 1 between the amount they're trying to buy and the bids they're getting. Now, some of those are relatively flaky bids and some of the proposals were to begin. There were a lot of proposals there, and certainly every time we've done some sort of proposal for a RAM or whatever, for the smaller size, again, it's really oversubscribed. So you want to be buying wisely and providing pricing signals.

And we see a lot of variation. In California, as we indicated, PV is certainly going to be more production during the peak periods while the peak for wind in our summer period is off-peak. So again, there's a lot of variations among the technologies. So you really want to be providing the pricing signals for them to try to optimize their systems. And then again, you're probably just going to be amazed at the range of proposals you're going to get.

Now, like I said, some are very solid and some are pretty flaky. But again, there are real opportunities there and you want to get competition between the various technologies. I mean, one of the things actually we're struggling with right now is that obviously we're looking more for a portfolio of projects, but the solar PV is just really sweeping the market. You know, I mean, the last solicitations, only a small handful, a couple of projects that are not solar PV that were winning. And the solar PV prices were, you know, actually below the cost of what you'd expect for a combined cycle of its life.

So again, it's really dominating that. And I think one of the issues again is how do you make sure you've got a diverse portfolio of characteristics there?

MR. EBINGER: Jim.

MR. ROGERS: I'll just make the observation we are in a period where it's a supply-demand issue with respect to the price of solar panels. There is a huge oversupply now and that's driven the price down. At the same time the actual price of producing is coming down but Moore's Law, what might have worked with semiconductors doesn't work with solar panels in terms of the more you invest, then you'll drive it down the curve. It doesn't work exactly the same way.

And so I would dare say that it's important to keep in mind that we can't over read this period in history where there's oversupply. I actually think the fact that -- I mean, I agree with Andy on this -- suing to stop the import of cheaper panels is really not the answer for the American public in terms of using renewable energies. I just don't think that is the right way to approach this issue.

MR. EBINGER: Some of you have touched on my next question but I'll just throw it out. What, if any -- I'll add if any -- role should the federal government have in promoting

DPS? And are things like the investment tax credit and production tax credit useful or kind of useful or are there other measures you think the federal government -- Andy seemed to suggest that somebody needs to think how we do all these. Who might that be in the government?

MR. KARSNER: You mean this government? No, I'm kidding.

It's a serious question. It deserves a serious response. I think going to the old bad of mechanisms that we have of erratically applied tax credits that we cannot afford that only work sequentially, you know, at a time that you fundamentally need transformation and some sort of catalyst for market-based capital formation to flood this zone, you know, that's not going to work. And so we've got to get people out of their traditional silos and saying, well, I just need two more years of the tax credit and how much is OMB's cost in that? And you know, I'll give you that and trade you a production tax credit. It is not going to work. It is incremental, and if we have a security crisis, if we lose ATMs and have panic for 72 hours in this country, it is whistling past the graveyard.

And so you've got to say how do we get private capital to work on this? In other words, how do we get the homeowner, the shopkeeper, the CFO, the housewife, to say this is a good investment for me today? And then policymakers on the other hand have got to say this is good for the nation, not over 40 years but over the next 5 or 10. Time has got to matter if you accept that there is a security implication. Not just a military one but very real cyber threats and economic continuance.

And so we don't have those tools. I'm very hopeful and I think you have a right to be very proud of this publication for stimulating this discussion. But we have got to bring new tools to bare that say how do you unlock private capital to direct it towards localized power generation sources? As long as it's a niche market where select, informed players are saying this might work if I live in the right jurisdiction and cobble together the investment tax credit. If it doesn't expire by the end of the year, that's just excessive cost for incremental gain. And what you've got to get to is I think you've got broad bipartisan consensus on the virtues of this issue, so what you've really got to get to is how does the government have the lightest touch to enable private capital to perform this function with the greatest impact in the shortest time? And those

tools have not yet been formulated and developed and the placebo effect of going back to tax credits and everything else we can afford is going to delay the inevitable need for this stuff.

MR. ROGERS: Let me just comment. I mean, it's -- yes, you can have federal policy. You can have tax policy. And I think Andy addressed that very well. But there is a huge delta between the prices of electricity in different regions of the country.

In North Carolina, we're about 30 percent below the national average, while in California they're about 30 percent above the national average. So kind of what works in one market is different than another just based on price alone.

