THE BROOKINGS INSTITUTION

BEYOND THE SMART GRID:

CHALLENGES IN THE ELECTRICITY MARKETS

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PARTICIPANTS:

Keynote Speaker:

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PANEL 1 - THE GOVERNANCE OF NATIONAL TRANSMISSION LINES

Moderator:

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Panelelists:

BILL GAINES
Chief Executive Officer and Director of Utilities, Tacoma Power

CHARLES GRAY
Executive Director, National Association of Regulatory Utility Commissioners

PETER HUBER
Senior Fellow, Manhattan Institute

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Director, State and Regional Assistance
Office of Electricity Delivery and Energy
Reliability, United States Department of Energy

PANEL 2 - POLICY REFORMS OF THE ELECTRICITY DISTRIBUTION SYSTEM

Welcome and Introduction:

ROBERT PUENTES, Senior Fellow and Director
Metropolitan Infrastructure Initiative
Metropolitan Policy Program
The Brookings Institution

Moderator:

LYNNE KIESLING
Senior Lecturer, Department of Economics
Northwestern University

Panelists:

CHERYL HINDES
Director, Customer Load and Settlement,
Baltimore Gas and Electric

RICHARD MORGAN
Commissioner, District of Columbia Public
Utilities Commission

JEFFREY ROSS
Executive Vice President, Grid Point

LISA V. WOOD
Executive Director for Electric Efficiency
The Edison Foundation

Closing Remarks:

ROBERT PUENTES
Senior Fellow and Director, Metropolitan
Infrastructure Initiative, Metropolitan Policy Program, The Brookings
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P R O C E E D I N G S

MR. EBINGER: Good morning, ladies and gentlemen. Delighted to have you all here on this rainy day. I'm Charlie Ebinger. I'm the Director of the Energy Security Initiative Program at Brookings, and on behalf of the ESI program and our colleagues in Metropolitan Policy, particularly the Director, Rob Puentes, we are delighted to have you here today. And we're particularly delighted to have Commissioner Wellinghoff to talk about this very vital subject confronting the nation.

I think we all know that if we don't move forward in building a new national electricity grid and the "smart grid" component of that, that we will not be able to harness the great potential this country has to utilize our renewable energy resources, particularly our vast wind and solar resources and move ourselves away from a fossil fuel driven economy to an economy of the 21st century and beyond.

I am delighted to have Chairman Wellinghoff here today. For those of you that have not had the privilege of meeting the chairman, I can think of no one better suited to have been appointed to this high-level

position by the President. He is an energy law specialist with more than 30 years working in the field. Before joining FERC he was in private practice and focused exclusively on energy matters related to renewable energy, energy efficiency, and distributed generation.

The chairman was the primary author of Nevada's Renewable Portfolio Standards Act, which has been recognized as one of the two states to receive a star rating by the Union of Concerned Scientists. Anyone who can get the Union of Concerned Scientists to endorse you is doing okay.

In addition, he has worked with clients to develop renewable portfolio standards in six other states, and the chairman is considered an expert on the state renewable portfolio process, and he has lectured extensive in various law schools and other forums across the United States.

I will not take more time. You have his full biography in your program, but it's indeed a privilege to introduce Chairman Wellinghoff.

(Applause)

MR. WELLINGHOFF: Thank you, Charlie, and I want to thank Brookings for inviting me here today to this forum, an important forum and important topic that we all need to discuss. And I'm also glad that it's starting to populate the front row here. I was afraid I was back in academia -- nobody wanted to sit in the front seats. So I'm glad we've got that going.

Well, were any of you at my talk yesterday at the American University Law School?

That's good, because I'm going to basically say the same thing, more or less. I'm more or less going to go through the same thing. It was a good group. It was primarily the ABA Renewable Energy Committee and about 20 -- or about 60 of them and about 20 law students, and, actually, it was a very good discussion. So it was a good warm-up for today what I want to go through.

What we want to talk about is transmission, and the distribution level side you're going to talk about later on today. The next topic you've got is governance of the transmission system and how that's going to work. And I'm going to talk about that in some detail from my perspective.

But let's talk about where we are, and I'm just going to throw up some slides, and the slides are not necessarily going to follow what I'm going to talk about. I'm just going to give you some slides for some background.

This particular slide is one that was prepared by Black and Veatch for the Western Governors. The Western Governors is doing an analysis of the western interconnect of transmission, and it's interesting that we now finally have people looking at the eastern and western interconnect. But if we look overall to the transmission system in this country, we have over 300 individual transmission owners. We have over 125 -- and, actually my people at FERC tell me we have 126 balancing

authorities -- that means that we have 126 different entities who have responsibility over some portion of that transmission system that have to balance it and keep it in frequency balance precisely, to ensure that the lights stay on within that particular balancing authority. But we have 126 of them.

We have over 160,000 miles of transmission lines that are over 230 kb, fairly high voltage lines, but less than 3,000 miles of lines that are over 500 kb. And that's a lot of what I'm going to talk about today, is the fact that I do believe we need to look at some of these higher voltage lines; or we need to look at some other way for more deliverability because we're actually needing to look at a new paradigm in this country with respect to transmission, and I'll explain that in a moment why.

Since 2001, only 3,000 miles of transmission lines of 230 kb or above had been put into service, and only 682 miles of transmission line above 345 kb have been put into service. And only 650 miles of that 3,000 miles that I said that were put into service over 230 kb since 2001 have crossed state lines. So most of these higher voltage lines have actually been put in place, in service, just simply within a single state.

And we can look at all of that with respect to transmission and contrasted with the fact that since 2001 over 13,000 miles of interstate natural gas pipelines have been put into place. And I'll talk more about that in a moment.

So if we look at this system with so many owners, so many control areas, so many low-voltage lines and so little of a backbone throughout the entire system, I think we can say we have somewhat of a Balkanized system. I think we have a system that is outmoded in ways physically, financially, and legally, and I think it's something that we need to consider. We need to consider why does it matter.

Well, the original purpose of the transmission system in this country was much different than I think what our purpose needs to be in the future. The original purpose of the transmission was primarily for delivering energy from fairly local centralized generation that was put in place by either municipal entities or co-ops, or vertically-integrated-investor-owned utilities to serve their own modes, usually from their own generation in a very local area. And then there was some modest exchanges between areas between utilities for balancing and for economic purposes.

That's changing. It's changing substantially because the number of national policies and international policies require us to look at something different:

No. 1, we have an imperative to reduce carbon.

No. 2, we have an imperative to maintain security.

No. 3, we have an imperative to ensure the economic viability of this country.

If we look at those three imperatives, we need to look at a different transmission system because I believe we need to do something that can start to develop the vast renewable resources that are in this country that can start to provide and help us provide solutions to these policy issues of economics, of security, and of carbon.

If we look at the resources that we have in this country, renewable, we have probably over 350 gigawatts or more of wind in the Midwest that's developable. We may have more than 200 gigawatts just off the Atlantic Coast of wind that's developable. In fact, Secretary Salazar has indicated that there may be as much as 800 gigawatts of wind just off the Atlantic Coast that is economically developable. There's probably more than 200 gigawatts of wind in the West, in Montana, Wyoming, Colorado, and New Mexico that is developable for the western United States.

There may be as much as 1,000 gigawatts of solar energy in the Southwest that could be developed and delivered to western loads.

There's over 50 gigawatts of geothermal energy, conventional geothermal in the West that can be developed. And above and on top of that that's probably over 100 gigawatts of unconventional geopressure-geothermal in areas like Texas and Louisiana. We've drilled deep gas and oil wells, and one of the by-products of that drilling is a lot of hot water that they don't know what to do with, but now, it is in fact potentially

economically viable to turn into electricity through a rank and cycle process that we use for low temperature geothermal.

And there's also, in addition to this, probably over 100 gigawatts of hydrokinetic energy in streams and rivers and in the oceans adjacent to our coasts. So if we put all that together, it's a huge resource. It's a resource that can help us with those three issues of economics, of reliability, of carbon, and can ultimately look to directing us to a point where we can get out of the problems we're in.

But none of it can be done without transmission. Transmission is ultimately the key. In fact, quoting Bena Johnson is the Achilles heel of renewables. If we cannot put the transmission in place, we cannot deliver it to loads, and so we have to somehow look at the fundamentals of what's necessary to make that transmission transformed into a system that ultimately can provide deliverability, marketability of these renewable resources.

So what do we need to do to look at those fundamentals? Well, we need to look at three things: planning, siting, and cost allocation. So let's start with the first of those, planning. I was the author of a statute in 1983 in Nevada. At that time we called it the Least-Cost Planning Act, and since then those types of statutes have been referred to as integrated resource planning acts, or integrated resource planning. But your number of states engaged in -- in fact, from the Nevada statute and there were about 17 other states that looked at variance of that statute and put similar

statutes into place and started engaging in this integrated resource planning.

Integrated resource planning is, basically, requiring utilities to look at long-term load forecasts and the requirements of their load and ultimately determine how they're going to meet that load in the most reliable least-cost way for their customers. And it's something that's really very fundamental to the utility process.

Part of that is, of course, transmission planning as well as looking at the resources both on the demand and the supply side that are going to meet your loads. It's something that sort of fell into disfavor in the late 1990s when we started to look at deregulation, or look at restructuring and look at going to markets, and a number of states moved away from integrated resource planning. It's now starting to come back into favor, and I personally believe that integrated resource planning can be consistent with and compatible with markets, because I think markets are very -- electric markets are very important to all that we're talking about to making these renewables viable, to making the "smart grid" viable, to improving the grid.

I think we're going to have to have viable wholesale electric markets in this country, and I think that integrated planning, in fact, can be compatible with a market structure. And we're seeing that in the RTOs, the Regional Transmission Organizations in fact are engaging in

transmission planning, and they're looking from that beyond transmission planning to extend into the issues of supply and demand.

In fact, FERC, in our recent Order 890, which was the upgrade of Order 888 directed transmission owners and operators to engage in regional planning that looks at not only the transmission, that looks at supply and demand in a comparable way. So it does start to bring together what effectively is sort of an integrated planning process.

FERC is currently holding a number of workshops on Order 890, and the planning aspects of Order 890. We just had one yesterday in Atlanta. There was one last week in Phoenix, and there will be one I believe next week in Philadelphia. So we're moving in that direction.

But with respect to renewables, I believe we need to look at planning even on a wider basis. I believe we need to look at planning on an integrated interconnect basis, the Eastern interconnect, the Western interconnect, and the, of course, there's Texas, which is interconnect into itself. But the two interconnects -- and we have the Western one up here -- need to be looked at in an integrated basis because we have renewables in remote areas, and that's again the difference.

We had these central plants that were located relatively close to loads, and now we have instead resources that are location-constrained and remote. So somehow we have to be able to plan to develop them, develop them in a robust way so we don't strand them behind

transmission lines that are too small to deliver the full amount of the resources there and deliver it to the load centers.

And for this map, for example, most of the resources are in the Montana-Wyoming area and also Eastern New Mexico area, and the load centers are mostly on the West Coast. So to deliver these we have to have some type of a planning construct that will help us determine how to move these resources to loads. The Western Governors are starting to do that, so we do have an entity in the West doing that.

In the East -- and let's look at our full map here of our planning system -- in the East -- and this is going to go for awhile, and you'll see a number of things come through here -- you have a group that has formed with the RTOs, with a number of investor-owned, and other utilities that are coming together looking at forming a formal organization. In fact, they have applied to DOE -- and you may hear more about that later from Larry Mansueti -- for a grant under the stimulus money to do planning in the Eastern interconnect. And that planning I think is essential as well.

And so, ultimately, we need to look at planning on both an Eastern and Western perspective. So we need to do it, 1) for reliability -- or, excuse me, 1) for deliverability for these resources, for the renewable resources; and we need to do it, 2) for reliability. And what you see here is a scenario that my reliability people have put together of delivering more and more wind from the Midwest and offshore Atlantic to the load centers.

And what's happened as we deliver more and more of that variable resource to load center areas without building up the grip, without strengthening it, without ensuring that we can maintain frequency, and by maintaining frequency thus maintaining reliability. The problem, if we do that, we believe, FERC believes, is the creation of stress throughout the grid.

Now, we don't believe that this is something that can't be overcome. And, in fact, we're currently engaged in a study now to look at the effects of variable resources on the grid, both in the Eastern and Western interconnects. This study should be done sometime in March or April, and what we're going to do is look at putting increasing amounts of variable resources into each one of those interconnects and ultimately see what that increased amount of resource will do with respect to maintaining the frequency on the grid and determine where the limits are.

And then, based upon those limits, we're going to look at what are the solutions to overcoming those problems, because we think there are cost-effective solutions to overcoming the problems of integrating in high levels of renewables into the grid. We believe that's true. But the place to start is looking at the study as to where the problems are. And nobody has done that study yet. So this will be a first-time study as I understand it.

So from that I firmly believe we do need interconnect-wide planning. How we get that done, I'll talk about that at the end of this.

Let's talk about our second topic area, and that's siting. And here I want to talk a little bit about pipes and wires. Let's talk about the natural gas system and how we site natural gas pipelines versus how we site transmission lines.

Natural gas pipelines are sited by FERC. As I mentioned to you, over 13,000 miles of natural gas pipelines have been sited, certificated and sited since 2000-2001. It's, I think, a very effective process, and we have a robust wholesale gas market in this country largely due to the fact that we have great deliverability with respect to gas throughout the entire country, because we have a very robust delivery system: that transmission system.

FERC was given that authority in the 1935 Gas Act to have that siting authority. We weren't given the authority, however, over siting transmission lines. That largely falls to the states. In some instances the states actually give it to the counties as well, so it depends. But it's largely the states.

There's two instances were FERC does have some limited transmission siting authority. One is in the 2005 Energy Policy Act. We were given authority under the National Electric Interest Corridor Section of that Act where DOE can designate a congested corridor -- congestion in a corridor. And by designating that corridor, then developers who may develop transmission lines in that corridor if they go to a state and, in fact, cannot get that particular line sited through that state process, they have

potential backstop coming to FERC. There's backstop authority where they can come to FERC and get that line sited.

The other area where FERC has a siting authority is with respect to the Hydro Act, Section 1 of the Federal Power Act. Any hydroelectric facility, the line coming off of that facility that interconnects into the main transmission line is a line that is sited by FERC. And when I say "sited by FERC," it means that there is eminent domain authority to site that line, ultimately.

So hydro facilities, fortunately, are defined rather broad and have been interpreted rather broad in the Act, which includes a traditional dam impoundment. A hydro facility could be a hydrokinetic facility which would be an in-river or offshore facility. Or it even could be a pump storage facility. Even a pump storage facility is considered to be a hydro facility and, as such, the transmission lines from a pump storage facility would be one that would be under FERC's jurisdiction for siting.

But beyond that, it is entirely up to the states. So let's look at, you know, back in 1935 why did Congress, you know, decide to give authority in one hand to the FERC and the national, the Federal Government, to site natural gas pipelines and gave no authority to the Federal Government -- or allowed the states to retain authority, in essence, to do so for transmission lines?

Well, again, it was the nature of what was the problem, what was the issue there facing the country. At that time we had tremendous

amounts of natural gas that needed to be developed in Texas and Louisiana and throughout the Southeast, and it needed to be delivered to loads. It was remote location-constrained resource that had to be delivered to a load -- the loads in the Northeast, primarily, or in the West, West Coast -- and so we had to have pipelines sited and that gas had to be moved to places where it could be used. So it made sense.

On the other hand, from an electric standpoint you didn't have location-constrained resources of electricity that had to be moved to loads because you could, in fact, site your generators fairly close -- a fossil fuel gas plant or coal plant, or whatever it may be -- relative -- or an oil plant -- at that time there were many oil plants as well -- could be sited relatively close to where the load was by local utility. And there didn't need to be this large system.

Today, as I have indicated, we have a much different situation. We have location-constrained resources, all of those renewable resources that I enumerated, and those do need to be moved to loads. That generation needs to be moved to loads, so I believe we have the situation today that calls for some level of consideration of broader federal siting authority. And I'll talk about exactly what level I believe is appropriate when we get through the last item, and that's cost allocation.

With respect to interstate lines, the FERC does decide upon cost allocation, interstate lines under our jurisdiction. But to date those cost allocation decisions have been largely for either a transmission owner and

their footprint, their control area, or for beyond that an RTO, within a Regional Transmission Operator's boundaries which can be as big as the state of California; it can be as big as New England. Or with the case of Midwest ISO, goes from Minnesota to Kansas, and into the Dakotas, and over to Montana, little parts of Montana. So it can be a fairly large area.

But to date, FERC has yet to actually do cost allocation cross regions, across multiple RGOs, across states where there are transmission owners, throughout the
West for example. It's been very localized.

So the question is if we are going to do planning across an interconnection, how do we do cost allocation across an interconnect. Legally, I think FERC has the authority to do it across the entire interconnect, but I think politically it would be very useful to have some support to ensure that that's something that Congress thinks is the right thing to do, the states think it's the right thing to do, and it's something that can be agreed upon, generally. So I'll talk about, in a minute, how to do that.

But the issues in cost allocation, of course, come down to, you know, are you going to socialize the cost? Is it going to be the Interstate Highway System where, you know, in essence, at tax everybody pays, and we just going to -- we're going to decide what this backbone is going to look like, and it's going to be spread to everybody. Or are we going to,

in fact, look at beneficiary payees; who are the beneficiaries of the system, and who's going to pay?

Let's look at one visualization of a backbone. This is what's put up by NPR, a National Public Radio, in a story that they did on the grid. And I'm not sure even where they took this grid outline from, but it's just one concept of the yellow lines, or one concept of adding to the grid. And again, it's not a concept that FERC endorses or I, necessarily, endorse; it's just for discussion purposes. There's many, many, many -- many other concepts.

But the question is, again, who is going to pay for this? If you take a line from North Dakota, for example, you can see the line starting up in North Dakota, it's going to go all the way, you know, to functionally Boston, and it goes through Ohio. Should Ohio pay for parts of that line? It's most of the wind is being delivered to the Northeast. You know, that's a question that somebody is going to have to answer. I'm not sure FERC is the appropriate one to answer that, but again if we're going to build this system, somebody has to decide who pays and who pays for the specific discrete system.

Let me interject here a minute, because I've got something on this slide that I think is kind of interesting, is the "smart grid" parts of it. Let's talk about some interesting little upgrade.

