QUADRENNIAL ENERGY REVIEW

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Quadrennial Energy Review held at the New Jersey Institute of Technology, Campus Center Ballroom, 150 Bleeker Street, Newark, New Jersey 07103, commencing at 8:49 a.m., on the above date, before Jennifer P. Miller, Certified Court Reporter #30X100234100, and Notary Public for the State of New Jersey.

A P P E A R A N C E S

Peggy Welsh, Program Director, Energetics Incorporated, Moderator

Dr. Karen Wayland, Deputy Director for State and Local Cooperation in the Office of Energy Policy and Systems Analysis, Department of Energy

Dr. Joel Bloom, President of New Jersey Institute of Technology

Dr. Ernest Moniz, U.S. Secretary of Energy

Jimmy Glotfelty, Co-Founder and Executive Vice President of External Affairs, Clean Line Energy Partners

William White, President, Norton White Energy

Michael Kormos, Executive Vice President for Operations, PJM Interconnection

Kurt Bilas, Executive Director of Government Relations, Midcontinent Independent System Operator

Joseph Welsh, Chairman, President and CEO, ITC Holdings Corporation

David Mullet, CEO, Vermont Public Power Supply Authority

Betty Ann Kane, Chairman of the District of Columbia Public Service Commission, Board Secretary for the Eastern Interconnection States Planning Council

Ashley C. Brown, Executive Director of the Harvard Electricity Policy Group

Steve Corneli, Senior Vice President, Sustainability, Policy and Strategy at NRG Energy

Ralph Izzo, Chairman, Chief Executive Officer, Public Service Enterprise Group Incorporated

A P P E A R A N C E S

Thomas A. Fanning, Chairman, President and Chief Executive Officer, Southern Company

Gregory J. Starheim, President, Chief Executive Officer, Kenergy Corporation

Garry A. Brown, Commissioner, New York State Public Service Commission

Sean Trauschke, President of OGE Energy Corporation

Scott Prochazka, President and CEO of CenterPoint Energy

David Hallquist, CEO, Vermont Electric Cooperative

Wes Kelley, Executive Director, Columbia Power & Water Systems

Damir Novosel, President of Quanta Technology and President-Elect of IEEE Power and Energy Society

Dianne Solomon, President of the New Jersey Board of Public Utilities

Jennifer Chen, Esquire, Sustainable FERC Project

P R O C E E D I N G S

MODERATOR WELSH: This is the Quadrennial Energy Review hosted by the Department of Energy. My name is Peggy Welsh. I'm with Energetics Incorporated. We are a technical support contracting company to the Department of Energy.

And I am very honored to be your facilitator today. We want to welcome everyone in the room and welcome those who are watching us via live stream. We've got a very terrific set of speakers for you today.

But we also want to hear from everyone who is in the room. And those of you watching, we do have a website in which we'd like to have your written comments, that is qercomments@hq.doe.gov. Please submit those comments because the comment period will end on October the 10th.

All of those comments will be reviewed and considered and will be part of the analysis of this report.

One of the things that I want to talk about today is the purpose of our meeting. Pursuant to the Federal Advisory Committee Act, the purpose of today's meeting is to ask for your

individual or your organization's input regarding the Eastern half of the United States transmission and distribution systems and provide a forum to exchange information.

To that end, it would be most helpful to us for you to provide these recommendations and information based on your personal experience, your individual advice, information or facts regarding this topic.

The object of today's meeting is not to obtain any group position or consensus. Rather, the U.S. Department of Energy is seeking as many recommendations as possible from all individuals at this meeting.

So, with that, it is my honor and pleasure to introduce Dr. Karen Wayland from the Department of Energy.

DR. WAYLAND: Thank you, Peggy.

In January, President Obama issued a presidential memorandum directing his administration to conduct the first ever quadrennial energy review. The Secretary will speak much more in depth about that, but I just wanted to give you a little background to kick the meeting off.

The Quadrennial Energy Review, the goal is to identify threats, risks and opportunities to the nation's energy infrastructure, and to make recommendations for federal action to enhance our national security, our economic productivity, and to protect our environment.

We are working on the first installment of the QER, as we call it, which will focus on energy infrastructure. But this first installment in January will be looking specifically at transmission storage and distribution energy infrastructure.

As part of the presidential memorandum, there was a paragraph that directed us to do extensive stakeholder outreach. As Peggy mentioned, this is the 12th meeting that we've done around the country. We have several more that we will do before we wrap up and close public comments on October 10th.

And to that end, we're very fortunate to have the New Jersey Institute of Technology hosting this 12th meeting here. We're excited to be focusing -- we did a meeting on electricity in Portland, and this is the other half of that meeting here in the East Coast.

I'd like to introduce Dr. Joel Bloom, who is the President of New Jersey Institute of Technology. He joined the Institute of Technology in 1990, and has served in a variety of capacities from vice president for academic student services to the first dean of the very prestigious Albert Dorman Honors College, and now is the president. He's also the chair of the Science Park Board, and serves on a variety of other boards. He also has been an educator and administrator in the New York City Public Schools.

So I want to thank you for hosting us, and we look forward to your welcoming remarks.

DR. BLOOM: Thank you, Karen.