But the other piece of this that I think is really important that is touched on in the study but I think is really the interplay between distributed gen and energy efficiency and new proposals that will result in productivity gains in the use of electricity. So I think in many ways the first step for most consumers, for most industrial customers is how can they reduce their usage? Because that will be the cheaper investment. So then distributed generation will come later. But to understand the interplay or it might come contemporaneously. But the bottom-line is there is an interplay there that needs to be explored even more because I think that will be critical. Because I happen to hold the contrarian view of most that where they see the growth and the demand for electricity between now and 2030, I actually believe it will be flat to slightly declining during that period, not withstanding greater electrification of our country and more EVs. And so it's a combination of energy efficiency and distributed gen that will kind of offset what would have been a predicted growth in demand for electricity.

MR. WEISENMILLER: I tend to think that it is important to make investments. I mean, even in the depths of the depression, that's when California invested in the bridges. Certainly, that was when Hoover was done. And it's a time -- we have to be moving forward on basic infrastructure.

On the federal side, RD&D is just incredibly important. You know, we just need those federal dollars targeted towards those game changers, energy efficiency. I think at the same time certainly the military is taking a real leadership role and rolling out the technologies and helping us test bed those and demonstrate those and get the volume. And again, the federal

government is a major user of energy and not only the military but across all of its operations. It's really got a leadership role for the public and how to move forward on energy efficiency and DT.

Now, certainly as we go through, frankly some of the things the federal government has got to get out of the way on. You know, pace has been something where we were really making progress on retrofitting, you know, existing buildings and that was stalled by that. We're really trying to come up with programs in the commercial sector but it's really important to deal with the existing buildings. And certainly the federal actions on PACE really set us back. So they've got to move out of the way on some of the things. But also to try to use the states as the laboratory. Any funds they have that can help us move forward on key programs and get out the information on what's working and what's not working is important.

And certainly incentives. You know, if you're doing something which is not at this point commercially viable, getting some way for the federal government to support those commercialization programs is critical at this stage. And again, whether that's tax policy or how you do it, but we need the help to get over the hurdles there.

MR. EBINGER: Kevin, a quick comment and then we want to go to the audience.

MR. FOX: Sure. Just a couple quick things I want to add in terms of federal regulatory policy. I think it's important to note that all the states really control -- have control of a lot of the levers of distributed generation policy. They don't have control of all of them. Most importantly, FERC is the regulator of wholesale power markets when wholesale sales are interstate commerce. What that means is outside of Texas, Hawaii, and Alaska FERC essentially controls the wholesale power market. I absolutely agree with Commissioner Weisenmiller. One of the key issues that needs to be addressed is interconnection reform so that we can bring more wholesale distributed generation systems onto the grid. However, that really is FERC policy and FERC has been somewhat, I think, slow to really transform the interconnection procedures that are in place around the country in a way that's really going to allow a lot more distributed power systems to be brought online.

MR. EBINGER: Thank you.

We'll now turn to the audience. We ask -- we'll have mikes coming around. We ask if you please identify yourself when asking a question and please keep your questions brief. If you'd like to ask a particular panelist, please so specify. Otherwise, we'll let anybody who wants to comment, comment.

The lady here.

MS. AYRES: Thank you. I've got to get this in the right place. I'm Mirabelle Ayres . Nice to see you, Charlie.

MR. EBINGER: Nice to see you.

MS. AYRES: It's been a long time.

It was interesting to hear the discussion about federal policy and Andy, you in particular raised the need for it. And I was also interested to see in the report, very glad that it's co-sponsored by the Hoover Institution and Brookings because it makes it a bipartisan report -- a recommendation that there be energy -- comprehensive energy and climate policy to advance DG resources.

Now, those of us living in Washington know that that seems like a very far off idea in the current political context. So my question really is, and Andy, you might want to answer it but I'm happy to hear from any of the panelists, and again, from Secretary Schultz, if appropriate, how do we get Republicans and the Republicans in Congress to understand that there is a driver here for both national security and infrastructure investment? Because we haven't been successful in doing it and these issues have been more associated with climate which has become politically toxic.

MR. KARSNER: Hi, Mirabelle. How are you? (Laughter)

MR. EBINGER: Please withdraw the question.