I've had somebody come into my office recently proposing a three-ring Dc bust to be put in this area that I've just highlighted in

Northeastern New Mexico that, in essence, would connect WEC, Western connection, interconnection, with Texas, IRCOT, with SPP, would connect all three together.

None of those three entities have any incentive, per se, to put this particular piece of equipment in because it's no particular advantage to any one of them, but it's tremendous social advantage to the entire area. Because from a market standpoint, it would provide great deliverability for West Texas wind, for example, for wind from Oklahoma, for wind from Eastern New Mexico, all of which is very robust and very developable, to all these different areas to be able to have multiple markets.

So, you know, you've got a third-party entrepreneur coming in to me saying, you know, "How do we get this thing built? Who's going to pay for it? And how does it get put in place?" These are the kind of questions that we have to start to answer because there are these kinds of ideas that ultimately can make our entire system much smarter, much more efficient, and much more cost-effective for everybody.

Here's another idea that walked into my office. And this is a Dc backbone down the Atlantic Coast that ultimately would connect Southern Virginia with New York City. Now, part of the idea of this is to deliver offshore wind somewhere between six and ten gigawatts, 6,000 to 10,000 megawatt to wind to all these areas. It could be delivered into the

Southeast, be delivered into the D.C. area, into New Jersey, into New York and New England, ultimately.

But the interesting thing about this line is -- and they had some very compelling economics that were done by a very respected economic consulting firm in this country indicating that this line makes sense even if you put no wind on it at all. Just the difference in prices between these areas would pay for a line in four or five years. But the problem is, you know, how do you get the capital to make this line go? How do you convince investors that this is going to make sense? And how do you get the financial, the regulatory and the physical problems all worked out in a way that ultimately good ideas like this that will make the grid smarter, will make it more efficient, will make markets work better, will reduce costs for consumers, can get put into place?

And so, you know, how do we do all that? Well, I think we do need some expansion of federal authority in planning, siting, and cost allocation. Once that's said, let me give you the caveat:

I think it should be very limited, No. 1.

No. 2, I think states should be -- states and/or regions -- including the RTOs, should be the first movers. They should be the ones who have the first opportunity to do the planning, the siting, and the cost allocation. Give it to the states, give it to the region to look at this as their responsibility to do it with a bottom-up review of what they need in their individual areas, but understanding there is this top-down national policy

imperative with respect to carbon, with respect to economics, with respect to security. It has to be factored in that they have to consider, and they have to consider that the purpose of their planning is to do the deliverability of these renewables that we're talking about.

Ultimately, I think that's, if we can give that charge to the states and the regions, then as we have this Eastern interconnect group applying to DOE for the money, we have the Western Governors and others who are looking to do it in the Western side, I think that planning can be done there. But at the end of the day, if they don't get the job done, it's got to come somewhere. It's got to come somewhere, say, it's got to get done because we have a national imperative, a national policy, a national need to do this. So that's with respect to planning.

With respect to siting, again I think it should go primarily to the states, but let's have a backstop. Let's expand the backstop beyond this narrow national interest corridor that we have now and let's talk about a national grid plan that will, in fact, provide for these national policies but the siting can be done at the local level as long as it gets done. It has to get done to make these things work.

And, finally, cost allocation. Lock them in room and decide how the hell the cost allocation is going to be done. Again, let the states and the regions and the entities decide it. But at the end of the day, if they don't -- if they come out of the room and say, "We can't decide," somebody's got to be there to say, "Okay, if you can't decide, we're going

to decide for you." And it's amazing how that is a great incentive to get people to decide, if you tell them that somebody else is going to decide for them.

So that's what I think needs to be done. Let me talk a little bit about -- and then I'll end up here and we'll have some questions -- how we're going to get there. We get there with all these things with legislation. There's legislation up on the Hill right now in a number of areas in this regard. First of all you're all familiar, I'm sure, with the Waxman-Markey bill that's been passed, and it's now over in the Senate side for consideration. That bill has nothing with respect to siting and cost allocation in it. In planning, it has some aspects in the Western interconnect, but it has nothing with respect to the Eastern interconnect.

The Senator Bingaman on the Senate side and the Senate Energy Committee has a bill that does have some aspects that talk about planning, siting, and cost allocations, and Reed has a bill that has those things in it as well.

We have circulated -- FERC has circulated a draft document that we have put together based upon some discussions with Congressman Markey asking us after a hearing to go talk to some people, and we talked to Chuck Gray, and we talked to other regulators, and we talked to the Western Governors. And we didn't get a consensus -- no surprise -- but what we did get is a lot of ideas. And, basically, what we did is we just put a lot of these ideas into this document, and we gave that document to

Markey's people. I think it's got some good ideas in it, and I think it's worth consideration.

And then, of course, there's WIA that just recently has come out on the Hill with a transmission proposal. We've got it. I haven't looked at it in any detail. We're actually trying to look at the WIA proposal and compare it to the one that we gave to Markey's staff and see how the two compare.

But what I'll leave you with is the final note that I think is a very important one and one that I'm very happy about and proud of, and that's what Senator Reed has said. Senator Reed from my state has indicated that there will be no climate bill, no energy bill without a transmission component, without a very, very robust transmission component. So this gives me some hope that we can all come together and determine how we can shape transmission policy for this country to ensure that we can all get where we need to go.

Thank you.

Questions? Have we got time for some questions? Okay. All right, yes, sir?

MR. EBINGER: We have two mikes going through the room, so if you just would raise your hand, and we'll get one to you.

SPEAKER: My name is (off mike). I have two questions for you.

MR. WELLINGHOFF: Sure.

SPEAKER: No. 1, we have information network, Internet.

MR. WELLINGHOFF: Yes.

SPEAKER: To some extent it's the same principle of network, smaller number providers and huge number of customers. So what is parallel you see in this two network? It's No, 1 question.

And No. 2 question is as you've have said, time changed. In 1935, if I remember correctly, it was basic problem was gas pipeline. Can you go a little bit farther about this pipeline because to transmit gas on the long distance, as I see it, it's economically very bad decision instead to transmit electrical energy.

So it's my two questions.

MR. WELLINGHOFF: Okay. Let me answer your second one first. I want to say that it is usually correct that it's more economic to have distributed generation. And I think we should not ignore distributed generation. Certainly, it is a resource that I think is very viable, certainly, with the amount of gas reserves that we have found in this country recently, and the deliverability of natural gas, using that natural gas for distributed generation is going to be a good bridge for us, because you can put distributed generation in place that will ultimately reduce your costs and improve your efficiency substantially. Many distributed generators, Komiteen (?) power systems, for example, have efficiencies that exceed 60, 70, 80 percent versus central station power plants, fossil plants that are going to have efficiencies less than 50 percent, plus your line loss associated.

So you're absolutely correct there. We should try to do everything we can with respect to distributed generation, but I just don't think that's going to be enough. I think we are going to have to develop our location-constrained remote, renewable resources, and the only way to use them is to deliver their energy in long lines. And those long lines we have to make as efficient as possible. That's why the "smart grid" is so important, is ultimately to make it as efficient as possible.

But on your first question, I do believe that there is a great analogy between what we're trying to do here and the communication system. I mean we've put in fiber. You know, we've put in the long lines. We deregulated the system, broke up AT&T, and did what we needed to do to bring in entrepreneurs into the system. And I think we need to do the same thing for transmission. We need to bring in people who want to develop and make money off of these robust transmission systems, both the lines and the attendant "smart grid" and strong grid systems, and make sure that, ultimately, they can get built in some way.

So I think there are great analogies between where we've gone with the Internet and the communication system and where we ultimately need to go with the new transmission system.

MR. EBINGER: In the back we've got -- (inaudible) -- thank you very much, Jon.

MR. BERNSTEIN: Thank you. Scott Bernstein, a member of the City of Chicago's Climate Task Force.

A similar question about the role of energy efficiency, and let me just preface this by saying in the last couple of years cities and metro areas around the country have aggressively been dealing with one-year goals on climate change. And I think we know what it's going to mean to have to actually reduce emissions by a very aggressive target by a very aggressive date, which it seems is going to change the demand for energy.

I don't think it undercuts your premise that we need to upgrade the grid, but it might change the specification of it somehow, and it seems that FERC has a role to play here that would create a virtuous circle. If they could send the right signals out to the utilities that you regulate on the wholesale on interstate side, it might make it easier for cities to meet those aggressive goals and, in turn, get a better stack and a better balance overall in the system that emerges.

Have you thought about that?

MR. WELLINGHOFF: No, you're absolutely right when we've done more than thought about it, we're actually doing it in the sense that in the RTOs we're encouraging the Regional Transmission Organizations to incorporate into their tariffs the opportunity for customers to bid in not only demand response, which would be the shifting of loads and the modulation of loads so that they're reduced at times of higher use, but also to be able to bid in energy efficiency.

So, for example, now PGM allows energy efficiency to be bid in, and I think the last auction they had like 600 megawatts of energy efficiency bid in. New England allows energy efficiency to be bid into the system as well. So what we're doing is setting up real economic incentives for customers to increase the amount of energy efficiency.

And on that, let me just expand a little bit. We need to set up some system in this country that we can break down the fundamental barriers to the installation of more energy efficiency into our system. And those barriers are largely not economic. Well, I mean and sort of economic in the sense that part of the barriers is the fact that, you know, most people -- and their payback rates and their returns are, you know, a two-or-three-year period, and we pay for power plants over a 30-year period. And, you know, that discontinuity between how we pay for the supply side resources versus how we pay for the demand side resources is a real huge problem that people have talked about for many, many years, but we've done very little about.

We need to somehow put in place loan guarantees or other ways to reduce the cost, the capital -- first capital cost -- of putting in what our very economic or more economic investments than the next incremental power plant. And that's really hasn't been done on a widespread basis in this country yet, and we really need to figure out how to break through that and do that.

And let me give you a very personal example, the first building, which is very personal to me. You know, when I moved into that building in August 2006, I looked at the lighting in my office and decided that, you know, it was a 1994 lighting system. That's when the building was built. It was state of the art in 1994, but it needed to be updated.

So I brought in a team, we did a review of the lighting system, and we changed it out completely. We got manufacturers to provide to us a state of the art system to upgrade it. The result was in my office suite on the 11th floor, we've reduced our lighting energy usage in that suite by 50 percent.

I could do it throughout the building. The problem is I don't own the building. The building's owned by a third party. We have a lease through GSA. I have no incentive under that lease to do anything because I get no advantage from reducing the energy use in the building. I don't even know or understand what the landlord's advantage or incentive would be to do it, and we've had some discussions with them and it's very vague to me whether they would do it or not do it, and we want to move forward with that.

I'm not sure how much help we can get from GSA. I've had an offer from DOE to help us, and we're going to try to team with DOE and see if we can do something with FERC's building. But, you know, economically, you know, it makes a lot of sense. The payback is probably less than seven years, maybe less than five years to do it. Our lease

extends through the next 15 years, so certainly, you know, we're going to be there for that period of time.

But again, those barriers are there. We've got to figure out how to get those barriers out of the way. The technology's all there, the ability is there to do it. We just need to figure out how to reduce the barriers.

Next question. Back over here. Yes?

MR. MARMET: Good morning. I'm Robert Marmet with the Piedmont Environmental Council. In the absence of a strong greenhouse gas controlling legislation or green electrons like Senator Reed's bill has, how do you ensure that the new robust grid doesn't simply carry carbon energy and undercut the efforts to develop cost-effective renewable generation or distributed generation, or even energy efficiency?

MR. WELLINGHOFF: Well, you're going to design it for what you're going to build, and what you're going to build first is the cheapest and fastest thing to build. The cheapest and fastest things to build are wind, No. 1. Geothermal hydrokinetic 2 and 3, you know, building any new carbon sources is going to take awhile, ultimately. And if you're building natural gas sources to replace coal sources, that may be a good thing because you're going to reduce your carbon by half. So I don't see the carbon argument as a big one. I really don't see it as a major issue.

Well, they're existing but they're very high capacity factors, so you're not increasing the total amount of carbon that's being put out overall. Ultimately, you're not -- in other words, taking a coal plant that's

only operating at 20 percent, and all of a sudden it's going to operate at 80 percent because it's got a new transmission line, that's not happening.

Most coal plants -- and we did this capacity factor analysis at FERC for this exact purpose -- most coal plants are operating right now in excess of 80 percent capacity factor. So it's not that those coal plants are going to be putting out any more carbon. The amount of carbon it's putting out now is the amount of carbon they're going to continue to put out until they retire.

So I don't see where putting in a robust grid is going to exacerbate or increase the amount of total carbon that we're putting out in this country. And it's only going to reduce it because you're going to be building that grid, primarily, for those resources that ultimately can be put on line quickest. And those that can be put on quickest and most economically right now is wind.

SPEAKER: (off mike)

MR. WELLINGHOFF: No, not necessarily. In fact right now gas is displacing coal. Gas is cheaper than coal, and in many instances wind is cheaper than coal because it has a tax credit. In fact wind, wind has been dispatched in this country at zero cost because it, in fact, can still make money because it has an investment tax credit. So that, in fact, is not the case.

SPEAKER: (off mike)

MR. WELLINGHOFF: Sure.

MR. MARMET: Then you wouldn't -- you wouldn't be in favor of the kind of green electron requirements that the Reed bill has in it?

MR. WELLINGHOFF: I don't think they're necessary.

MR. EBINGER: The one to your right here.

MS. BAGGETT: Good morning, Chairman. Nancy Baggett from the Electric Power Supply Association. Kind of a quick question.

In everything that you've gone through, and we have attended -- I haven't, personally, but have colleagues who've attended the past two conferences on the 890 regional planning processes.

MR. WELLINGHOFF: Right.

MS. BAGGETT: And I think rate improvements were made through that order. Each region I think is experiencing some issues. They differ. I'm wondering, though, at this point if you believe there is more that can be done at the FERC level or, really, to get to the next steps, you need some sort of federal authority. And I understand there are varying levels of authority being discussed, but that's the only way to get to the next step.

MR. WELLINGHOFF: And that's a very good question. We do believe that there needs to be some additional federal authority both from political and a legal perspective; however, if we don't get that Congressional authority, additional Congressional authority, FERC will attempt to go the next step to the extent we can. And I believe we do have the authority to expand planning beyond the footprint of an individual

transmission owner or even beyond the footprint of an RTO across and through multiple regions. And I think we will definitely explore that if, in fact, it isn't done specifically in legislation that comes up.

Yes, ma'am?

MS. SPEAKER: I was wondering if there were international models to follow of distributed electricity generation that might be useful as the U.S. is considering this.

MR. WELLINGHOFF: Well, my understanding is that Denmark has maybe 35 or more percent of its energy from distributed generation. So there are a number of countries that have much higher levels of distributed generation than we do in this country, and certainly, we need to look at those models and see to what extent they can be put in place.

But I think we have probably different legal and regulatory structures in this country that are -- that do inhibit and cause barriers for things like distributed generation. I mean we have issues about local distribution franchises that you can't, you know, run a wire across the street; you can't run hot water across the street in some instances because if you do, you become a utility even though you may own the building across the street. You can't, in fact, have a cogent system that serves multiple buildings in an area if you have to go through across public areas.

So, you know, these types of things can inhibit us from looking at local cogeneration and combined (inaudible) power in other systems that

could be more efficient, and we need to look at those. And those are primarily things that have to be determined on a local and state level.

Yes, sir?

MR. BERRY: Hi, my name's Craig Berry. I was wondering what role or how FERC works to incorporate the Canadian and Mexican authorities to help build a more coherent North American energy grid.

MR. WELLINGHOFF: Well, we have meetings with both the Canadian and the Mexican authorities to discuss these issues. Certainly with respect to reliability, the Canadians are part of the reliability group that we do our liability planning and liability rules with. So we look at from that standpoint.

We haven't done as much as I think we could, though, and I would like to actually have more meetings with both the Mexican authorities and Canadian authorities to see how we can better integrate our needs with respective resources they may have to provide us and vice versa, and how we can better integrate transmission systems to do that throughout North America overall. I think it's an excellent suggestion.

DR. HASKELL: Hugh Haskell, from the Institute of Energy and Environmental Research. We've been talking about efficiency at the local -- at the user level, but the grid has its efficiency issues as well. And I wonder if you could discuss something about what we might do to improve the transmission efficiency of the grid itself.

MR. WELLINGHOFF: I think from the other side of the meter, from the distribution system on up to the transmission system all the way to the generators, there's perhaps as much efficiency to be gained as there is on our side of the meter, on the load side, the customer side of the meter. And it's something that I am very interested in.

In fact, I had a gentleman from Eprey into my office about two and a half years ago discussing the fact that he had initiative going to look at efficiency on the distribution system and how to improve that distribution system, the transformers, and switching, and data analysis and the ways it would upgrade it, substantially.

And I said to him, "Well, why don't you look into the transmission system?"

And he said, "Well, that's a good idea." So he started an initiative, and he just has completed the first part of that initiative where they've had a series of regional workshops throughout the country -- I think they had, like, 10 or 15 of them -- and brought in stakeholders top provide ideas of how to upgrade and make the transmission system more efficient.

And then we had a kickoff meeting at FERC just two or three weeks ago of the analysis of all that data, bringing it all together in one place, and from that they've now developed a number of projects, specific projects that Eprey is going to initiate to start looking at improving

efficiency of the transmission system and how that efficiency can actually be put in the field and put in place.

So what they're going to do is actually do a demonstration and deployment of some of these advanced technologies out there on the transmission system. So we're working on it. It's something that I'm very aware of and something that I'm extremely interested in.

Okay, a repeat question, or -- I have actually missed somebody behind the -- but go ahead.

SPEAKER: Sorry, I still have another question. My question is it's well known that alternative current in the transmission line disappeared some energy as a heat.

MR. WELLINGHOFF: Yes.

SPEAKER: One of the basic problem and basic principle how the distribution system is designed.

What about a distribution system by direct current? Because now we have very efficient converters from alternative to direct current and vice versa, so what is the situation right now?

MR. WELLINGHOFF: Well, we need to look at a DC and how we can better use DC systems. And I really don't want to talk about it at the distribution level. That's actually a very long discussion, and actually, you know, using DC at loads -- I mean it's a whole discussion.

But if we look at the transmission level instead -- I had a very interesting idea come into my office just yesterday, for example -- on a DC

upgrade to a pair of lines in the West at Mead, which Mead is in Southern Nevada, and there's a line that goes from Palo Verde, which is a nuclear facility in Arizona, and it goes up to Mead in Southern Nevada, and then it goes from there over into Southern California. And these two lines right now are AC.

And the idea that this gentleman had was instead of having those two lines AC, if you put DC -- make those lines DC and put converters on them, a converter at each end and a converter at Mead, he had some analysis that he had conducted that indicated that he could upgrade the capacity of those lines by 1900 megawatts for a cost that was about one-third to one-fourth of the cost of putting in a line that would increase that capacity by that much.

So it was a very cost-effective thing to do, but he was having problems convincing a number of entities because he wasn't, you know, owner-operator of the lines. He had difficult convincing the entities, you know, of why this would be an advantage to them.

So again, there's a lot of these ideas out there, and part of them entail looking at more DC lines like the one I showed you off the East Coast. That's a DC line, the backbone that would go up the Atlantic and be a backbone for not only delivering offshore wind but also for helping to deliver a price-effective energy throughout the Eastern United States. That's a DC line.

So again, DC lines have a great role to play. You can reduce losses with DC lines, although there is technology now with AC lines that are also reducing losses substantially. So you have to look at the cost-effectiveness between the two because we do have a largely an AC system, and to get the DC lines in place, you do have to have converters at the end of them, and those converters are relatively expensive. So you have to look at those cost tradeoffs, but I would agree with you that we do need to look at a DC as an alternative.

MR. EBINGER: Right back here we've got a question behind you.

MR. GROW: Hi, my name is Bob Grow. I'm with the Greater Washington Board of Trade.

Could you tell me how the NIST standards are coming along for the "smart grid," and I guess as part of that as a follow-up to the question you just answered is, is the DC transmission being considered as well? Thanks.

MR. WELLINGHOFF: The NIST standards I believe are coming along well. I haven't gotten a real recent update in the last couple of weeks, actually. But the Commission issued a policy statement recently on the "smart grid" standards to help direct the NIST process. And I know that FERC and DOE and NIST are all working together.

My understanding is that we're going to be getting -- FERC is responsible for actually promulgating the rule to come out of that standard

development process -- but we're going to be getting from this, I understand sometime in December, their first group of rules, of proposed rules, that they believe we should be looking at to promulgate.

So my understanding is the process is moving along. It's moving along pretty quickly for a very technical and complicated standards process, and I'm very encouraged by what they're doing.

With respect to DC, specifically, I'm not sure what NIST is doing on that area regarding the incorporation of DC into a "smart grid" system and how it may affect or be affected by potential "smart grid" standards or rules. That I can't tell you.

Scott.

MR. PUGH: Scott Pugh, Homeland Security. What would you like to see us do about the physical and cyber vulnerabilities in the grid that we have today and the grid that we will hope to have some day?

MR. WELLINGHOFF: Oh, boy, that's a whole another lecture, Scott. But -- and I need Jill McClellan standing by my side here to help whisper in my ear and give me some help. But I think I can give you some general idea.

I think, certainly, with respect to cyber and physical security, there's no question in my mind, given all the information that I've seen so far, that we need to do something, and we need to do something relatively soon. And I think that there does need to be, you know, some central

authority to be able to put in place recommended changes for the grid to establish better cyber and physical security.

I know there's been a lot of articles recently about EMF, or EMP I guess it is, Electromagnet Poles, which is a physical issue that could upset the grid. So I know that Congress is working on it. I'd like to see some additional authority at FERC, certainly, to be able to work with the utilities to get put in place, standards and requirements that would ensure that we are in a more secure place. But, you know, I can't give you a lot of specifics.

Anybody --

MR. EBINGER: We have time, maybe, for one more question.

MR. WELLINGHOFF: One more question. Maybe we're out of questions, which could be good, too.

MR. EBINGER: There's one in the back.

MR. WELLINGHOFF: We've got one in the back here.

SPEAKER: Thanks. On your building problem, I have a discussion later today with the Commissioner of Public Buildings at GSA. I'll be happy to pass that one along.

MR. WELLINGHOFF: Please. Please do that.

SPEAKER: Yes. My question was about smart growth and the form of the grid. We're starting to see a drop in vehicle miles traveled in transportation in the U.S. The foreclosure crisis may end up finally forcing

a focus. Congress is talking about some legislation to force better development patterns.

And if you think about what that means about the shape of your map there, it seems to me that it might be worth thinking about how future urban and metropolitan form may change that map and maybe even put some efficiencies into it. Putting a hundred single-family homes out there at an acre each, or putting them all in one building makes a huge difference, it seems to me, ultimately, not only on distribution but on transmission.

Would FERC be interested in a dialogue on that?

MR. WELLINGHOFF: Well, no, absolutely, because I think all those variables are going to have to be put into the mix when whoever these regional entities look at these interconnect-wide planning constructs. They're going to have to, you know, look 10, 20 years in the future at least, if not farther, to determine what they are planning for and what -- you know, they can't plan for something that's not going to be there, you know, when they get there.

And so you're absolutely right. If the urban construct is going to change substantially, but we do decide to get more efficient in the way that we plan and design and develop our communities, our residential and commercial communities, then that's going to be a big issue that will impact, certainly, the distribution system and also will mitigate more toward the distributed generation as well, but will also have an impact on

how the transmission system should look, ultimately. I agree with you fully.

MR. EBINGER: I want to thank Commissioner Wellinghoff for taking the time to be with us.

(Applause)

MR. WELLINGHOFF: Thank you.

MR. EBINGER: And I thought I understood these issues, and now I realize that it's come a time for me to get updated. And I teach a course at Johns Hopkins on the subject. Maybe we can get you over there sometime.

MR. WELLINGHOFF: Thank you, sir.

MR. EBINGER: If we could get the first panel to come up, and we'll get you miked, and while that's happening I'd just like to make one small addition to the program.

At the end of our first panel, David Girard, who's here today from the Rockefeller Foundation, has asked for just a few minutes to explain a new initiative the Foundation has underway on many of these same questions, and we are delighted to give him an opportunity to take five minutes and tell you more about that.

Just also on mechanics, after our break following this panel, Rob Puentes is going to take over moderation of the Chair. I want to apologize to all of you because I, unfortunately, have a double commitment today, so I'm going to have to leave. But I just want to thank you all very much for

coming to our session. And Rob will ably take over the second session later today.

Our format on the panel, it's going to be a little different than often the way we do things at Brookings or we have kind of a formal statement from each of the panelists. We're trying to avoid that today in the interest of a more stimulative debate, so what's going to happen is I, as the moderator, am going to pose a question to -- a separate question -- to each of the panelists. After that panelist kind of takes off and leads the remarks and answering the question posed, we'll then present an opportunity to the rest of the panelists to amplify, rebut, and take issue with what's been said.

We have purposely -- and we want to thank our panelists for being here today -- we have purposely tried to, on this issue of the transmission -- governance of the national transmission lines, we've tried to bring people with at least different institutional positions so that we'll try to generate some thorough discussions. I think, as we hear from the Commissioner, these are not easy issues; they are very complex issues, as anyone who's been dealing with them -- most of you in this room -- know.

So without further ado, and I will not go into the detail biographies of each of the speakers because they have been given to you, but first, let me pose the question to Bill Gaines, who is the Chief

Executive Office and Director of Utilities at Tacoma Power, and we're particularly delighted to have him here.

Bill, let me pose the following question: How do you believe that local governments can best be involved in the planning, of the siting of high-priority national transmission lines in order to avoid later disputes. And if you could take that off, then we'll let the other panelists respond to your remarks.

MR. GAINES: Thank you. This scenario where -- by the way, I'm here to represent the large Public Power Council today, which is a 23 large, municipally-owned utilities in the country -- this is an area where we actually agree with Chairman Wellinghoff. We think that state and local governments should be given the first opportunity to do siting of lines, including large interstate lines.

But we do agree that there probably is a need for federal backstop authority to the extent to the extent that states can't ultimately agree. And we think that the presence of that backstop authority would provide emphasis to the states and to local governments to get things done.

But to the extent that the federal authority ultimately does need to be exercised, we think it ought to give substantial deference to what states and local governments can agree upon.

And, finally, we didn't talk a lot earlier about cost allocation, but we do not feel that the imposition of federal backstop authority on the

siting issue should necessarily be a basis for the use of federal authority to socialize costs.

MR. EBINGER: Anybody want to respond to that?

MR. GRAY: Hi, I'm Chuck Gray with NARUC. I just note that the planning component of the question, really, I think there's some good news right now that there is, are efforts underway in all three interconnections to bring in stakeholders, local governments and other nongovernmental parties to the process of planning the next generation of the transmission system. And I think, clearly, the kind of folks that Bill represents are going to be participating in that.

There are efforts underway in the Western states right now through the Western Governors Association that Chairman Wellinghoff mentioned, so I think there is some good news that there are some processes now that are being seriously discussed, seriously implemented, that can address some of these problems.

Just on the backstop siting authority, I would agree with Bill's point, and it's, I think, the fact that there is backstop siting authority today is clearly, you know, an artifact that everybody's living with. And we're trying to make sure that it works as it was intended by Congress in 2005.

MR. EBINGER: Excuse me just one minute. I neglect to introduce our two other panelists. You've heard from two of them now.

We have Peter Huber from the Manhattan Institute, and Larry Mansueti from DOE.

Peter or Larry, do you want to add to either of that?

MR. HUBER: It's hard enough to end up socializing costs, whether you like it or not, and I hate socialized costs. But I mean you've got a 4-gig line, you know, cutting 1500 miles across the country, and it's trying to link together, you know, Boone Pickens' wind farm, if he ever built it, with New York I mean and people want on and off ramps all the way. You've got a big and difficult cost issue. We're not going to escape it. I'd love to if we could.

SPEAKER: So we have a model in this country that's worked for many years where the direct beneficiaries bear the cost of transmission just like they bear the cost of generation itself. We're not sure that a different model is needed.

MR. HUBER: I mean, you know, economic theory worked out about 50 years ago that when you have a big shared capital cost in anything, there actually is no optimum pricing. You try Ramsey pricing if you can, you know, but there just isn't a right number. Often it becomes very political, and, you know, if you look at the national economics, they're quite easy. There are tremendous economies to be captured in knitting our nation into one electricity market.

I mean you look at the price dislocations you see across the country, we're seeing three-or-four-cent price dislocations in wholesale prices at any minute of the day, and as an engineering matter there's not

the slightest doubt you can actually move that power for well under a cent across the country, and you can do it.

And so there's a huge economy at that level, but, you know, that means if you're an Iowa, or Kansas, or, you know, flyover country, I mean things are going to cut through that aren't serving you. It just will happen.

MR. MANSUETI: This is Larry Mansueti, Department of Energy. What I can add is this is exactly the kind of debate that's occurring in Congress on the cost allocation as well as other issues.

Unfortunately, with our electric grid, it's mostly a fee which means it's very difficult for engineers to say that that electron is going from that point to that point, and therefore making it very difficult to define things precisely. And so cost allocation ultimately is a political decision of our country, regional or what have you, between these two kinds of, you know, local beneficiary pays and a national type of a regional type of thing.

So it's not really can be solved by engineers; it's going to be political choice. You've got, collectively, we do or do not make it through Congress.

MR. EBINGER: Well, let me throw another zinger out and see if we can't get a bit more controversial.

Charles, why don't you take the lead on this one, and then the question we have is: How does the fragmentation of the electricity market, both in terms of owners and regulators, affect transmission planning?

MR. GRAY: Well, as we heard from Chairman Wellinghoff, it makes it more difficult. There's no question that if we had a single owner of the entire grid in the United States, publicly-owned, for example, managed like the federal highway system, it would be a lot easier to plan transmission than the current system where you've got four different -- at least four different categories of ownership: municipals, co-ops, IOUs -- the Federal Government is a major owner of transmission assets. And all of those parties are going to have to participate in the planning process.

I, again I can just come back to my last answer that there are initiatives underway through the stimulus money, and I know Larry's probably going to be up to his elbows in this at some point. But we see some efforts that are coming together where particularly in the Eastern interconnection where parties are coming together both at the industry level that Chairman Wellinghoff mentioned when he mentioned the group that was coming together in the Eastern interconnection of transmission owners. There's sort of a parallel effort being made by the state officials, including governors and other public utility commissioners, those kinds of folks, to try and come up with an interconnection-wide planning process that builds consensus as much as possible.

That said, there are clearly -- the fact that you have new procedures in place isn't going to solve the same kind of problems that we heard this morning. Already, the people are worried about importing coal from the Midwest; in New Jersey, people worry about losing offshore wind

in New England because of lines that bring power in from other parts of the country. So all of those problems don't go away simply because you have a better process.

MR. HUBER: In fact, let's be frank, they get worse. I mean if you're in one corner of the country and you've got high-cost power there and a lot of politically influential people in that corner who have just deadbeat assets, they ought to be shut down for whatever reason -- because you don't like their green credentials or because you don't their money credentials -- I'm more interested in the money myself.

But anyway, the fact is that -- no, the grid is an enemy of everybody who's seriously above cost on their production. And there are a lot -- I mean we don't live in Lake Woebegon. Half the country's above average and half is below, right? And the grid flattens that out. It will have many local enemies, okay? And it will have -- the proponents will tend to be physically further away because often somebody far away has cheaper real estate and a friendlier regulator, or is nearer a big gas pipeline, or is sitting on a field of stranded gas that can generate electrons right there. I mean there's many of these scenarios. There will be lots of local resistance in at least half -- in half the time?

MR. EBINGER: Anybody else?

SPEAKER: That, unfortunately, is the reality of the situation. One can think back on the wars on trying to get -- there's a national push earlier in this decade to have standard market design, i.e., have these

RTOs all over the country, decentralized, organized electricity markets. Well, that failed in the West outside of California and in the Southeastern. In many of these regions they had low-cost power, and they were afraid of importation of higher costs, how that would -- well, exploitation of their lower-cost power to the high-cost power areas for these very reasons.

So these issues are not electrical engineering issues. They're all political issues, sometimes hiding its technical issues which one of the reasons we have this forum today. They're difficult to solve.

MR. EBINGER: Okay, Larry, we'll come back to you again. How should a high-priority national transmission project be defined? And how should the electricity policy be adapted to accommodate high-priority national transmission projects?

MR. MANSUETI: Well, first off it starts by just studying -- Chairman Wellinghoff mentioned -- existing law. Existing law does say in their EPACT 2005 that DOE does a congestion study every three years. We've got one right now sitting at the White House waiting under final review to be issued anytime.

Following that study, the Secretary of Energy can, if he or she chooses to, designate certain geographic footprints of national interest electricity transmission corridors, really areas, and vendors backed up fighting there. Those geographic footprints, the law says, well, those are areas that DOE deems under federal law certain parameters of national interest to resolve that congestion.

Now, it doesn't say that DOE, we're supposed to go out and say you must build transmissions to redistribute generation efficiency and so forth. Congress did say, though, if a transmission line is broke, then in the state that was it was an accident within certain parameters -- there's been a court case on that and so forth -- some folks say that it may have been weakened by the court case -- then it goes to FERC.

So that's how it's currently defined. In a sense, we have all the different proposals before Congress that are being sorted out, or will or will not be, depending on how legislation goes.

We currently also have how the -- where the administration stands. The administration wants more efficiency, renewables, coal (inaudible) station nuclear deployed. Go to whitehouse.gov, you can see it all there with the administration policy. But also the President has mentioned his interest, in State of the Union, of having coast to coast wind and solar renewables that implies transmissions. I can't give a specific answer to your question because the administration is still undergoing review of its transmission policy.

The Chairman of FERC is at an independent -- Chairman Wellinghoff of FERC is an independent agency, so he is able to espouse his views, but we haven't sold on anything yet in the new administration. But there has been intensive review sponsored by the Council of (inaudible), and Chairman Wellinghoff has been in those discussions as

well as other cabinet secretaries looking at various bills before Congress and where we should go.

Pragmatically, though, what is occurring, what is occurring is a stimulus bill, a stimulus act. There is funds in there for loan guarantees as well as other types of generation, energy efficiency and all that kind of stuff, so there may be some lines that go for -- very large lines that may go for loan guarantees. There is a large amount of trial-balloon transmission projects in the West trying to get buyers and sellers to agree. They have been in trial-balloon-phase for a year or two.

The Western Governors Association, Western Interstate Energy War has a great map showing all these proposals.

Some of them may be flushed out and become commercial where they actually become real financed projects through some, I think it's about $6-or-$7 billion in loans, barring authority that's kind of a power administration that Western Area Power Administration has. They've got a tremendous amount of proposals coming in, and some of those that one would call national interest, or signification lines may end up being financed.

The -- I like Chairman Wellinghoff's -- the last point I was going to make, how they're going to be perhaps defined pragmatically out of stimulus money. The lock-them-in-the-room approach. Well, that's the approach that Congress gave us when they gave us authority at DOE that you issued $80 million to support interconnection regional planning.

We've got an RFP out on that on the street. The proposal is due by this Monday, East, West, and Texas. That is really what we're doing there with our funds in the East and the West, Texas.

We've got an RFT (inaudible) that says we want all the technical folks to get together, all these engineers and (inaudible) and so forth on an interconnection-wide basis, East as well as Texas, to come together and do interconnection-wide transition planning in a public participatory format, and in a heavily, heavily scenarial basis, meaning lots have looked at alternative scenarios, nonwire scenarios, nontransmission scenarios. We feel that's critical if you're going site transmissions. You have to make the case. You really need the transmission lines. We're doing as much as possible on nonwires, DG efficiency and so forth. We think that's crucial, particularly to get folks together.

And we're also, at Topic B, funding the states. Group of regional entities that can claim that they have the support of the governor are welcome to submit proposals to us. We've heard some of those names earlier by other folks, and in the East that's going to be a tough slot, because Eastern interconnection is 40 states. Forty states.

The West has a good track record, and from our standpoint until Congress acts and says this is what national transmission lines should be, not be, or what have you, that's probably going to be the game in town where the East and the West, the states working together with industry

and interest groups and interested parties have a crack at being in the room.

And the last point is that I've heard from many state commissioners, among themselves and to us, in public statements saying: This is our last crack at the state level for us to work regionally, interconnection-wide together and try to crack all these different nuts. And, if not, then federal siting authority may need to come in. And, in fact, they've been warning themselves, hey, we have to be in this room. We have to from the Southeast be in the same room with folks from New England and try to solve it.