MR. KARSNER: Well, you know, we passed these two bipartisan energy bills during the Bush years when the president was at 35 percent and arguably entering lame duck and Iraq was raging. And the climate bill that President -- President Obama, by the way, voted for both of those bills. And the climate bill redacts that he had wanted as a Hail Mary at the end of the Waxman-Markey exercise that, you know, found him back in Senator Bingaman's

committee saying can we get anything out? Ended up looking a lot like the Bush 2005-2006 bipartisan bills.

And so a lot of it is how much acrimony and angst do you need to go through polarity and toxicity before you actually get to mature deal making? And it seems like we had much more of the former and very little of the latter in the last few years. But a lot of it is terminology, too. You know, how do we get Republicans to understand that they should protect their children? I mean, we have to kind of be careful. You know, you have to be careful in how we're characterizing these things. The energy policy always has climate consequences. Climate policy, if we want to label it that, always has energy consequences. What you're really talking about here is national security policy. You're really talking about how do you -- how do you offer the nation cost-effective insurance that it can purchase for itself with private sector dollars at the earliest possible date for its energy resources. That is really the subject matter. And were it to be put forward by this administration or the next or whatever, in that context I think you would be able to get it beyond our institutions and into terminology and a deal mode that even Congress would comprehend.

But I think -- I do think there is a degree of inevitability in it when the dust clears from the exercise that we've just come through, that I think the attributes do have common roots and so I'm confident that you will get this taken up and policy will move. I'm less confident it will be the right policy, which I think should be something very simple, oriented to moving capital and private dollars as rapidly as possible to market penetration of the localized model.

MR. EBINGER: Secretary Schultz. Oh, does somebody want to say --

MR. SCHULTZ: No, I was pointing. I know when I come to Washington I'm going to be put on the spot to speak for Republicans. So I'm glad to do it.

In the first place, I can't believe that anybody who supported the Waxman-Markey bill actually read it. In the first place, it's so long that none of the people who voted on it read it. I'm certain of that.

But to the extent you dip into it you'd say to yourself this cannot possibly be a sensible way to go about anything. So to kill it is a good idea.

What Republicans want is something that works. Now, just think of the history. Ever hear of Teddy Roosevelt? When did the EPA get created? Maybe people will blame us for this these days. That was done -- President Nixon signed that bill. And I was director for the budget when it was signed. And when a new organization is created it can't advocate itself. And it gets created by taking things -- space and things from elsewhere. So the OMB has to be their representative. So that was me.

And we're pretty good representative because we know where the bodies are buried and nobody wants to mess with us. So we created the EPA. Then along comes the problem of the ozone layer. And we worried about that in the Reagan period. I was the secretary of state then. I went over it personally with the president. And it was sort of like now there were some scientists who thought that it was a real problem coming; others doubted it. Actually, there was universal agreement that if it were so, it was not reversible and it would be a catastrophe.

So President Reagan thought, you know, we better take out an insurance policy here. So we worked this thing through. And when there were people, bureaucratic problems, I always could say let's refer it to the White House because I knew where the president would come down on it. But at any rate, when the Montreal protocol got negotiated, President Reagan said it was a magnificent achievement. And it turned out the scientists who were worried were right. So the Montreal Protocol came along at just the right time.

I might say, as you look back on these things, it's always interesting in the industry the contribution and what really kind of saved us in the Montreal Protocol was the fact that DuPont came along with an invention that was not expensive, that people could use, and what made a big contribution to having it work. I must say I think in the current context getting the pot stirred here, we're going to see things come along and probably they're going to come along in part from industry.

I have in my pocket a little press release from General Electric that strikes me as very important in this load balancing business that we've been talking about a new turbine that they have probably -- I see Jim shake his head, he probably knows all about it -- that's sufficient but also is very sensitive. It can go up and down easily. So if you are dealing with an

intermittency problem you can have a supporting gas plant with this kind of a turbine that in effect does the job that the large scale storage might do. So it's promising. I don't know whether it's going to work but this is a great idea.

Then along comes the acid rain problem in the first Bush administration. And they put into place the only cap and trade system that I'm aware of that really has worked as was well done, carefully done, with a lot of tough mindedness in it. So those are the Republican things to do. But actually, they aren't. Having taken part in some of them they weren't gone about as Republican things. They were gone about with the Congress as problems and let's try to solve the problem. And nobody thought of the Montreal Protocol as a Republican initiative or a Democrat. It was something we needed to do because there was a big problem for us and for the world in general and so let's do it. Here's something we can do. And I think we've got to get back. Maybe it's impossible in Washington. I don't know. We've got to get back to that era where we said here's a problem. What can we do about that problem? And then solve problems. And then we'll begin to get somewhere.