Otherwise, which is, frankly, a tough thing to do, culturally in this country, as you know.

MR. GRAY: (Inaudible)

MR. MANSUETI: Yeah. We did have a Civil War at one time, you know.

MR. GRAY: I've been in those room. You need a translator.

MR. MANSUETI: Yeah, Chuck has been in those rooms. And so there they know that they're under the gun at the state level to get it done, or heavy -- this experiment may fail and Congress may act either now or in a few years.

MR. EBINGER: Thank you. Anybody want to comment on that? Chuck?

MR. GRAY: I would just note -- and I think Larry made the important point. The difference between what we were talking about in 2005, which was relieving congestion, the corridors at that point, the national interest was in relieving congestion to make markets work better. I think that's clearly what you saw in the debate leading up to that legislation. It seems to me it's a very different debate right now.

And the question, I think one important question that there hasn't been a lot of time spent on is the open access, nondiscriminatory policy of Order 888 for access to the transmission system, still a national policy. I'm not sure it is.

MR. MANSUETI: Well, we observe that it's still a national law.

MR. GRAY: It's a national law, but so all of this, you know, favored access to certain technologies, all of that sort of runs counter to the open access policy that

we --

SPEAKER: Well, I think it does, but I think our view would that those things could coexist. We might even support broader federal backstop authority than just for renewables-related utilities.

MR. HUBER: You know, if you want the prime example in our federal law of lots and lots of commending criterion interest coexistence, you know, open the Federal Tax Code, all right. And there is a line for green, and a line for this, and 12,000 pages of regulation later. Nobody

knows what they are, and there's a very high risk that the grid goes exactly that way.

I mean you were saying this -- you (inaudible) completely. I agree with everything you said, actually, but you said it's not an engineering problem. And the very first words you used, of course, was then congestion, which is an entirely engineering problem. Am I going to burn the sucker to the ground? Is it going to fall down when it gets hot, you know? Or is it going to keep sharing the load?

You know, Baltimore, Baltimore doesn't have a congestion problem. They have no power, okay, so if they raise prices sky high there'll be no more congestion. They want to import it from somewhere else. They've got a -- I mean they've got their own home-grown problem.

Now, there is -- I mean with all this talk let us not lose focus -- there is a pretty darn clear objective economic metric of what we ought to want if we actually want to maximize U.S. wealth. And that is after you've put in your environmental and whatever loads you want to on the nodes, the little round points on the map, okay, and loaded those costs wherever you want to put them, you actually want a grid that then gives us a national market.

And so that if you got a three-cent price location but you -- a dislocation which you can move or spread, but you can move the power for one cent that you move it. I mean that will maximize -- that will make America as a whole wealthiest, and over time it ought to be a positive sum

gain where you can -- and you really first makes these maps. You can look at -- I mean there are big, big price spreads, and they're, of course, time-of-day within a region. But then geographically they're just enormous. I mean factors of two in average retail prices and so on. And on the wholesale market scale, we should be beating them.

I mean it's free money. At 765 kv, you can move this stuff 3,000 miles. The losses are small, and it's not expensive. We're talking a fraction of a penny to move it that far, or maybe a penny.

MR. EBINGER: Do any of you see any dangers that the government seems to be choosing the technological winners of the system rather than simply concentrating on --

MR. HUBER: That's the whole danger. It's everything all the time. I mean, and locally they're choosing it. I mean everybody is guarding their little bit of turf, which is good, locally and in the short term, and bad nationally in the long.

SPEAKER: We would agree with that. We would rather see the end goals, legislative, and allow some flexibility on the part of the utilities and regulators and local jurisdictions to meet them. I think if we unnecessarily constrain the problem the solutions get contorted.

MR. MANSUETI: And one aspect about that from a good standpoint with all this interest in carbon legislation and so forth, all this alarm about climate change couple with, hey, all the busts in property now as (inaudible), all that money is going looking for a place to invest. We've

seen these massive trends of venture capital going into all these new energy technologies. But that also means that we don't know today, in 2009, which one of those technologies or sweeper technologies will be the killer out 10, 20 years from now.

Some folks say (inaudible) is poised with all the billions in capital investment is to break out and be so cost-effective that people will be buying them automatically. There are people who say this, in about a decade.

Just like they automatically buy cell phones and go off the telephone grid. Or geothermal in the East, there is technology to do that and so forth. Or low-cost nuclear, if you believe that, and so forth.

So if we take as a nation and place our bets too early, will there be economic losses from doing that? So on one hand it's great that we have all this technology blooming, but if you pick the wrong ones too early, will that pose problems for us economically?

SPEAKER: In fact, one of our concerns about cost socialization is that if you do that in favor of large centralized wind, you probably prejudice other renewable forms, and you probably prejudice economic efficiency to some degree.

SPEAKER: This is not a new issue. Purpose started defining, you know, preferential types of technology. This was 1978. You know, that's when we first lost our virginity on this issue, and now it's just a question of how much farther we go. And RPS is essentially picking

winning technologies, and, you know, that's got a lot of support for very good reasons.

But I don't think we'll ever see a neutral policy if we ever had one.

MR. HUBER: Yeah. I mean to remember how bad it gets, lest we forget, for nine years it was actually illegal to build a new gas-fired power plant. Now it's essentially mandatory. So in the space of 20 years, you know, it's a crime or else it's you get a Nobel Prize. I mean that's --

SPEAKER: Yeah. And here are the -- there are some old-timers in the (inaudible) industry complained, look, UDWE under federal law in the early '80s from these, in order to build the gas line, we had to come to you and get a permit. Well, that was a bit hassle. You, eventually, would rubberstamp us, but the permits to build gas as gas supply increased. But then we went out and built gas -- coal plants. Now, we're being told, oh, coal is bad, we have to clean it out.

So if you look at some long-term trends, and we have to do a careful look at what we choose to do as federal laws. Things change over decades' time.

MR. EBINGER: The Chairman seemed to suggest that, you know, seemed to say he had a preference for having these issues dealt with at the state and regional levels, but with clear backstop if that didn't happen to, you know, move toward some kind of federal preemption.

The question I'd like to ask, to what extent do you think there's any prospect that somebody opposed to a particular thing that FERC would like, like a national interest corridor, to what extent would there be any grounds for a challenge to the U.S. Supreme Court on whether FERC has such jurisdiction?

SPEAKER: Well, there was a decision after Order 888 about -- the Commission then took jurisdiction over unbundled retail transmission, under unbundled retail service, and the Court upheld that decision. We were parties to that case.

And the Court hinted, I think, that the Commission, if it so chose, could also assert jurisdiction over bundled retail transmission, which it didn't do and it hasn't subsequently. But I think there may be some -- they may have some authority that they could rely on for an expansion on their own, of their own authority, at least to the extent of taking authority over the entire transmission now, work as it relates to both retail and wholesale service, including services provided by the vertically integrated utilities that now operate the same as Southeast or the Northwest. I think there would be a huge political push-back on that from those regions, but I think if the Commission wanted to take an aggressive approach, you know, those kinds of cases would be the ones that they would cite.

SPEAKER: Obviously, I can't speak for the Commission. Looking at natural gas, it's been able to (inaudible) natural gas a pipeline. There's been opposition. They've had to deal with court suits and EISs

and so forth, but natural gas, the lines are buried. Transmissions, until someone comes up with a killer (inaudible) to cheaply bury transmission lines, superconnectivity, or some other new-fangled technology, they're going to be above ground. And, you know, human nature to some folks they're not pretty. You know, to some folks that's a NIMBY thing; to some folks I think they don't like seeing them.

So federal siting authority, it could help, but it's no panacea because if you're -- in our modern democracy with all the walls and ability to sue and stop and voice your opinion, and rights, if local groups don't like these transmission lines, they're going to be delayed or bollixed up, and, you know, there will be things occurring at FERC because they're (inaudible). You can see them.

MR. EBINGER: Peter, let me ask you a question to lead us off.

How have the last three decades of utility restructuring shaped the modernization process of the electricity grid, and has this necessarily been good for consumers?

MR. HUBER: When you (inaudible), I assume by "restructuring" you mean essentially the separation of generation from wires. And I think, you know, let's quickly run through some three perspectives. I think on the generation side it actually did much -- not all but much of what was hoped.

I mean to pick one example, probably not the favorite du jour, but the nuclear power business was taken over by essentially one company,

and it got very good at running these plants, and they got them up-graded at the NRC, and it raised capacity factors from 70 to 90 percent and without building a single new plant. I mean with a huge expansion output, and you got the merchant generators, and wild competition. So that was what was foreseen and plan-expected. Basically, you created incentives to get much more efficient.

I would say, on balance, the intensive on the grid was close to exactly the opposite, or certainly zero and negative. I mean you basically have somebody -- in the old system, you know, you have one person owning both, and these splashed the money around a bit. You were going to put some in wires, some in plant, and that's basically -- you get to make those choices, rationally, within your own universe even if the regulatory structure created weird incentives. Once you separate the two, the person who owns the wires has actually, I would say, zero or negative incentive to go out and connect to the cheapest producer. That tends to be somebody far away. It means you've got bigger problems of, you know, the lines going down, and you're sitting in Baltimore. Do you really want to rely on Ohio or Manhattan?

You know, New York actually has a law. You've got to generate locally 80 percent or something. You can't import it all from Montreal, and it's a costly process if you own the wires, so, you know, it's expensive power. We'll pass that on, and we get our margin. I mean that's the core

incentive, you know, and you don't have money splashing around to build wires anymore, and that's why we have a problem.

So we've got a huge expansion in competitive generation, and lots of people far away generating very good electricity. We lost, if anything, our cash and our sort of centralized managerial authority to build our wires, and then on the third hand, back to the power plants, I mean, you know, you really mobilize the independents and the merchants on one side versus the local producers on the other. And they are simply in direct opposition.

I mean if you own a gas peaker that's not a very good peaker somewhere on the East Coast, and there's somebody sitting on free gas 1,000 miles away, you know, who can put peak electrons your way, you don't want more wires, you want fewer wires. I mean you want more gas pipelines, but you want less grid. And would say, if anything, we created -- we found some problems and we put the focus on how unsolved the grid problem is.

MR. EBINGER: Anybody else want to comment on that?

SPEAKER: I would just note that a lot of consumers paid stranded cost payments for those nuclear plants that are the gems of the industry right now that are getting market-based prices that have nothing to do with their cost; that it's a great thing to own a nuclear plant these days.

MR. EBINGER: If you know how to run it, it is. If you know how to run it.

SPEAKER: Exactly, yes.

MR. MANSUETI: Well, I think what I heard is that there's pluses and minuses to what occurs. That's my personal analytical view, not the Department of Education or administration because we have no position on electric construction in the administration.

Because of my professional background, a lot of the hat I've worn in the last decade or two is off on the demand side. The efficiency side, one of the negatives of, unfortunately, of restructuring is that in the '90s there was a deer-in-the-headlights look among utilities and others investing in efficiency because -- and some aspects, other aspects of capital waiting for this new restructured markets, and who's going to own what occur.

And so things like energy efficiency was less -- well, the thought was the market will do that. That was even in the Clinton administration, the view that the retail restructured markets would bring massive energy efficiency and renewables and so forth. And now we've been seeing a big push, now really interest.

The fact that Edison Washington Institute has Lisa Wood, Institute of our Energy Efficiency, the National Action Plan for Energy Efficiency, where the nation's utilities came together and regulators can say we need more energy efficiency, that's been a resurgence.

But in some aspects, electric restructuring caused a deer-in-the-headlights wait for certain things to happen. And that is a negative. There were positives with it all too.

SPEAKER: I think from our perspective, you know, the objective of regulation was really not grid modernization, it was something else, and probably we did achieve at least parts of something else. But I think what's going grid modernization is not that. Somebody observed earlier that it's a little more about politics than it is about engineering, and I think that's probably right.

MR. EBINGER: Do you think on bundling and the restructuring was a good or bad thing for the deployment of the "smart grid" technology? We've had some people suggest to us that, in a vertically integrated system, the deployment of "smart grid" technology can occur much more efficiently than it can when you have a more fragmented ownership system. Do you agree or disagree?

SPEAKER: I would agree with that. I mean, in general, public power and entities in the Northwest opposed restructuring in that region. We were successful, so we largely are still politically integrated. You see a number of "smart grid" proposals rolling out under the stimulus bill in our part of the country, including my utility. And we're doing it for reasons really unrelated to the restructuring of the industry.

Those will see a large rollout of energy efficiency in our part of the country for reasons unrelated to restructuring, just basic energy economics.

SPEAKER: I want to pick up a thread that Chairman Wellinghoff mentioned. He mentioned integrated resource planning. In the West, you have mostly vertically- integrated utilities still, and they still practice integrated resource planning. The major utilities there requires to file with their PUC, the public power usually is do to integrated resource planning, and there is an advantage to being one person making the rational choices, assuming you have a good IOP process between generation transmission and the demand side. You have that in the Southeast.

For those areas that have markets, since we organized markets, yeah, you do have the problem of deploying some of these technologies because you don't have one owner. There was a six theory has been to try to do it through market design. Chairman Wellinghoff mentioned the four capacity markets both in New England and PJM that do allow demand side resources which can be "smart grid" enabled to compete equally. There that it is possible to do it in nonvertically-integrated areas. You have to engineer some kind of market system which always takes time to get perfect and get right. Well, knowing that you can never get a market perfect.

MR. EBINGER: Okay, Larry, if I could direct this question to you, and then we've move to the audience: How does the development of a

renewable energy portfolio standard influence society in financing of electric transmission lines?

MR. MANSUETI: Totally. Totally. I'm thinking particularly in the West. That is literally the main thing that's driving the Western Governors Association in the entire West to pursue long-distance transmission lines. They've said right now it's very difficult to do nuclear or coal, or even coal (inaudible) in the West. The only options we have are efficiency removals in the West, and we don't want to do more gas because of their overreliance on natural gas. And that is literally driving the Western removal Energies Zones Project with the transmission.

And the last point is, on the utilities side, the utility industry themselves have organized a Western Electric Industry Leaders. All the major utilities in the West, these big ones -- public power co-ops, investor-owned -- they've formed little lumps of all their COs. They pay for some number crunching and miling to be done, and, voile, their miling resulted in a letter to all the governors in the West, all the PC commissioners saying, hey, you've got climate pressure, we've got RPSs to meet. We really need access to location constraints renewables. We need to build transmission. Please help us. Don't stand in the way, Governors.

And Western governors have been in correspondence with them through the Western Governors Association. So "totally" is the answer in the West. And, increasingly, perhaps in the East, the Eastern interconnection, there's a -- well, I say perhaps because there

are 10 states in the East -- the Eastern governors from Virginia all the way up to New England -- that have sent a letter to the Senate Energy Committee. And you see a lot of folks in town saying, "We're not interested in (inaudible) renewable transmission lines; we think we want to do them regionally around here, build out renewables and efficiency and other generation resources.

So more so in the West, somewhat in the East.

MR. EBINGER: Anybody else have an opinion on that?

MR. HUBER: Unfortunately, I'm sure you're right. I know you're right, and that's about the only thing out there that would make me -- because I'm getting old and I've seen a lot of this, okay, think, gee, scrap the whole thing, okay, because we will regret it. If you have any green memories at all, you clearly remember the day when the grid was the brittle energy of green, okay? You wanted less grid, okay? I mean you've stop the grid at all costs because it led to big centralized power plants. All the numbers were wrong, it was bunk beginning to end, but nevertheless it shaped policy.

Now the greens are suddenly, you have some greens, not by any means all, but have flipped to the other end. We desperately need a line to solar in the middle of Nevada, you know,, or to wind in Texas. Very good, but, you know, these are very long live resources. They are all capital up front. I mean you can spend huge amounts of money on this,

and, you know, you can make the stranded costs of the nuclear there look small compared with a grid to nowhere, you know?

I mean everybody -- no, look, keep in mind, ladies and gentlemen, world politics change more than you think, okay, in a lifetime. You may think carbon's a done deal. I'll tell you, if India and China don't come in on this, okay, and say, "We're going our own way," which is probably as likely as not right now, okay, I suspect carbon isn't a done deal, okay, because we will find that it is just economically ruinous to go it alone when we control, you know, way under half of the world's carbon supply, less than half of the carbon emissions, you know. China's the biggest emitter of the developing world, it's 55 percent, and unless this global treaty coalesces and gets enforced, a lot of these things won't last as long as people think. And if you have a long memory in this business, you do not invest for the long-term based on the latest regulatory winds, because they are more changeable than you think.

SPEAKER: Larry, I'd just like to pick up on your last comment that the West, at least, doesn't want to get overreliant on natural gas. Does this make sense when we've had the greatest additions to natural gas supplies in this country over the last four years or so? And many people in the gas industry will argue that the reserve base may even be much greater than even the farthest numbers have been projected.

I mean there are people who are beginning to say gas should not only be utilized, that it can take away market share from certainly from

coal, which even though it may not be the preferred option it's certainly better than the burning of coal from the CO2 perspective, and it would also, you know, develop American jobs and keep jobs that are right now being lost in the oil and gas production patch.

MR. MANSUETI: A two-part answer. First, that's a very good point because that's a recent development. The Marcellas formations in (inaudible), that's discovery, and that's great. Sometimes there is good news in the energy and electricity business, like that find of oil in the Gulf, the NASA's find.

What occurred in the West, when they set up that process I described, that was done when natural gas looked scarce, or expensive, or national security's problems getting all this LNG from overseas, and we're hoping that actually as part of our interconnection-wide planning we're going to fund in the West that the West revisit some of their assumptions because of this natural gas. And that's hopefully one of the scenarios they're going to be running.

Of course, there's the caveat that, some folks say, that if you want to greatly expand wind, you do need to build something to help with the intermittent field. You change some practices, one of the answers -- there are many -- is building more gas plants to back up the wind.

SPEAKER: Just one other observation on the use of gas in the West, I think it's not because utilities wouldn't like to do it; but you need to keep in mind that most of the Western states, at least where the loads are,

have put RES laws in place. So most utilities in the West are scrambling to buy renewables in order to meet the RES requirements, you know, without regard to the economics of integrated resource planning.

MR. EBINGER: That's true. Do we think that's as good thing or a bad thing?

SPEAKER: It changes the view on the carbon thing, I think.

MR. EBINGER: And that's up to the voters of that state.

SPEAKER: Mm-hmm. And California is paying twice the retail cost of electricity as Indiana. Okay, well, an all gas state versus an all coal state.

MR. EBINGER: Chuck, could we ask one final question before we turn to the audience, and that is: In terms of the siting authority for high-priority transmission lines, how do you think the responsibility should be shared, if indeed it should be shared between the states and the feds? And what can we do to incentivize private investment in transmission lines?

MR. GRAY: I guess I need to be careful on this a little bit, and speaking for to meet myself in speaking for NARUC.

We have shared jurisdiction right now, as we discussed a few minutes ago. There's backstop siting authority that goes to FERC. It's been in existing for four years. FERC has got the site of power line using it, so there's one application now pending. Does FERC need more robust backstop siting authority? That's what the current debate is about in

Congress. I think there are members, some commissions that think that would be a good idea, Clearly inconsistent with what Peter was saying that there's haves and have-nots, there are commissions that are frustrated by the inability of the state-by-state system to build new power lines, but they want to import cheaper power. They want to sell a power out into other markets, and they see that as being frustrated by the way the siting in other states is concerned and that.

But there are other states that for a lot of reasons strongly would oppose any kind of expanded federal authority over the siting of power lines for the kinds of reasons -- and it's interesting how the arguments have somewhat shifted -- because it may result in bringing in high carbon generation, as I think Chairman Wellinghoff addressed that problem. I think he's probably right that those plants in the Midwest are probably near capacity most of the time anyway, so it might not be as big a problem as some people think.

But then the offshore winds in New England, those folks want to take that first, and maybe the national corridor would frustrate that policy.

So I think we're going to muddle through. I suspect Congress, though, there is some momentum right now for expanded federal authority to do this. And I fairly expect if that goes forward there will be some expansion of FERC's authority, perhaps along the lines that Chairman Wellinghoff -- expanded backstop authority nationwide and not in just in zones in some kind of a period of time for a bottoms-up approach to both

siting as well as planning to operate, and then have it transferred to the federal authorities when the states fail to move the ball.

MR. EBINGER: Okay. We'll turn to the audience now. If you would please identify yourself and direct the question to one of the panelists to lead off the answer to your remark. Yes?

MR. OBERLANDER: Thank you. Leonard Oberlander. We're talking about national systems -- pipelines, grids, and so forth. And I'd like to follow what Peter Huber said last and the following comments by the panelists with a question about the changing, let's say, entrepreneurial spirit that may accompany the use of gas and gas pipelines for transporting gas and industrial uses of gas, as well as the electric grids.

In the context of financing into the future, where there's money to be made there will be corporations, people, governments there to benefit from it. So following on what Peter Huber said, why not consider even a vertically-integrated structure that either produces or imports gas, for instance, and then transports it and injects it into the industrial use in factories, having one corporation do this, one group of private investors, if that's going to be profitable and efficient?

And what is the role of investors that we've been talking about, not only American investors but private equity investors that are national, international, foreign national, and others? Where is the legal and regulatory framework standing today with regard to international

investment, partial or total foreign ownership of certain of the energy assets?

I will end the question there because it's narrower than I'm thinking about it, but it's very difficult to grasp the essence of the legal and regulatory ramifications of the very many different kinds of private and intergovernmental investments in this.

MR. EBINGER: Does anyone want to take that?

MR. HUBER: I'm not an expert on the foreign investment. In telecom, I know there are the quite strong in the foreign ownership of infrastructure. I don't know what they are in energy.

But I will -- there is a very important point you raise, and I -- I'm a telecom owner, or used to be, and I will tell you that all of these issues played out about two decades earlier in the telecom business than they did in the energy business. We've seen them all.

And I'll tell you this: The models we've been through are complete vertical integration, which was AT&T, or the old utilities, okay. We're just separation. You slice the generation off here, and you put the transmission over there, and they both have their problems. And I actually -- and, by the way, in telecom we finally worked our way through, and we got a sort of messy hybrid, which was almost certainly the best.

The best analogy I know, if you're trying to put up a 100-story skyscraper in New York, okay, if somebody said, "Look, you've got to build it and the, you know, have equal access, and defer cools on who can buy

what at what price," it would never get built, okay? The only way a skyscraper gets built, a huge capital investment, is with anchor tenants, okay. You've got a developer, but you also have two or three or four people who will buy the first 20 stories and put up a lot of capital, and you want it that way because there's actually a cohesion of interest.

You have exactly the same thing in electricity. A power plant without a grid beside it is valueless, and a grid without a power plant is valueless, and the complete separation with FERC trying to run it all is, I think, a serious mistake. There ought to be some middle ground that actually lets some equity ownership with -- you will never go to a completely integrated system again. If you're going to have public rights-of-way across the country for pipelines or wires or so on, you will have public access. You won't have somebody monopolizing that monopoly structure for their nukes, or their wind power, or their anything. It just won't happen.

But you can't -- these are capacious grids. I mean, you know, one 765 line can carry something like
1 percent of the total average U.S. electric power consumption. I mean it's fantastic amounts of power in one line, and you ought to be able to find some middle ground where you can draw in private capital which will want to make a profit. Because, currently, the grid owners don't make spectacular profits, it's not the place to go for big money. Little money, yes, but not big money.

But you want -- you want the venture capital in there, and that will drive your efficiency. They'll look for the DC alternatives where they make sense rather than the AC. The two sort of completely pure versions have both, in my view, serious limitations. There should be a middle ground that lets serious private money, for-profit money, flow into the grid.

SPEAKER: Just on the foreign investment question, it was under the Public Utility Holding Company Act that was essentially foreclosed. But that we repealed, so now we see foreign ownership of, you know, Scottish Power and National Grid come in, and they own utilities. So the kinds of restrictions maybe on the telecom side have actually been lifted in the energy side. So, you know, those markets are open.

MR. HUBER: Not on the grid. I mean the grid you have the open access rules.

SPEAKER: That's right.

MR. HUBER: I mean there are studies -- you cannot -- it's very -- and New York wanted it. You've got people who want to build a line because they want to build a plant at the other end. They just can't do it. There's total -- they can't get the guarantee that if they building the line, they will then get to put their power into it. And a serious (inaudible).

SPEAKER: You're saying (inaudible) on natural gas?

SPEAKER: Yes.

SPEAKER: Because there's open-access pipelines.

MR. HUBER: And I think you need half-open access. I've seen this in telecom. You got a -- no, you've got a fiber line. It's fantastically capacious. You know, Verizon or whoever's building it wants to be the anchor tenant. They want their stuff going down there. They build the line after all, and we litigated that for 20 years, and more or less they got the right to do that. You can't turn everything into a common carrier or you just won't pull in the private capital.

MR. EBINGER: All the way in the back?

MR. SCHNEIDER: Hello, this is a question for Mr. Huber. My name is Jonathan Schneider, and I'm an attorney that labors in these vineyards, and just slightly before my time and only slightly --

MR. EBINGER: Will you raise your mike, please?

MR. SCHNEIDER: Sure. Again, the question is for Mr. Huber. Just a little before my time, the nation faced a challenge of similar magnitude. It was the transportation challenge, and the question was how we moved people and goods and services from one part of this country to the other.

And Congress settled, of course, on not just an objective but a solution, a means to an end, and that was the Interstate Highway System. And the highway system was accomplished in significant part effectively by socializing the cost through tax revenue.

Now, we did achieve the objective, but we did so by foreclosing a range of alternatives, and for a generation we foreclosed mass transit. For a generation we made it quite conceivable to spread civilization throughout what was otherwise pristine wilderness.

Turning to the electric grid, it occurs to me that we may very well be in the same position. We have challenge that Congress may very well rise through either Cap and Trade legislation or an RES, and the question is whether it would be wiser to allow us to enable entrepreneurs and others to provide the right solutions in a most economically and a most environmentally-correct way by their own lights without dictating the solution.

MR. HUBER: Well, "dictating" is a strong word. I actually shipped down here (inaudible). I haven't gotten my hold on it, my bit -- my piece of grid wire, okay. It's something I (inaudible). It's just a piece of wire that just sat around.

Our power, it carries five Jumbo Jets of engines straight down the wire this big, okay. It's a lot of power. One line, which has about 14 of them or something, about 50 Jumbo Jets of energy going down that. I will assert you, just simply as a quantitative basis. I mean raw numbers -- this isn't political opinion -- that stuff, okay, has done more to improve the efficiency, the basic thermodynamic efficiency of our energy economy in this country than every improvement in car engines since the day of Henry Ford, okay, because big centralized plants let's you jack up the

temperature way high, okay, and you get tremendous thermodynamic efficiencies.

Now, that may be changing in the future. And, by the way, don't take it from me, we've -- the report of the World Wildlife Fund called, plugged in from last year, you know. I mean you get huge economies when you can, you know, put your plants where you can do your pollution control, where you can jack up the temperatures. I mean spreading loads, flattening things out has been -- this is what hybrid cars do in a tiny way. They flatten out the load for that little engine, and you double your fuel economy. The grid's been doing that for the electric economy for a century.

That happens to be an engineering judgment, and, of course, new technology could change that completely for the next century. But the fact is -- oh, there it is, there it is.

SPEAKER: Yes.

MR. HUBER: Okay, five Jumbo Jets at 765 kb's down one of these, okay? Anyway, you know, the only way to not meddle, okay, is to say no grid, no pipelines, let's have everything local. It's a charming vision, okay, and Amory Lovins has been pushing it for 40 years. You know, it ain't close to economic reality. I mean, you know, you can dream all your life, you won't see it in your lifetime, okay. We are not going to do 4,000 terawatt hours, okay, of electricity with roof-top solar. Not in your lifetime, okay, nowhere close.

MR. EBINGER: Any further questions? Yes, ma'am?

MS. BROWN: If we migrate -- I'm sorry, Debra Brown, Para Cyber Unit. As we migrate to smart, critical infrastructures, obviously, vulnerabilities increase. The keynote today talked about security, but just mentioned security, and I was wondering if the four of you had any comments from cyber perspective.

SPEAKER: My view simply is that it's a concern, but it's not insurmountable. I mean it's not a reason not to go forward with modernization of the grid.

SPEAKER: I would happen to agree with that. It's part of my own life is the march towards more IT, you know, like now we're seeing this big, big push for increasing the amount of IT. We've always had IT in the electric industry. It's not like we've never had a "smart grid." We're just going to increase it quite a bit. If look at it otherwise, other parts of our life, it's a security concern. We all -- the spam and all that kind of stuff with our Internet. Unfortunately, it's also the reason why we have to do all these passwords, and user codes, and how do you remember them all?

That kind of stuff, hopefully, as better than that will have to be addressed. It has to be addressed with the "smart grid" both at the host -- at the transmission, at the distribution level.

MR. HUBER: If I could add just one thing, there's no question whatsoever that your most reliable power source is a diesel (inaudible) set

on premises and a big tank of diesel in the back, okay? It's not cheap at all.

The second most reliable, however, is not one line stretching, you know, 500 miles but a densely interconnected grid, a mesh grid, essentially, so that, you know, when one set goes down, you've got two or three other pathways.

New York, internally, almost never loses power because its grid is so dense, you know, it's got six paths to your building. I mean whatever blows up. It really takes something to bring down New York. We could be building a much more interconnected nationally. We ought to interconnect our three regions, -- big, big challenge, but we should do it.

MR. EBINGER: Or, as some folks in the next panel will espouse, don't consume the electricity. Conserve it.

MR. HUBER: Even more reliable.

MR. EBINGER: Yes.

MR. HUBER: No energy.

MR. EBINGER: I do -- I do call the audience's attention to a recent study that was chaired by Jim Schlesinger, you know, former Defense and Energy Secretary which for DoD, which argues that because of the cyber threat security problem, that all military bases in the United States should be on their own energy systems and not connected to the grid anywhere. If you haven't seen that study, it's a very interesting one.

MR. HUBER: But they are. I mean National Airport is all -- I mean everybody who's got absolute critical loads and New York Stock Exchange, all have their own. They've got distributor generation, folks. It's all diesel (inaudible) set, and you don't like it. I mean it's expensive, it's dirty, it's everything you don't want.

MR. EBINGER: Yes, sir?

SPEAKER: So another version of an earlier question, if every study of metropolitan climate protection shows that to get an 80 to 90 percent reduction in emissions by 2050, you have to not only deal with technology, but you have to deal with spatial form. And we're starting to do that. One scenario might be that, in fact, we have started to get on that path, and we end up with a more efficient country.

If we do that, it seems like we end up with a virtuous self-fulfilling prophecy. We set the goal for carbon reduction and security and end up with a more e c economically efficient United States because things are distributed in metropolitan form that makes a lot of sense.

If that were to happen, it seems to me that, to go to the point that you made about Amory Lovins, which I think was misstated, you would end up with both efficiency and distributed generation, and you would end up with it in a much more efficient form, and you wouldn't need quite as much transmission capacity. And the lines wouldn't be in the same places as if you planted an assumptions of spatial form under business as usual.

I'd be interested in any position that any of you have on that because that's not hypothetical. In another part of this building, they're holding these same discussions today and every day about that spatial form that's a live debate and a policy set of options that this administration seems to be starting to commit to. How does that affect some of the framing that you've just laid out here which so far hasn't been no a spatial basis other than to talk about this war between the states.

Thank you.

MR. GRAY: Just on the transmission planning piece that we talked a little bit about, one of the things that the stimulus money's going to pay for are a series of scenarios that are going to be run through the planning process, and I suspect that they're going to be, you know, some of our commissioners are interested in looking at very different kind of approaches to the structure of the industry that maybe that -- I'm not sure it responds directly to your question, but I think there are going to be some folks that want to look at sort of out-of-the-box kind of approaches to transmission planning.

SPEAKER: I'll give a two-part answer -- one is to agree with Chuck. I was looking at -- to look at RFP, it's the code words, as much as we've put them in there, say we want robust planning on the many different scenarios. Geez, you could almost whisper it's integrated resource planning. In some parts of the country that's a bad word, so we

didn't use that. We didn't want to bring up those battles of the late '80s and so forth.

And, pragmatically, my second answer is, pragmatically, looking at the controversies in building a transmission line that occurred in some parts of the country -- not all parts of the country -- if you don't bring that early into the dialogue of looking at alternatives to transmission, you're going to have trouble building that line, siting that line. You have to, in our modern society, address those points.

SPEAKER: Thank you. I think it's a good point and a good question, and if you think about kind of what the real drivers are behind these large, high-voltage grid proposals, a cynic might say that the wind industry is trying to legislate its own business plans.

MR. EBINGER: Lisa?

MS. WOOD: I just want to follow up on that question. It seems to me if we had a carving goal we wouldn't be sort of talking about RPSs on the one hand and building transmission and having energy-efficient transmission standards and various other things state by state; we would just basically do what makes sense to meet the carbon goal. And that would be a mix of energy-efficiency distributed generation and renewable in the right mix.

But since we have so much uncertainty around carbon, instead we have, you know, 25 or 30 states at this point with renewable standard, so -- and leaving us scrambling about how we're going to meet the

renewable standards. So we're talking about building these transmission lines, and it's extremely expensive.

So I guess I don't know if I have a question so much as a comment. I mean it seems to me that because of all this uncertainty around the carbon legislation we're putting all these pieces in place, whereas just having the carbon legislation would let everybody plan efficiently. I don't know if people want to respond to that.

MR. HUBER: Well, could I actually -- I mean, question, you know, there are carbon-free alternatives that are not small distributed. I mean the nukies, you know, can knock out all our coal 100 percent with 250 plants, you know. If we had finished building the plants that were in the pipeline before the DMI accident, we would -- we could conjure those plants just in (inaudible) -- we would put ourselves into compliance with Kyoto just like that. I mean there are -- you know, our grid today, you know, on a carbon-based average is about as good, just about as good as an all-gas grid 100 percent, because there can be uranium plus the hydro bring it down enough. That's not a bad starting point, you know.

If you take the electrons off this grid which is 50 percent coal and displace the oil in your car, according to the World Wildlife Fund, pretty straightforward calculation, you lower carbon footprints because you're using a 45 percent efficient generator to displace a 25 percent car engine.

I mean there are very -- you know, Pickens wants to do wind. He's put a lot of money on it, but he doesn't want to do them distributed.

He thinks in Texas where it's windy and there's nobody lives is better than maybe off Cape Cod, and he may well be right. I mean -- but he can't do it unless you connect him to Massachusetts.

SPEAKER: I think this is a very good point. I'd like for it not to get lost, because as a utility executive, we're on the implementation end of all this. And if the overall goal is, you know, carbon reduction, let's just say so and allow people to get on with it and use some innovation.

But if you say to the utility executive, "Well, what I really want you to do is reduce carbon, but I want you to use this particular form of renewable, and I won't let you interchange energy efficiency for that particular form of renewable. And you must do it with the transmission line that I, the Federal Government, will, you know, divine and site," you pretty soon get a constrained problem that's very difficult to solve.

And I think from our perspective, we'd rather have the high-level objective stated, you know, have some innovation to flourish.

SPEAKER: I would just like to add the one point I think Lisa may have left out. If your goal is carbon, let's get an administration that's serious and put on a carbon tax and put on whopping gasoline tax and let the market respond.

SPEAKER: Right.

SPEAKER: Rather than toying with all these other alternatives. Sorry, I'm from an editorial state.

MR. EBINGER: Deeply felt after 30 years of fighting these battles.

Yes, sir?

MR. HERSHEY: I'm Bob Hershey. I'm a consulting engineer. What effect will the newer distribution technologies such as Skata, and automatic meter reading, and distribution automation have on the picture?

MR. EBINGER: What was the last word? Have on the grid?

SPEAKER: The picture.

SPEAKER: Oh, on the picture.

SPEAKER: That's the next panel, isn't it?

SPEAKER: Yeah.

MR. HUBER: They're excellent things. We should have done them years ago. Skata is basically a grid management to terrific stuff. Intelligent meters, I don't know why we didn't start 25 years ago. It's a -- we should have them everywhere, and we should have intelligent appliances so people can use off-load balance. I'm like many other people, I don't think it'll lower electric demand; I think it will raise it, but it's a good thing regardless.

SPEAKER: The march forward of our society towards more computerization or ITs, it's hard to resist that tidal wave.