So I don't know what we're going to do in California. We're a bunch of nut cases out there. I know all you people in the East worry about us but, you know, we actually like to breathe clean air. I know that we're odd in that respect but we like it. And so it's a good thing. And we're willing to pay for it. But, at any rate, I have my own ideas about federal policy and I notice on your program it says I'm supposed to summarize. So if you're still here when it comes my turn I'll tell you what federal policy should be. (Applause)

MR. EBINGER: Questions? In the back.

MR. MANTO: Hi, my name is Chuck Manto . I had a question about the dual problem we're facing it seems, at least in the American layman's point of view. We lack a sense of urgency because we feel like climate change and peak oil, while it's honest it won't really affect us for 50 or 100 or however many years the commercials tell us we don't have to worry about it.

And secondly, we always have the sense that it's really not our problem anyway because Washington will fix it or the utilities will fix it. It's their job; it's not mine. I don't know anything about this.

But I was looking at these reports that came out in the last year and a half from NERC and FERC which talked about a half dozen different ways we have these high impact, low frequency threats to the bulk power system. And if seems like if everybody were to be convinced that the 100-year solar storm could hit us at any moment and as much as the utilities want to get ready for it they really won't be able to get up to speed fast enough, maybe it becomes all of our responsibilities to make, say, 20 percent of our own power with the help of folks like Duke so that it's no longer the Fed's responsibility, the utilities' responsibility. We don't really have to wait for a tax incentive. We don't have to wait for a credit. It's just in my own self interest because if the whole country loses power for months at a time, half of us could die off. And since I don't want to be in that number I want to make my own power. And I'm wondering if distributed energy in that light from that type of security problem could provide the sense of urgency and motivation that everybody can buy into if done in a reasonable, rather than a radical way.

MR. ROGERS: I think that's a good suggestion. I do think that because we're in a period of rising rates in the U.S., which I said is a benefit to the development of distributed gen, which I believe, I do see huge pushback from state regulators in terms of allowing utilities to even rollout to a communication of the distribution network or to install two-way communication meters. They are saying we don't see the benefit so we don't want the rates to go up because we're already, you know, retiring plants, building new plants because we just spent $5 billion on retrofitting our coal plants and getting ready to spend another $5 billion with the new EPA regulations. And so you have huge political pressure at the local level because the real price for electricity has been flat for 50 years. They do not want to see it go up. And so there is this huge pressure that said any investment by utilities, particularly in the states that we operate in that will facilitate even smart grid. I mean, it's been only in a few states that we've actually got approval of it, which is actually needed to facilitate the grid that allows the dispatch of distributed generation on the grid and to maintain the reliability of the grid at the same time.

So that's really the challenge that we have, particularly now in this recessionary period. With nine percent unemployment, there's just a reluctance to allow any investment to modernize at the local level because of the tough financial situation. And even as you make the

case, and I think you can make a case for it very strongly, a little bit of it is based on what's going to happen in the future and nobody is willing to make that bet with what's going to happen, at least in terms of paying for it today for some future event. That's just the cold reality of on the ground trying to make things happen in state commissions that are reluctant to see prices go up for any reason.

MR. MORGAN: If I could just respond to Jim. As a regulator I'm not necessarily going to disagree because I do see that as one of the big challenges that we face and there's certainly a lot of pushback that we're getting about the cost of advanced metering infrastructure but it's important to recognize that it's not just whether or not you spend the money on AMI and smart grid technologies. If you choose not to go that route you're going to have to do something else instead. And that may be building another power plant, for example. Now, of course, utilities have been building power plants for a long time and the idea of doing something different, you know, that's a hurdle that we've got to get over. But I am certainly seeing progress. It's not as fast as Jim would like or as I would like but we do have a number of states. Besides the District we've got Maryland, Delaware, California, Ohio. In Canada, Ontario is moving very quickly.

Advanced metering is being installed as I speak. AS I speak, early next year we will have every retail customer in the District of Columbia with an advanced meter. And we have a docket where we're going to look at what kind of pricing we're going to do to take advantage of that metering. And I've got to tell you that really the killer app in a lot of ways in order to bring about distributed energy resources is to get the pricing right. Right now the customer does not see the true value of the electricity at any given time. We've got a robust wholesale market where the prices vary from hour to hour at the very least, and yet the customer just sees the same price 24/7. They get a bill at the end of the month and the utility doesn't even tell them how much power they used when. It's just, you know, it's like going into a grocery store and filling up your cart and paying for it by weight. And that's the way we pay for electricity in this country.