SPEAKER: I would observe that the Federal Communications Committee has an energy staff now, and they've put out a notice requesting comment on "smart grid" and the kind of some of the questions

you've raised. So I think that means something, I'm not sure exactly what. But the FCC is now a place we go for energy policy.

MR. EBINGER: I think we had a question all the way in the back.

MR. FORDNEY: Hi, I'm Jason Fordney. I'm a reporter with Platts.

A question for Mr. Mansueti. You sort of were characterizing the interconnection-wide planning processes that are going on as kind of the last crack for the states to have, you know, its final siting authority. What will you be looking for in these proposals that would cause DOE to say, okay, you got it right, and how would that interplay with the push that we have for more federal siting authority? In other words, would you say they've got it right with these proposals, we don't need federal siting authority? How would that break down?

MR. MANSUETI: Well, I have a very simple answer. I'm a current employee. That's a question to be answered by the political appointees way above me after a year or two of those projects going forward.

MR. EBINGER: So we asked our former colleague, David Sandalow, who's now head of policy at DOE, that question.

MR. MANSUETI: Yeah.

MR. EBINGER: I think we have time for one more question maybe. Yes?

MR. GROW: Bob Grow, Board of Trade, backing up with kind of a simple question. How much of the conversation on expanding transmission lines is driven by the need to connect with the renewables? In other words, you need more power connecting to existing coal, nuclear at center, but how much is driven by that conversation?

MR. HUBER: The best possible view of it which I still cling to is, in fact this is for the first time in my lifetime I've been interested in electricity we actually see a convergence of interest, as far as I can tell, between some powerful green interests and some fairly traditional utilities. We want to keep the grid lit, and we want to make it economical, and, you know, Charlie goes too far: He'll never get a carbon tax, that's been tried and failed, okay?

But if you have any kind of way of internalizing the costs that worry you, you do that -- you do that at the nodes and then let the grid carry the stuff. It'll actually ease the pain. I mean if -- my guess is if you -- if you -- some of you manage to get in your draconian carbon limits -- and I know you want to, we'll see if you do -- but -- and if you do, the only way it'll be politically palatable is if we have a very efficient grid behind it to make it affordable.

MR. EBINGER: I want to thank all the panelists. I thought it was a very provocative panel.

(Applause)

MR. EBINGER: If I could ask everyone just to remain a few minutes before the break, I was going to call on David Girard, in the Rockefeller Foundation, who had asked to make a few remarks about your new project. Do you still want to do that?

MR. GIRARD: I'll be very brief, Charlie.

MR. EBINGER: Yeah, just come on up.

MR. GIRARD: Under five minutes.

MR. EBINGER: Yes.

MR. GIRARD: Thank you for giving me a two-minute commercial. I've known Charlie for a long time.

Actually, Peter Huber's last point is where we take off, which is that the Foundation is starting an exploratory effort to see whether, given the new imperatives, global and national, on the electricity system and the power grid -- and, clearly, you've heard a lot about that which is not just the climate mitigation, (inaudible) mitigation, but also climate resilience, having an efficient interconnected North American power grid that will also have to address questions of energy security as the transport sector becomes more and more electrified over time.

So what we've started to do is to have a process by which we are having interviews with all the stakeholders. We are starting with the premise that we need a timely, authoritative, equitable, fair transparent process that will involve all the stakeholders in this very complex business. We will not duck the hard questions. We fill face them head on. We do

start with the premise that, in fact, a modern interconnected secure resilient power grid is in our economic interests, in our environmental interests, in our vulnerability interests, and also if we take energy security seriously in terms of petroleum gradually being drained out of the transport sector over the next several decades.

So what we're doing is we're having a process by which we will interview up to about 50 stakeholders at the state, federal, local level, involve the industry, involve environmental groups. We want this to be credible, authoritative, independent. We will look at comprehensive transmission siting protocols, what are the best practices, best tools. We'll identify what the obstacles are and tools and technologies to speed the process. We will be looking at sitings, planning, and cost allocations, focusing very much on what some of the solution paths up -- policy solutions, regulatory solutions, technological solutions while accommodating legitimate community and environmental concerns.

So our goal is not to be lobbyists, not to influence legislation, but to face the hard questions here and come up with solutions to some of the hard questions, both in terms of substance and in terms of processes that will give is timely results. And so what we'll do is after the set of interviews -- Meridian is helping us with this as is the Energy Future Coalition -- and we will have -- we'll convene one or two meetings of all of the primary stakeholders after having done our homework along these lines.

I just wanted to let you know that, and so many of the folks here are going to -- we will engage with both in one-to-one discussions and, hopefully, in a larger convening, one or two larger convenings in the next few months.

We'd like to get some answers in six months, and there's no point in us getting in there and dragging this process on for two years. We'd like to come back to all of you with some answers both about the process and the substance. And again, we will try to be as independent and authoritative and transparent as possible.

Thank you, Charlie.

MR. EBINGER: Please reassemble. There's coffee and rolls now to enjoy here. Please reassemble at 11:30 and (inaudible) share our next panel. Thank you.

(Recess)

MR. PUENTES: Thank you everybody for sticking around on this rainy Friday. It's good to be here anyway. My name is Rob Puentes. I'm with Brookings Metropolitan Policy Program. As Charlie mentioned, he had long-standing commitments so he had to step out. The Metro Program is actually co-sponsoring this great event with Charlie's Energy Security Initiative. We're very happy to do that. We're very happy to kick of this second half of the show here.

I thought the first half was really outstanding. I thought the chairman's remarks were very interesting and very enlightening. I thought

it raised a lot of key issues that were talked about on the first panel and if there's one takeaway I have is that the governance, and the planning for these high-priority transmission lines is definitely a challenge. I think the second panel will dig into now the distribution part of the energy grid and I think we're going to also see that it's somewhat of a challenge. Fortunately we've assembled a really great panel that's going to dig into this. Our moderator is going to be Lynne Kiesling. Lynne is a Senior Lecturer at the Department of Economics at Northwestern, and in the Social Enterprise Program at the Kellogg School there. She is also a faculty member of the Northwestern Institute on Complex Systems and the Center for the Study of Industrial Organizations. Much more about Lynne and the rest of the panelists are in your bios, so I'll go ahead and turn it over to Lynne. Thank you.

MS. KIESLING: Thank you for that introduction and for inviting me to moderate this panel.

This session is focusing on the distribution end of the electric power network. I know we spend a lot of our time down in the policy weeds, and a lot of our discussion here will involve some ideas for how better to get good outcomes and good results from the stuff that we do down in those weeds. I'm turning on my timer so I make sure I don't try your patience.

Before we do that, I'd like to ask you to step outside of the policymaking trenches and ask yourself a core question, and it's going to

sound a little strange, but I'm going to ask you anyway: Is consumption or production the ultimate end of all industry and commerce? That's a big question. If the wording sounds archaic, that's because it's a question posed by Adam Smith in his critique of mercantilism within the 1776 book, "An Inquiry into the Causes of the Wealth of Nations." Smith's answer to that was that consumption is the sole end and purpose of production, not the other way around. Consumption is the sole end and purpose of production, and his critique of mercantilism was that in fact mercantilist policies by favoring particular producers and putting place policies to favor those producers reverse and cause unintended and intended consequences that actually reduce growth and reduce welfare and reduce well-being, particular consumer well-being. So I wanted to start with that kind of big picture, big picture framing, because this remark really reminds us that despite the century-long focus on production and supply in this industry and the economic and physical regulation thereof, consumption and consumers are still the ultimate end of commerce, and that's true in this industry as well as in any other industry.

By that I mean, and I know from some of the tenor of some of the comments that we've already had that a lot of the issues that are bound up in this are environmental ones, so when I say consumption and consumers are the ultimate end of commerce, I think Adam Smith meant and I certainly mean form and not quantity. It doesn't mean the ultimate end of commerce is for us to buy more stuff and have more stuff, but to

engage in the consumption of products and services that enable us to flourish and thrive, and if that means that I care very deeply about how my electricity is generated, then I'm going to buy green power. So it's not about quantity of consumption, it's about form and self-identity and self-meaning.

Moreover, if you think about that broader question and the policy trenches we all live down in, the transformations that we've seen in our daily lives from communications technology has substantial implications for electricity consumers and consumption in the physical and economic structure of retail electricity markets. So notice by framing this panel this way I've broadened beyond just the physical distribution grid and the wires and the substations and the transformers. I'm encouraging you to think differently and think more broadly about the questions surrounding the distribution network as being ones that don't just involve the physical how do we transport the electricity commodity from those who produce it to those who consume it, but more broadly, think about the digital communications technology revolution that we've seen over the past 30 years and the transformations we have had in our everyday lives and how different your life is today in terms of how much you can keep in touch with people, the types of transactions you engage you, you may not think of them as transactions but they really are especially those of you who have iPhones, and the potential for that to transform the electricity industry is similarly enormous, although it's hard to see in foresight as in

the 1970s when nobody could imagine why anyone would want a telephone that you could have in your pocket while you walk around. Similarly today, I don't think that we don't necessarily see the potential value that the ubiquitous information, more individual transactive capabilities that that brings to us in this industry. But it also has broader institutional implications particularly for the regulatory institutions that establish the context in which retail electricity markets form or don't and the distribution of electricity to end use consumers takes place. So these technological changes that are part of what we call smart grid definitely have implications for things like consumer protection and does or should constitute what we have for the past century in this industry called regulation under the public interest because the potential here is one where we can have new products and services, new bundling, we can bundle home energy management technology with home entertainment management technology all into one portal and give consumers a bundled product or service that they hadn't even imagined before was possible because they just think about electricity as I flip the switch and the light goes on. So the products and services in part differentiate in bundling as well as new pricing and forms of dynamic pricing is substantial and that we should while we are in the here-and-now policy, what are the policy activities we should be undertaking now, that we should keep in mind these longer, broader potential value-creation opportunities. But we also know that changing culture takes time whether it's the culture within a

regulated utility, within the regulators themselves and within customers. So these are obviously incremental and interactive processes that we're talking about when we think about how does technological change transform the value propositions we can put to end-use consumers and what are the business models and different ways that we in the industry are going to carry this forward. To that end, one of the things that we're going to end on because I think it's one of the most evocative, forward-looking examples that I'm going to plant the seed in your mind for right now and then we'll come back to it is think of the electric plug-in electric vehicle and how the plug-in electric vehicle has the potential to transform our relationship with the consumption of electricity as end-use consumers. That's a really broad, enormous, huge framing for what are very important, necessary, detailed, step-by-step, incremental policy things that we are going to discuss on this panel and hopefully we can integrate those two things.

We have a really superb panel of very distinguished speakers today. I'm just going to introduce them quickly and then as Charlie did in the previous session, I have a question that is essentially targeted to each one but open for what I hope will be a fairly fluid and organic conversation among us. To your far left we have Jeff Ross who's an Executive Vice President at GridPoint. Next to him is Cheryl Hindes who is the Director of Customer Load and Settlement at Baltimore Gas and Electric. Next we have Lisa Wood who is Executive Director of the

Institute for Electric Efficiency at the Edison Foundation. And at my nearest right, your left, is Rich Morgan who is a Commissioner for the District of Columbia Public Utilities Commission.

With those as our panelists, I will start in with the first question that I have and Cheryl is going to take the lead on this and then we will toss it around. The first question to the panelists is, What is the states' role in enabling demand management response and dynamic pricing if any? Or I should say demand response management and dynamic pricing if any? How should state regulators ensure that they coordinate their responses to real-time pricing strategies of companies that sell electricity in several states? There are a couple of issues there. Cheryl?

MS. HINDES: Good morning. I am Cheryl Hindes. I work for the Baltimore Gas and Electric Company which is an IOU, an investor utility northeast of here. If you call the map that was up when Chairman Wellinghoff was here, there was a little bubble over the middle Atlantic that said high stress, we're right below that bubble together with Washington, D.C. and our neighbors just to the north. So there is a lot of congestion in this area and some concerns about reliability.

At BGE we're been doing a number of things over the years. We have a long and strong legacy of demand side management. In 1979 we had our curtailable program for very large consumers, in 1988 a direct load control program, whereby customers with central air conditioners

could get incentives of they allowed us to cycle their air conditioners, we've been doing that continuously ever since. We've now upgraded that system to more robust not only switches, but we have thermostats that are cycling the customers' air conditioners taking advantage of their natural duty cycle and cycling on that basis. In addition to those programs, it was in January 2007 we made a filing with our commission for our Smart Energy Saver's Program. This included a very large energy-efficiency program, conservation that is. It included the upgrades for our direct load control program. Finally, it included an AMI, advanced metering infrastructure program, which also included a dynamic pricing component.

I had the pleasure of leading the dynamic pricing pilot in the summer of 2008 as well as 2009. We offered customers our standard rate, 14 cents per KWH. If they were able to reduce their consumption when notified a day in advance between the hours of 2:00 and 7:00, they could earn a rebate. So rather than just paying the 14 cents per KWH, they could earn a rebate of $1.16, or $1.75 for every KWH they were able to save. We offered another flavor of the program whereby customers instead of paying the 14-cent rate would normally pay on off-peak hours 9 cents per KWH. During that peak period from 2:00 to 7:00 on normal weekdays, they would pay the 14-cent rate, but on certain days when capacity is constrained and the prices are high, rather than paying 14 cents, they would pay $1.30, 14 cents, $1.30, or 9 cents. So we had

those three different pricing scenarios going on in the summer of 2008 and we had some pretty interesting results.

I should back up a bit. The question is about what states can do, and one of the things that our state did in the form of our Governor Martin O'Malley in 2007 is he challenged us with the Empower Maryland Goals. That goal is to reduce energy consumption as well as critical peak demand or peak demand by 14 percent by the year 2015. That's a rather aggressive goal, and our conservation programs do support that. We're not all the way to 14 percent yet, but we have plans of increasing as we get up closer to that timeframe.

In addition to that statewide goal from our governor, we also have the Public Service Commission playing a role, and so far they have given us the go-ahead for our conservation programs for our new direct load control programs for the air conditioners, we're still working on the AMI and the dynamic portion, and we actually have some hearings coming up in November that will help the commission decide on that basis. What the state commissioners can then do in our view is to offer timely cost recovery for the cost of these initiatives, they can offer incentives that are appropriate to reach the goals that we set and mutually agreed upon, and in the case of conservation, they can allow decoupling mechanisms that remove the direct link between the revenue and the amount of energy that is purchased. So those are three things that states can do now in the form of the regulatory.

Back to our smart energy pricing, which you can see I'm rather invested in that program, we had a very interesting summer. Before that summer we actually had focus groups of our customers, six different focus groups, to get a handle on what customers understood about pricing and electricity, and it was extremely varied. Customers understand conservation but demand response and the price of producing electricity is not necessarily in the normal customer's mindset. Another thing that states and all of us need to do is get involved with communication and education of our customers. We were able to do that using our focus groups as a platform and develop information so that customers could understand that at certain times here on the East Coast, it's on weekdays, it's when it's very hot in the summer when we've exhausted all the base load, the nuclear and the coal, and customers are still demanding more with their air conditioners that the prices go up and it's those times when we need to send a price signal to customers to reduce. I think they understood that because when we evaluated the results working with the Brattle Group who did the econometric analysis, it showed some interesting things. We looked at 50 hours over the summer, this is 10 different days, where the customers were asked to control a day in advance. They reduced their consumption between 18 and 33 percent on average depending on whether or not they had a technology to help them or whether they had an orb glowing different colors to show them that this was a critical time; 18 to 33 percent. The system peak conditions which is

the hour ending 5:00 p.m. at a certain temperature/humidity index, 83 is that index, they actually saved even more, 22 to 37 percent. So customers were able to understand the information that we were giving them and worked with us, and we gave them hints on what to do to actually reduce their peak demand. On the conservation end though it was interesting as well. The peak time rebate customers did conserve a modest amount of electricity. The customers who had that dynamic peak pricing, that high price component, the $1.30, because they had that 9-cent off-peak rate, they actually used a little bit more. So we had a rather exciting time. We asked our customers what they thought of it, and 93 percent were either satisfied or very satisfied. In fact, 62 percent were very satisfied, so we were very pleased with that. Ninety-seven percent indicated that they would like to have the same rate structure in the following summer, so that's exactly what we did. We offered again this summer. When asked whether these should be standard rates, 81 percent of the peak time rebate customers said yes, 70 percent of the dynamic peak pricing customers said yes. So we had a very interesting experience, and I'll just open it up for further discussion.

MS. WOOD: I'll just make a comment to Cheryl's comment on her program in the context of what can states or policymakers do. I think one thing that we're seeing happening across the country is pilot programs like what BGE is doing where they're going out with their residential or residential and small commercial consumers and offering

these different kinds of dynamic pricing programs and we're getting results that are similar to what Cheryl described in terms that customers are responding a lot. So I think the important things for policymakers and for regulators are, one, to allow these things to happen, allow these experiments to happen, and allow mass-market customers to see real price signals because, again, we have a lot of different people in the audience, but in the electricity market, for many mass-market customers, wholesale prices are really invisible. They're just getting a flat rate and really no awareness whatsoever of what's happening in the wholesale market and whether you have huge constraints or extremely high prices. So I think that is fostering these experiments around the country where we're allowing customers to see these prices and respond to them and have that experience and react and see what makes sense as the next step is critically important.

The other thing I think that's happened in the Northeast that's been extremely positive is allowing both energy efficiency and demand response to be bid as a resource into the wholesale market. This makes tons of sense. It creates a huge incentive for utilities to go after demand response resources and I think that's a great things that's happened PJN and in the New England wholesale market.

MR. MORGAN: If I could comment from a regulator's perspective, I sure don't have anything different to say from what we've heard from Cheryl and Lisa. Indeed, the kinds of questions that we look at

at the D.C. Commission, and I think this is true of other state commissions as well, are things like improving investments that utilities to come to us seeking approval on, and certainly the cost recovery issue is related to that and of course we have to subject to a rigorous cost-benefit analysis. Typically, for something like advanced metering, a utility would need to do a business case and show that in fact the benefits exceed the costs and there are a lot of different ways to evaluate it. In many cases the benefits are amorphous, you can't always translate it all into dollars and cents, so we spend a lot of time talking about some of the less-quantifiable aspects of doing things like AMI and dynamic pricing. As Cheryl said, getting the incentives right is really critical. D.C. is looking at decoupling right now and we expect a decision very soon with respect to our electric utility.