We now have the technology to do a whole lot better than that. And once we get the prices right and we send customers pricing lists that where they can see the value of the electricity and they can see where the opportunities there are to save energy, then that's going to

open up the door to plug in electric vehicles, to smart appliances, to more solar on rooftops where you can give credit for the very hours when it's generating when it's worth a whole lot more than that flat rate that they're getting for it now. So there's just tremendous potential out there.

But yes, we do have some hurdles to get over but I really do believe that the regulatory community is moving in that direction. It's going to take time. It's not something that's going to happen overnight.

MR. EBINGER: Andy.

MR. KARSNER: Yeah. I want to share some further thoughts on that. And to the gentleman's direct question I want to say that I think the way you proposed it is the only way that it'll move forward, is on a security basis, at least in a timely manner. Another point is I want to make sure that Secretary Schultz's comments were recorded because I've got to explain to my wife why I go to California once a month and that's the reason. Nobody can explain the Republican Party in this town as well as Secretary Schultz can explain it from the other coast.

What I would tell you about what we've been talking about here, the customer relationship, I thought Jim was going to get through that whole thing without saying the word "smart" at all for smart grid in terms of adjectives because it's got baggage. Right?

MR. ROGERS: I try to avoid it.

MR. KARSNER: Yeah. You almost got there. You only used it once.

It's the old saw in terms of the customer value proposition that, you know, everybody in this room is interested enough to be here and are readers in this field and are researching better ideas or better technologies. But, you know, Americans really only care about a cold beer and a warm shower. And if you're going to reverse that then you're going to have them be concerned. (Laughter) And so I don't -- as much as we would like to invent the reason why real-time pricing is going to move them into the same sort of reaction that they have with an Xbox or with Apple TV, you know, there's probably an unlikelihood -- there's a sexiness delta there. And I think that, you know, we've got to come to grips with some of the behavioral realities around this. And what we've been doing is having interested parties in rooms like this cook up how the specific mechanism will move them to push a button at a different time.

We did some of the behavioral studies at the Department of Energy when we were working with Maytag and Whirlpool and all these guys on the real-time pricing of the appliances and we found out 80 percent of the people operating those things just began to view it like an alarm clock. They were like, ah, stop it. Oh, there's that red light again. I don't want to deal with it. You know, so I mean, you've got to get down to how people behave and respond to these things.

And what's actually gone on with the overzealous selling of the smart grid, which is a fundamental building block that we do need to have and come up with clever policy that will move it. And we're obviously not there because all the money we've thrown at it is not moving it at a rate that's consequential to enabling the distributed generation we want. So we come up blank. We've spent a lot of money and we've come up blank but you've got to recognize that the value proposition at a time that people have less disposable income and have this classic not caring about filling up, you know, the minivan with electrons is that you're giving them a value proposition saying we're so smart. We can take care of you. We know you've never had to think about this and we know that it's been a bulk price and a cheap price and it's always been there whenever you needed it. But now we'd like to price it at a premium when you need it most. And we want you to think about and concentrate when that is and you're going to thank me for that later. I mean, and that's kind of the policy proposition we've laid out.

Okay. And so we've got to be more clever to get to the middle of the bell curve to make it appealing on exactly what your question is. What are the macro security implications for this country for not modernizing its grid, for not empowering the distributed users to get to redundant, reliant, resilient power.

MR. MORGAN: Andy, I agree. If you put dynamic pricing that way to people it's obviously dead in the water. But there are ways to sell it. A lot of it involves having a conversation with consumers and finding out what their needs are and letting them know what the opportunities are. And it's actually been done very successful in a number of places, including here in D.C., at least on a pilot basis where we tested three dynamic pricing methods on about 900 customers. And they tried it for two full summers and one winter and at the end of the pilot

we asked the customers would you like to stay on dynamic pricing or would you prefer to go back to your old flat rates from PEPCO. And by a margin of 14 to 1 they said we would like to stay on dynamic rates. Once they've tried it they loved it.

So if you ask somebody ahead of time, you know, do you want a price that charges you a premium when you're, you know, when power is most valuable they'd say hell no. But if you pitch it a different way and say would you like us to tell you when you could save the most on your bill by shaving your load, you've got a very different answer. And that's how the more clever utilities are doing it. And we're really starting to see good results.