Then finally, the issue of pricing is really going to drive a lot of where we go in the future in my opinion. If we continue just offering blended, flat-rates that charge the same rate 24/7, we're never going to get all the benefits of the smart grid because so many of those benefits have to do with sending the right signal to customers about the value of their loads and the value of modifying those loads. If we go out and spend in our case $60 millions and some on advanced metering and then don't use those meters to send signals to customers and let them know right now you have an opportunity to save a whole bunch of money if you reduce your load because right now the system is under stress, then there is this huge amount of money on the table and that customer is going to

miss that opportunity. Not only that. When one customer reduces their peak, all the other customers benefit certainly in this market in PJN because that brings down the market price for that hour for everybody, so that there is this huge potential savings. Finally, in answer to the last part of the question about what state regulators can do regionally, in this region, five of the state commissions from the original PJN footprint have gotten together through an organization called, MADRI, the Mid-Atlantic Distributed Resources Initiative, which I was privileged to chair for the first couple of years, and it continues to be active playing a role for dialogue not just among the regulators, but we have invited the utilities, all the other stakeholders, the energy officers of the environmental agencies, to get together and talk about all the different kinds of benefits and opportunities that might come out of distributed resources and that includes distributed generation, demand response and energy efficiency and we've had a very productive. Frankly, the utilities, especially the ones that operate on multiple states like PEPCO Holdings which is in four of the five states in the original PJN footprint, we were worried they might feel like we were ganging up on them, in fact, they were very happy us working together and talking to each other because they would really like to be able to have the same kinds of policies in the different states and the fact that D.C. is looking now at a decoupling mechanism that's very similar to the one that Maryland has already adopted is certainly something our utility is happy to see, and that dialogue continues. We have more meetings scheduled in

the future and they are open to the public, and if you want information about how to get on the mailing list from that, please let me know.

MR. ROSS: I'd like to make a quick comment. I agree with everything that's been said up here. It's key for regulators to give you the flexibility to do the types of programs that BG&E has done, allowing experimental rate structures, different programs that can be tried especially on a pilot basis. I also think it's important, and Cheryl talked about this and I think that's why the BG&E pilot was so successful, there's a big education component there. A lot of what has been done if you look at the pilots that have been successful have involved large campaigns to educate customers and get them involved because to date a lot of what's gone on is you get a bill at the end of the month, you open it up, and that's the relationship that you think about with a utility. This is a whole new way to get customers involved and I think ultimate success revolves around getting customers involved and getting them to participate in meaningful ways. The smart grid is really not an end, it's a means to an end which is to get a more intelligent system and a lot of that involves customer participation.

MS. KIESLING: To hook back into my original comments, I would say the end is value creation, and specifically, consumer-focused and consumer-driven value creation. Is that consistent?

MR. ROSS: Yes.

MS. KIESLING: I'm going to move on to our second prearranged question, and this one I'm going to direct to Lisa and we can open up for conversation. That question is, How does the current utility rate design inform the development of smart grid policies at the state and national level?

MS. WOOD: I think we've touched on this already, but let me just continue the conversation. First of all, let me say this. What does smart grid mean at the distribution level? We're talking basically about smart meters, so we're not talking about transmission, we're just basically talking about smart meters and what does that now enable for end-use customers because it's all about the customer as Lynne started out the conversation, what can we do now that we couldn't do before with customers? If you look across the country, we have over 58 million smart meters currently either being deployed or proposed or planned across the country that will be rolled out probably over the next 6 to 7 years. That's almost half of every U.S. household. So we will have a different country in 5 years and it will enable a whole lot of things, some we know and some we don't know, but it will change the landscape in terms of what we're able to do. As Rick mentioned earlier, for the most part we still have across the country a lot of flat rates that are being offered to mass-market customers with very few exceptions, actually, we do have these experiments going on, and as we start to see these 58 million meters being deployed, and this doesn't even count the DOE smart grid experiments that will be

funded over the next 4 or 5 months to the tune of $4.5 billion, and we'll see a lot more smart meters go out as a result of that, what are we doing with those meters and what can we enable customers to do?

Rick coined this, I'll give him credit for it, you've got to hang a smart rate on a smart meter. It makes no sense for us to spend all this money putting out smart meters which are not cheap to mass-market customers and not giving them options to either keep their current rate or go on to some other rate or do other things with these smart meters, because we really don't even know all the kinds of things that might be possible. It's a gateway in a sense to creating two-way communication with the customer.

I'm trying to go back to the question here in terms of rate design, because we have all these meters being deployed, it's going to create a lot of opportunities and it's very important to allow those opportunities to happen is what I would say at this point. As was said earlier, the utility industry by and large has sent out a bill at the end of the month to customers, you consume some amount of electricity, you got a bill, you have no idea what caused what unless you really take some time or run around with a meter and plug it into different appliances, but all those things are changing. We have monitors now where people can look at how much energy is consumed, kids can figure out what it really means to turn the lights off, you can actually see fluctuations when you do things. You might see how different rates might impact how much you're actually

getting billed for that electricity at any point during the day. So there are all kinds of opportunities that these smart meters will really allow and the smart meter in my view is really the building block to the smart grid because in the end it starts and ends with the customer. We're creating electricity for customers to be able to use electricity to do other things, so I think that we're just starting to see some of the things that customers will be able to do and I think many other things will come along as other entrepreneurs and other companies jump into this business on the customer side of the meter.

MS. KIESLING: Jeff, I'm not sure how many people are familiar with GridPoint, but in your experience what are some of those potential opportunities? What have you seen that customers are likely to want to do with the information that they can get?

MR. ROSS: We've been involved in a limited number of pilots where we've looked at a lot of those pilots. Just for a 10-second background, at GridPoint we provide software solutions for utilities to help them manage distributed energy assets more efficiently and essentially be able to create almost virtual generation through those efficiencies. There have been obviously a number of pilots going on around the country looking at things like dynamic pricing and I think there are two ways to look at it. On one hand, a lot of these pilots are focused on ways to use things like dynamic pricing for example to help manage load, help a utility meet peak demand, and the things that deal with that on grid operations

and reliability I think have an immediate benefit. I think the harder part to deal with is, and this is part of what Cheryl talked about earlier, when you think about energy and conservation programs, how do you design rates that both benefit customers, but allow the utility to still make a return comparable to what they would on assets that have been rate based traditionally? That's where I think we still have a little bit of a regulatory-economic issue to work through because I think in some instances we haven't seen widespread adoption because we haven't been able to figure out how to provide the right incentives particularly to investor-owned utilities yet where they can still be profitable and be deploying those types of energy efficiency and conservation programs.

MR. MORGAN: I already touched on some of my thoughts about dynamic pricing, but let me add a point and respond to an allegation that actually I haven't heard today but people may have heard it in other places about how dynamic prices may be very difficult and unacceptable to customers particularly low-income customers, seniors, and so on, that many of these customers will not have the wherewithal to respond to price signals and they certainly will not react well to a price of $1.30 per kilowatt hour even if it's cheaper the rest of the time, but in fact there are a number of reasons to be that customers really will benefit. For one thing, the current flat rates/blended rates that we have now are anything but equitable, that if you're charging customers the same price around the clock, the fact is the power in the wholesale market costs more at some

times than others. When you're playing for a blended rate, hidden within that price is a very substantial hedge premium which is what the utility or your provider has to charge in order to guarantee you the same rate 24/7 and that hedge premium has been estimated to be somewhere on the order of 15 percent and possible more of your bill. Once we have widespread use of dynamic pricing which of course also involves having widespread of advanced meters, one of the benefits is the ability to design rates in a way that the customer can keep the benefit of that hedge premium that they're paying right now. The other thing is that low-income customers in particular tend to have more favorable load characteristics. Their loads tend to be less peaky on average than other customers which means that right now they're likely to be subsidizing the larger customers. So a lot of the kinds of reforms that we're talking about are really long overdue in my view and they add to the benefit side of the equation, not that there aren't costs and the costs of just installing AMI ubiquitously is still very substantial and really needs to be very carefully scrutinized by regulators, but it's impotent to understand some of these substantial benefits.

MS. KIESLING: Cheryl, would you like to jump in?

MS. HINDES: I'd like to add a few things about our customers and their reactions. We've talked about the fact that information is key. When we had our focus groups, customers said, and we had some specifically low-income focus groups, we really need these

programs. We need to find ways to save, so we'll do whatever we can to save money, and in fact they did. When we looked at some of our highest savers, one was a retired couple, I'm not sure what they did but they must have short of turning the circuit breaker, they reduced their consumption quite a bit when we asked them to.

The other thing I'll say is that I think one of the reasons why our program was effective is we provided information to customers right after they saved. So every time we had a critical event, we summarized the customers' information and we sent to them within the week so they were able to think back about what they did last Tuesday, for example, to save money and do the same thing next time or try to do even more. We included tips at the bottom of that information to show them ways to save and they really responded.

MS. KIESLING: So the immediacy of the information?

MS. HINDES: Yes.

MS. KIESLING: As moderator I wouldn't let Jeff give a plug for GridPoint, but I'll give a little plug for GridPoint. I did a demo with GridPoint a year ago, and I mention this because it really does encapsulate the comments and at least plants the seed in your minds of what's next. Right now when we do infrastructure investment and thinking about the potential capabilities that a smart grid infrastructure should have at the distribution level, future-proofing is a word you hear a lot when you work with the smart grid interoperability stuff. If you work in evolutionary

biology you think of it more in terms of allowing for adaptations, future uses of the capability in ways that you couldn't necessarily initially foresee. But one of the things in terms of future-proofing that I think we're all focusing on and thinking about as we're doing this is what happens down the road when we have embedded intelligence in appliances and we have fully transactive devices, so your water heater, your clothes drier, your refrigerator, your coffee maker, can be price responsive if you the owner choose to take advantage of that capability? I mentioned the GridPoint demo because not only is there the potential for customers in a very user-friendly way using the portals of companies like GridPoint to control and manage their own energy use in very simple, kind of graphical ways, that if you can program your TiVo you can do this, and programming your TiVo is easier than programming your VCR, I've lost all of my antiquated technology knowledge. But one of the things that really struck me was say for example you have solar panels on your home and it's a 2 kilowatt solar array on your home and that you could choose as a homeowner to set a rule where if you're on a dynamic pricing rate and you h have solar panels that as the day gets hotter and you've used up your capacity because you're running your air conditioner, you can set a rule to say once I've used up the capacity of my solar arrays, then start powering down my appliances that are using electricity, cycle off the condenser in my refrigerator and obviously turn up the temperature of my air conditioner. So as a customer you can autonomously have your devices respond to

balance your green/gray mix and that's a potential that I found really striking in that demo.

Lisa had mentioned that at the distribution level the key technology when we think about smart grid is the meter, but as the lead-in to our next question I will mention a couple of others such as intelligence in the substation and transformers, autonomous digital switching, phaser measurement units, there are distribution devices we can use autonomously to make the distribution grid operate without as much human intervention and operate more reliably because that becomes one of the really important questions, and this is a question directed to Rick, due to heavy consumption and long distances from energy sources, metro areas are prone to liability problems. How can regulation be changed to allow for distributed generation, micro grids and so forth in the metro areas that would relieve the pressure on the distribution network?

MR. MORGAN: Here in the District of Columbia, we know what it means to be at the end of the wire. We import over 98 percent of our electricity mostly from Maryland and to the north which is really where our primary interconnections are. Also we're about to lose our last two central generators which are slated for retirement in a couple of years. A few years ago we got a painful reminder of how vulnerable the nation's capital is electrically. A local generator shut down very abruptly because of an environmental dispute, and thanks to DOE and especially Larry Mansueti who spoke on the previous panel, we were able to keep the

lights on through that crisis and eventually got a work-around with a new transmission line.

At any rate, given these kinds of challenges we're obviously very interested in exploring creative means of meeting the District's electricity needs including nontraditional sources like distributed generation and microgrids. These technologies are potentially valuable resources, but neither of them do we view as a panacea. We have to be very careful about integrating them into the distribution grid. They have potential liabilities as well as benefits. With DG, for example, it's possible to have too much behind the meter generation in the wrong places that could wind up being a burden on other customers. The size and location has to be matched with the system's needs, so it's case specific. With regard to microgrids, they can offer reliability and economic benefits to individual customers, but as a regulator I have to make sure that the participants in the microgrids are not sponging off of the rest of the distribution system. So these things really need to be done very carefully on a case-by-case basis.

In my view, the key to doing this well is to send the correct policy signals. You need to provide incentives for customers to pursue DG and microgrids where they provide value added to the distribution system, but not where they don't, and the best way to do that is through policies on things like small generation interconnection rules, net meting rules and tariffs, standby and supplemental tariffs, and we're in the

process of working through all of those in D.C. right now. All of them need to be fair and nondiscriminatory, otherwise you end up creating a problem with cross-subsidies and resulting inefficiencies. Ultimately, and you probably anticipated this, I think we need to move toward dynamic pricing rate structures that send customers a signal about the cost of their loads and the value of modifying those loads at any given time. If we can get all these policies right, I think it will go a long way toward creating an economic climate where economic distributed generation and microgrids will come about along with also economic demand response and plug-in electric vehicles and more energy efficiency as well.

MS. KIESLING: We're all in violent agreement up here.

SPEAKER: I'll make a further comment also, just to follow-up on what Rick was saying. From a reliability perspective, today many utilities are using just simple load control programs as reliability programs, sending out a price signal to control air conditioners or water heaters, but the dynamic pricing programs are clearly another piece of the reliability puzzle and just another lever really to pull in terms of keeping the grid reliable. There are lots of different possibilities on the demand side as well as on the supply side.

SPEAKER: And I would add to that for some of our customers, about 22 percent of our customers do not have central air conditioning and so they would not be able to take part in some of the direct load control programs that have been mentioned, but they can still

reduce consumption during the 2:00 to 7:00 window perhaps by changing their window units or taking other steps. I'd also like to emphasize the fact that these dynamic pricing programs that really allow customers to save money by using less electricity when it's most costly to produce, that these are very important and they're enabled by AMI. It simply would be not cost-effective to have dynamic pricing without an AMI system. You could not deploy the kind of pilot that we deployed system-wide. It would not be cost-effective.

SPEAKER: I'll just add that I think the ultimate goal is to try to reach some level of grid parity for distributed generation and other resources. We're obviously a long way away from that and to get there we have to do a lot of work in terms of how we can optimize different asset classes and enable utilities to be able to do that very effectively.

I think where we are today is the utility has to be intimately involved in any of the technology selection and decisions about how distributed generation or microgrids will be integrated and operate into the grid. I also think localities need to really be providing the right incentive structures as the Commissioner was talking about and that's tricky today. You have places that have network grids like New York City where every time you want to put in solar PV you've got to put in equipment up to $50,000 just so that it doesn't have a negative impact on that part of the grid; other areas of radial grids it's a little bit easier. But I think ultimately it will come down to what are the right incentive structures for consumers

and for the utilities and how do we set that environment. For consumers I think we need, as we talked about just a minute ago, net metering I think is great to be pursuing. I think we need to look at tariff structures, everything from stand-by tariffs, we're not ready for it everywhere, but discussions about feed-in tariffs and how that would encourage interconnection standards still needs work. So there are a lot of things there. I think for the utilities as to how they look at that, I think further progress toward rate recovery on distributed generation assets, we're starting to see that now. It's not just something for consumers, utilities can participate in that as well. And obviously there has to be the right interconnection from the utilities' standpoint in order for that to all make sense.

I think there's a lot of work to be done. What we're seeing through more and more of is just providing increased visibility to what's going on at the edge of the grid is having a benefit both for I think regulators, utilities and customers to come together and have those conversations and begin to work those things out. Again, in the District of Columbia we have a rebate program for solar and you see similar types of programs around the country. So things are starting to come together, but I think we still have a little ways to go.

MS. KIESLING: We're going to stay with Jeff for our last question which is the take us forward. How is the plug-in electric vehicle likely to transform our lives?

MR. ROSS: That's a big question.

MS. KIESLING: And I did deliberately frame it that way, yes.

MR. ROSS: No, that's great. I think the question you were talking about what's the impact for consumers for the distribution network and then also for regulators? I think for consumers it boils down to a couple of things. First, I think it's an opportunity to be participating in ways to reduce greenhouse gas emissions and do something positive for the challenges we all face around climate change and electric vehicles certainly are a means to do that and a very good means to do that. I would also say for customers ultimately it will be a way to save money. There are lots of studies out, but generally I think it's accepted that the fuel costs are about one-fifth what they are for gasoline-powered vehicles. So particularly as we get further along in the deployment, I think there will be lots of opportunities to see ways that customers can save money.

The other piece I'll just throw out on the consumer side is I don't know how many have driven PEVs, but they really are fun to drive. I wouldn't have missed that point. I don't mean just the Tesla Roadsters and things, but when you drive one of these cars they operate a lot more efficiently, there are fewer moving parts, they're lighter, the engines feel more powerful. I think we'll see consumer adoption an unexpected area and consumers will want to drive them not just because they're new but because they also are responsive and perform well.

I think for the distribution network, one of the key things to think about here is it's going to be a localized effect, so if you look at how PHEVs have rolled out, what we've really seen is it tends to be very clustered. It's clustered not just in cities but within cities in certain localities and within localities even down to individual neighborhood and street. Efri did a study on this to show that if you looked at the distribution of PHEVs and then the effect on feeders, particularly feeders for utilities, it's very, very concentrated. So this is a way of saying it's a very serious problem even early on. You shouldn't think of it as let's see how many hundreds of thousands of electric vehicles we need operating accessing the grid before we've got stress situations. It really can occur a lot earlier with just hundreds vehicles in very localized areas.

I think that's one reason there's a bit of a (inaudible) I will say GridPoint does work in this area, but really having smart charging capabilities is very important and it's important for the utility because they've got to be able to manage the charging of electric vehicles as a load class the same way they would look at different forms of generation, the same way they would look at demand response programs, some of the things we're more familiar with, really electric vehicles are going to become another load class.

The other piece is just from a regulatory perspective, I think we need to be thinking about new tariffs and this goes beyond what I think we've traditionally wrapped our head around in terms of dynamic pricing

and even time-of-use pricing. I like to think of it as a Rate 2.0 approach that's a compact between the utility and the customer. From the utility side, the customer needs to expect that vehicle owners will have very good certainty about how long it will take to charge their vehicle and have parameters by which they'll know when that vehicle is charged. I think from the consumer side, the consumers have to be willing to be much more active participants in what goes on with their vehicle. Again, because I think we're going to need to have smart charging down to locational specificity, that's very different from things that we've had today. For example, you could see smart charging programs between the utility and customers that certainly involve pricing signals, I think even that involve emissions or greenhouse gas/climate change type signals which is as a customer I want to set my preferences so that I can charge with more renewable energy, or I can charge even when I know that the utility is going to be relying on natural gas as opposed to coal. So I think it gets more detailed than we have to date, certainly the ability for a green power program to be able to have a tariff that allows me to access more renewable energy to charge my vehicle, and then simply a lot of concerns from the utility side which is there needs to be an effective load management asset class and so there needs to be signals to consumers to understand that and say I'm going to participate when the utility has an emergency or match my tariff up with what the utility is going to need as well, and of course, there are all types of price implications for that.

It's an exciting new area. I think there is a lot of benefit for consumers, for utilities, for the environment, but I think a lot of these things will need to be worked out beyond just getting vehicles out there, getting charging stations, et cetera, out there, and just letting everybody have at it.

MS. KIESLING: Again we're in violent agreement. I actually put this question on the list. The other thing that strikes me is there's a duality associated with the PEV. Everything in our century of experience with consuming electricity is very monodirectional. But once we have PEVs, not only do they consume electricity, but they can then become a network of distributed storage because that electric is storing energy that could be used at some other time by someone other than you driving your car. Similarly, it makes you the vehicle owner potentially both a buyer and a seller, and for people younger than I have who have grown up both buying and selling on eBay, this is going to be natural, and having business models and having regulatory institutions that can accommodate that evolution and adapt to the technological change is going to be really important.

SPEAKER: I was going to make that same point. I know, we're all saying the same thing here. This is a quote from the had of PJN, Harry Boss, who describes PHEVs as a match made in heaven with the electrical grid. When you think of it as a storage device and not just a load, then you have this potential revenue stream coming out of the

storage capability that makes it much more economical. These things may actually become widespread a lot sooner than we think because of that value once people recognize how they can be integrated within the grid even if you're using it to commute to work every day. It can still be a storage device whenever it's parked and that's of tremendous value. That's not to minimize the challenges of the logistics of coming up with the charging stations and making sure that everybody doesn't charge them all at the same time or at times when you don't want them. But those are all things that I'm confident that we'll be able to work out.

MS. KIESLING: Let's open up to questions. Yes, sir? I know we're running a little short on time, so I would like to encourage you all to be brief and picky in your question.

MR. RAFFERTY: Scott Rafferty (inaudible) I just had a couple detailed questions on the demand side management program. You mentioned that the $1.30 dynamic pricing, Cheryl, let people to consume more electricity and that just seems very counterintuitive that you would obviously have a strong incentive to avoid in peak and people would actually invent new ways of using electricity in off-peak because of the incentive. Also could you give us a little detail on what happened to their bills? Were there people in this population that had bill increases? The other thing Lisa mentioned was that after you install this smart meter she was assuming there would be the option of continuing a flat-rate policy. I just wonder why given the granularity of the investment decision

you wouldn't try to target people who were enthusiastic about conserving energy and whether you might also have cooperative investment situations with homeowners to get really smart meters. The puzzle to me is when I was at the Maryland Public Services Commission 20 years ago we had a very painless and passive program to interrupt air conditioners four times a year with enormous incentives, and we really haven't progressed very far from that. It seems there's a lot of scope to turn practically everything except the freezer and the TiVo off when you're not there. Thank you.

MS. HINDES: Thank you. I hope I can answer all your questions. You may have to remind me of them. If I skip something, let me know.

I didn't mean to imply that moving forward assuming we get Commission approval with AMI and dynamic pricing that we would have a flat rate. What we've actually proposed is a two-tiered plan with use rate with a peak time rebate associated with it. This is my own view and I think it's shared by others at BGE, it's not a corporation, the customers may start with a key time rebate but some customers may be better with a critical peak pricing program. For example, in our second summer we had a customer who installed solar between the first summer and the second. They were not able to save much because their typical consumption was already very low under a peak time rebate, so we would like to be able to offer customers like that a dynamic pricing program.

Back to the $1.30 rate. That was our dynamic peak pricing rate. Typically, the customer's rate is 14 cents and that's the traditional rate that we have for most of our customers at BGE in 2008. For this particular group of customers we kept that 14-cent rate during weekdays from 2:00 to 7:00 p.m. which is beyond peak price. We raised it to $1.30 on 12 days when we had a critical peak period when the demand was higher than normal or pretty high. All of the other hours except the hours of 2:00 to 7:00 on weekdays, they had an off-peak rate of 9 cents. We did see modest increases in consumption and I believe it's because customer were using more during those 9-cent hours, and I'll indicate that's about 85 percent of the summer hours that they actually had a 9-cent rate rather than a 14-cent rate.

So that's what we experienced. Could we give customer incentives to try to get them to conserve all summer long? That would be our goal, and that would be our goal whether they're on peak time rebate or dynamic peak pricing. Did I leave something out?

MR. RAFFERTY: (inaudible) revenue positive?

MS. HINDES: What about those customers? The rates are designed to be revenue neutral in that if customers did nothing, the typical customer should see the same rates. Not all customers are typical. For a few customers with dynamic peak pricing, their rates actually did go up. It was a handful. We had about 250 customers on that rate and I think it

was less than 10 that the rates actually went up. So they were able for the most part to do something to reduce their rates.

MS. KIESLING: Scott?

MR. BERNSTEIN: Scott Bernstein, Center for Neighborhood Technology, Chicago, and we've been operating various kinds of real-time pricing experiments with residential customers and in two cases with whole communities for 6 years now.

I want to go back to Lynne's original framing which I think didn't get quite enough attention on the Adam Smith question on consumption versus production.

MS. KIESLING: (inaudible) industry.

MR. BERNSTEIN: It seems what you're all saying is that there's an opportunity here to turn all consumers or all customers into at least part-time producers. Secondly, on your locational point, there may be some good news in that. After all, if you want to relieve stress on an overloaded part of the system you'd better target it. You don't want to spread your investment area-wide, so there's a community stake in this too. I wonder if perhaps the key to all of this isn't the unbundling of the metering and the information function; further unbundling. We've unbundled wires and generation, but without the unbundling of the metering most customers don't know what they could have. They don't have information about their own smart distribution or consumption or their load profile, and they don't have the information about what's possible.

Could we imagine as a further evolution of all of this one that might make the smart grid take off in a hurry, sort of a massive opportunity disclosure here or what's there? After all, we've saving money. We're saving a lot of money for people in these things. In our particular experiment we're outperforming the time-of-day kinds of pricing because we're giving people real-time prices which change every half-hour, so we're giving them an early warning. We've giving them tomorrow's prices disclosed today so that they can look ahead. What's really interesting is opposed to the autonomous stuff, we're actually getting higher participation and higher savings from the people who are paying attention. Maybe that's self-selection. I don't know. Walter Lippmann once said democracy means paying attention, and maybe that works in markets too.

What do people think about this further evolution of the information function and giving people more choice and more opportunities to organize around this stuff?

SPEAKER: Scott, there are a number of states that at least in principle allow unbundling. It's true here in the District of Columbia, but we haven't had any takers for competitive metering is what we call it. I believe the same thing has happened in New York where they've made an announcement that anybody who wants to go into the metering business can do it. Obviously it would be important to set up rules in a way that make it competitively neutral, but I think one of the reasons is that it hasn't happened, and that doesn't mean it won't, so far there just hasn't been

that much reason to do it because there isn't that much to be gained. Maybe once we start talking about more complicated metering and a smarter grid there may be more opportunities and maybe we'll eventually get there.

MS. HINDES: We have had competitive metering in Maryland since we had restructuring in 2000. To my knowledge, there haven't been very many participants or takers, but it could be because we don't currently have the kinds of rates that would support much.

SPEAKER: Chicken and egg.

SPEAKER: Yes. I would just say if competitive metering is the issue as much as competitive provision of information, and I think you are starting to see that. You're starting to see utilities offering different programs through a portal or information devices that can be placed in the home, you're starting to see large technology companies like Google and Microsoft and a whole group of start-ups offering products through the utility that will do that, and some are actually offering direct to the customer. So I think we'll see evolution of that, and again that ties into everything we've been talking about which is really empowering the customer with energy awareness and information which then enables them to be a participant in this, and I think we've all been saying that that's critical.

MS. KIESLING: Actually, Scott, I can interpret your comment as being an argument for retail competition where the consumer owns his or her own data.

MR. RAFFERTY: Absolutely (inaudible)

SPEAKER: Fell free.

MS. KIESLING: More questions? There's a microphone coming your way.

SPEAKER: I was wondering if you could explain more exactly how does decoupling work. I understand the basic concept, the power companies are not paid on the amount of power that they're producing but on something else, but exactly is that something else? If I understand correctly, Maryland already has it, so what is it that they're doing in Maryland and what are they considering in D.C.?

MR. MORGAN: Why don't I start and Cheryl can talk specifically about Maryland. It's not necessarily about the producing of energy, it's about how you charge for the throughput in the system. In our case in D.C. our electric utility PEPCO is a wires-only company, but they charge for delivering electricity to everyone. That's still a monopoly in D.C. and it's still a monopoly everywhere in the U.S. as far as I know for the distribution of electricity. They charge per unit, usually per kilowatt hour of electricity, and the company delivers less energy to the consumer, they actually take a hit on their bottom line because that's less revenue for them but they still have essentially the same fixed costs to cover. If you

instead allow the per-kilowatt hour rate to float a little bit, you can ensure that the company will take in exactly the correct amount of revenue whatever the amount of revenue was that was approved by the Commission say in the last rate case, and this is usually done on a per-consumer basis. That's the way we're exploring it in D.C. and I think that's how it's done in Maryland.

Then what that does is it makes the utility indifferent to how much they sell and the consumer's rate may float up and down a little bit, but bear in mind that if there's a very hot summer for example when they use a lot of energy, what the decoupling mechanism would do is actually lower the rate a little bit and has the effect of tending to stabilize customer bills over time rather than cause them to be more volatile. But the main point I think you're getting at is that it removes a disincentive on the utility's part toward efficiency by their customers and makes them at least neutral. There also are additional mechanisms you could apply that would provide a positive incentive for efficiency. That's something that California is doing now after having had decoupling in place for most of the last 20 years. Cheryl, I don't know if you have anything to add to that.

MS. HINDES: I'd like to mention that we decoupled our gas rates several years back. It's in our tariff as rider eight if you're interested in looking up some tariff language. On the electric side, rider 25 was put into place recently and it was our goal in working with our Commission to get rider 25 for electricity in place so that we could remove any

disincentive from our conservation programs. We wanted to support the Empower Maryland goals and reach the 15 percent but not take a 15-percent hit on our distribution rates.

SPEAKER: I want to just add one more thing to this because if you're not familiar with decoupling, it's a little bit weird because of the rate making mechanisms that are in place and because of the way utilities recover their fixed costs. So in the end it's just a (inaudible) mechanism to make utilities whole in terms of their revenue and to remove a disincentive to say energy. But it's really in a sense a response to the way rates are set which have a variable component in fixed cost recovery, so it's a way to deal with that.

MR. YONG: My name is D.J. Yong and I am from Duke University. I have been looking at several types of (inaudible) battery technologies (inaudible) agree that sodium and sulfur (inaudible) battery, they usually cost about 10 to 20 cents per kilowatt hour (inaudible) when I look at the price (inaudible) between the price they pay for (inaudible) peak price is often over 50 cents or over one dollar per kilowatt hour. So I wonder (inaudible) (inaudible) and a related question is that there is a lot of discussion about using (inaudible) that essentially is to use the lithium battery (inaudible) battery. And compared to others batteries, lithium batteries are much more expensive. If other batteries cannot compete, how can we (inaudible)

MS. KIESLING: Battery technology. Jeff?

MR. ROSS: I can talk a little bit about that. I think I missed the very end of your question. I guess the answer is it is starting to happen. There are a number of projects going on looking at storage throughout different parts of the grid, grid scale, community level and distributed storage we were talking about a little bit earlier. Prices are coming way down in part fueled by development of batteries for electric vehicles and the technologies are improving. So I would say that we're aware of more than a dozen pilots around the country, a couple that we're involved in using for example a couple of 1 megawatt sodium sulfur batteries that would be collocated next to a wind farm so that you firm wind as a resource that would be predictable and reliability for the utility, and you're starting to see more and more of those types of projects. You're also seeing community energy storage battery technologies that would be more like 500 kilowatt type pad mounted devices that would help provide backup ancillary services for a number of homes. So it is starting to happen, and again that's really being driven I think by advances in battery technology as well as the costs coming down and also I think recognition that there are a lot of benefits in addition to load shaping and shifting that the utility can benefit from like ancillary services.

MS. KIESLING: One last question.

MR. GERARD: Thank you. David Gerard from the Rockefeller Foundation. For full disclosure, I'm on the Board of Advisers for GridPoint.

MR. ROSS: I didn't stack the audience.

MR. GERARD: My question really relates to the bridge between this conversation and the previous one, the smart grid distribution level and the national backbone grid. It's clear that the technological capabilities we have now in terms of being able to get a very granular sense in space, in time, by customer load, by customer class, exactly how energy is being consumed and produced if you have distributed systems. Google has some phenomenal technology that's yet to be announced which I got a preview of a couple of weeks ago, a huge prodigious enhancement of Google Map that has enormous applications I think to the both smart grid and the smart national grid. How do you then from your perspective see the case for transmission as emerging from this very rich, very disaggregated information base that we now has on customer consumption, because clearly now one has powerful tools for load forecasting as well that one didn't have before because of the capabilities? What kind of conversation is taking place especially with folks like Rick between regulators at the state level and FERC on how to make the case for long-distance, high-voltage transmission?

SPEAKER: From the earlier panel I think you probably heard Chuck Gray who is the Executive Director of NARU say that obviously there are different viewpoints you're going to hear from different states and it's very much a live conversation certainly within NARU given the have-not versus haves states and so on. It tends to break down that

way, but I think there are certainly a lot of state regulators as well as at FERC, and you heard Jon Wellinghoff this morning, who are interested in taking a broad view of this and recognizing that with rapid changes in technology, the whole way we look at all of these things is changing. I've been hearing people say for example that as some of these smart grid technologies emerge, the distinction between wholesale and retail parts of the business are beginning to blur and that's going to create a bit policy challenge because at least up until now we've had a fairly bright line between retail and wholesale. In fact, retail electricity is purely in the purview of the states, wholesale is purely within FERC, and there is no secret that in recent years there have been more and more circumstances where we've been talking about how to keep from stepping on each other's toes and that seems to happen more and more often.

I'm not sure I really answered your question other than to say I think this is something that is on our minds as regulators and there will be more and more of these kinds of questions coming up.

MS. KIESLING: Lisa? I'm going to say to you what I said to you before if you don't jump.

We were having a little conversation before from an economist's perspective thinking in terms of economic efficiency and the theoretical construct of maximizing social welfare, the thought about building transmission when prices and values are so opaque to the end user. Isn't that just putting the cart before the horse? And that the

granularity that you referred to very insightfully and dynamic pricing combined I think is going to enable us as consumers to reveal our preferences in ways that have dramatic implications for massive and expensive nationwide infrastructure investment. So I think looking at the consumer preferences and working in to transmission as opposed to the kind of producer-oriented top-down way that we have been doing for the past century in this industry is my take on it, but as Rick said, the conversation is going on.

We're past our time, so please join me in thanking our excellent panelists.

MR. PUENTES: I completely made mincemeat out of my notes and I thought I knew what I was going to say. But I think as I've listened to this conversation, I was struck by how well this fits into this large frame that we like to apply to these sticky areas of policy which is lead, empower and maximize. When we talk about leading, I think we heard from the beginning that we do need the federal government to be really engaged in this issue. This is something that does I think merit national priority and the federal government really does need to be present in this issue.

We heard from the Chairman about expanded FERC authority for planning and siting cost allocation. I think a lot of those details are emerging. Some of that I think we heard answers to, some of I think are still be determined, we still need this national plan for the

transmission lines. The first panel also called on the federal government to lead in other areas. We talked about carbon reduction for example, and then allow innovation to occur at the state and metropolitan levels. Related to that I think leadership also means having the federal government get out of the way in certain and is not going to do everything. We don't want the federal government completely present, like this notion of the federal government being a backstop in these planning, siting and cost allocation areas that I thought was very interesting. But empowering also means not picking winners and losers, and I thought that was a very interesting part of the conversation as well.

In terms of maximizing, I think the whole third panel really was about maximizing, how do we really get the best bang from the buck from this investment. It's all about getting the incentives right. Cheryl talked about what they do in Maryland when you get the kinds of incentives. Pricing is a huge piece of maximizing the smart grid. That might be intuitive to a lot of folks, but I really was struck by that as being a very key part of the conversation, and we heard this in connection with the electric vehicles piece which I thought was really just fascinating as well, and Scott's piece about information I thought was right on as well.

That's probably a corruption of the really rich conversation that happened here today and you probably have your own takeaways, but this is an area where we plan to get into much deeper at the Metropolitan Policy Program. Clearly I think there is more to do, but this

discussion really keyed that up very well. I have tons and tons of questions and places that I think we need to go with this. So as this evolves, please stay engaged with us at the Metro Program and please stay engaged with the Energy Security Initiative.

In closing, let me thank the Rockefeller and Cerna Foundations for their support of our Metropolitan Infrastructure Initiative and also to the members of the Metropolitan Leadership Council for their support of our overall program. Let me especially recognize Emilia Istrate for helping organize the event along with Lea Rosenbohm for providing the intellectual support and the enthusiasm for pulling this together. I felt the enthusiasm in this room was palpable today and that was great.

Thank you all for sticking around. Have a great, have a great afternoon, have a great weekend.

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I, Carleton J. Anderson, III do hereby certify that the forgoing electronic file when originally transmitted was reduced to text at my direction; that said transcript is a true record of the proceedings therein referenced; that I am neither counsel for, related to, nor employed by any of the parties to the action in which these proceedings were taken; and, furthermore, that I am neither a relative or employee of any attorney or counsel employed by the parties hereto, nor financially or otherwise interested in the outcome of this action.

/s/Carleton J. Anderson, III

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