MR. KARSNER: But let me just give you one factoid that puts all of this conversation in perspective. The average consumer's cost of electricity is 1.9 percent of their disposable income, the lowest it's been in 50 years. And so they wake up in the morning and say they don't worry about it. It's totally -- when they throw -- I mean, think about it. How many people in this room know what they pay per kilowatt hour? Raise your hand. I think some of you are just making this up. (Laughter) But you all are more informed. But even in this room I'd say less than --

SPEAKER: Thirty percent.

MR. KARSNER: -- less than 20 percent maybe knew what the kilowatt hour price is because you don't -- nobody knows. But I bet you if I ask you the question how many people know what you pay for a gallon of gas, how many people know that? Everybody knows that because they know that number.

And so the important point is the message that has to be shared is that the real price of electricity is going to go up rather dramatically, and in that context people will start to appreciate it in terms of what the alternatives are in selling these new ideas. But if the world stays as it is today where electricity is totally in the back of our mind. I mean, think about it. When you throw a switch to turn on the lights in this room, do you go is that from a nuclear plant or from a coal plant? You don't even think about it unless the lights don't go on and then you go, "Damn utility." (Laughter)

MR. EBINGER: I just want to make one quick comment. The reason they like

your dynamic pricing versus the alternative is because that's PEPCO. Anybody that deals with Pepco has no love for the organization.

MR. KARSNER: Charlie, I was going to say the same thing. The best way you can sell it nationwide is to say I'll give you something other than PEPCO. And that's a very appealing argument.

MR. EBINGER: Well, I want to thank our panel.

SPEAKER: One more question?

MR. EBINGER: Do we have time?

SPEAKER: One more.

MR. EBINGER: One more question in the back. Where?

MS. FUND: My name is Nancy Fund . I'm an investor in renewable. And I would just -- I want to ask about storage but I just wanted to comment on Jim Rogers' point. One of our companies is Solar City, which I see is mentioned in the report. And while we care about rebates, we care about ICC, we care about net metering, in terms of where solar companies expand it has to do with electricity rates. That's the most important factor in determining where we're going to expand successfully. So I think that will drive a lot of solar adoption going forward.

In terms of solar -- storage for solar and wind, we see that it's been talked about for a long time but we're actually beginning to see the prices come to a point where they can be used in a distributed generation kind of system. I'm interested in the reaction that people have to the recent S-chip rebate changes and that the CPUC in California initiated where there's now a $2 a watt for certain kinds of behind-the-meter storage that would -- for a minimum of two or three hour discharge. So this is really borrowing a page from the rebates from the California Solar Initiative that helped to launch the very growing market for solar in that state and now you'll be able to get similar cost advantages to make storage affordable as it isn't yet. Technology coming down the cost curve but not there yet.

So in terms of -- and now you're seeing all these companies begin to design their products around that rebate which we've seen that movie before and I think you'll actually see storage begin to be deployed. Is that the kind of -- I'm interested in your opinion on that policy to

get storage out of the theoretical and into people's homes and into communities.

MR. ROGERS: I'd make the observation that we have -- we think of ourselves as a technology company disguised as a utility. And actually, that's how we started over 100 years ago is as a technology company. And what we've done is we're experimenting in our no trees wind facility in Texas with a 40-megawatt type of storage battery. We're also experimenting at some of our substations in the Carolinas with respect to battery technology. But there is a lot to be done to really drive that cost down and to use it. And so again, I think there's going to be more and more experimentation with it but there's another kind of storage that occurs and that is really the ability to reduce your usage.

I think Secretary Schultz said that he is the one that is responsible for energy storage in his home when he turns the lights out because again, on the peak, if you're turning your lights out on the peak then you're helping the system and you're not incurring the cost on the peak.

So, I mean, I think there's a lot of different ways to think about storage other than just pure battery technology of itself but our company is continuing to experiment with it at different sizes, different locations, including we have a storage project next to one of our power plants, again, experimenting with the ability to actually use it in the future. And I do believe it will play a key role but I'm also mindful of what Thomas Edison said in the 1890s. He said that storage technology will fundamentally change the power sector and its development is just around the corner. (Laughter) It's been a long, long corner.

MR. EBINGER: Well, I'd like to thank our panel very much for a great presentation. (Applause)