Welcome to NJIT, New Jersey Institute of Technology, and the City of Newark. A lot of people don't realize the City of Newark is a home of higher education institutions. On a daily basis, we have about 55,000 students, staff and faculty in the city between NJIT, Rutgers Newark. Rutgers now has the medical complex as well. It was previously University of Medicine and Dentistry. And we have a county college. We all work in partnership, which is, I guess, a little bit of the theme of today.

The QER is clearly a partnership to improve what we're doing in the field of energy, and I'll make some other comments about that shortly.

NJIT has been on a growth trajectory for several years now. We have an enrollment this past fall of over 10,500 students. We're growing our enrollment. When I came here, it was just over 5,000. Because demand for our students fair exceeds the supply, students graduating in the past couple of years have had three-plus job offers with very nice compensation packages.

University, in fact, was founded here in the city in 1881 in response to industrialist needs for educated technical work force. So we've been on that mission now for quite a number of years. We're growing the institution as well in our area of research. We are now doing a little over $110 million in research.

As the Secretary and I were talking earlier -- and you probably know his background, he's MIT -- among the 34 polytechnics, Mr. Secretary, yes, MIT leads in the field of research expenditures. But we're -- we're a very large dollar gap. We're about fourth or fifth generally

of those 34 polytechnic institutions. So I don't think we're quite closing the gap, but we're a competitor.

Our areas of research particularly focus on the whole field that's emerging of the convergence of science, technology, the health and life sciences.

We looked carefully at the Beryl Institute, in fact, which is the cooperative effort between Harvard and MIT and Mr. Beryl, who's been a very generous benefactor up there. And we are, in fact, creating some of that here in the City of Newark.

I mentioned we have a very significant medical school and what's now RBHS or Rutgers Biomedical and Health Science University. NJIT delivers on the science and technology. Another area of our research is the Internet of everything. It's obvious it's all around us, it's on us, in our pockets, and some of our wearables these days.

The third area that overlaps somewhat the QER is about is the whole issue of sustainability. And we've had a bit of a history and work in that area in 2011. We competed in the

U.S. Department of Energy Solar Decathlon. We brought our very heavy, but unique, concrete solar house down to D.C. We competed there. We were one of the finalists.

This past year, we partnered with a university in China and participated in the China Solar Decathlon. We feel that's a great way to introduce our students to the whole issue of alternative, renewable energy and solar energy, as well as bringing architects, engineers, mechanical, electrical engineers, civil engineers, together on a project that's as critical as this is.

Other areas of energy education, our research that we focus on here, resilient infrastructure, design solar cell technology, controlled delivery of power grid, and battery development and storage.

We are, in fact, partnering with China International Engineering Company to develop the next generation of thin film solar. The controlled delivery of power grid delivers -- focuses on delivering small loads of delivery based on demand.

Fourth mission element of this

institution, beyond the education, the research that is typical, and, of course, the services, economic development, NJIT is home to one of the largest and oldest technology incubators in the country.

Right across one of the avenues here, we have 90 incubator companies. They do a little over $80 million in expenditures. Again, they integrate about 300 of our students. One of the companies there is smart grid or -- focusing in particular on -- I'm sorry, Wattlots is a leading designer of solar arbors and integrated PV.

This past year, we launched a -- taking a page out of Georgia Tech and MIT, and we launched a separate corporation just to work with business and industry in the development of those three research and education areas that we mentioned.

We are currently partnering with Panasonic, Cisco, Virgin International, JPMorgan Chase to bring technology, to increase commercialization, and help in fields such as I've outlined, including energy.

We also just finished a significant grant of -- finishing up a significant grant

opportunity with the

Department of Defense on something called market share: How do you continue to use what the defense department -- what the defense department has contracted with for major -- with major companies and bring it again into the commercial sector?

So we are very focused on some of the topics that you're discussing here at the QER. We're obviously very concerned about the whole issue of energy.

I learned just a couple of weeks ago in the meeting, for example, with PSE&G -- and I shared this discussion a little earlier this morning with the secretary, and his reaction was as astonishing as mine was when I heard it -- 30 percent of the citizens of the City of Camden do not have power today as we speak.

Now, again, just to define that a bit, yes, there's connectivity to the home, we know that. They're living in the homes, they've confirmed that. But yet the issue of affordability prevents them from having power to their homes.

And we know about the international --

the global competition and the other statistic that continue to come across. Two billion people in this world of ours, on this globe, do not have access to power. Two billion.

So they have this medieval kind of existence. And as we look around, and we can talk about the conflicts of oil, the conflicts of energy, the challenges are great.

I know your topics are much more focused here. We wish you, Mr. Secretary, and the Panel Godspeed in helping us with these very complex problems. Thank you very much.

DR. WAYLAND: Thank you, Dr. Bloom.

It's my distinct pleasure and honor to introduce the U.S. Secretary of Energy, Dr. Ernest Moniz.

He was confirmed by the Senate in a rare feat, 97 to zero, so he brings unique qualifications to the job. Prior to his appointment, he was on the faculty at MIT. He was the founding director of the MIT Energy Initiative, and was the director of the MIT Laboratory for Energy and the Environment. He was Under Secretary of Energy during the Clinton administration, as well as serving in the White

House Office of Science and Technology Policy.

When he was at MIT, he served on a number of boards in different capacities. One of which he served on was the President's Council of Advisors on Science and Technology. And it was in that role that he helped co-author a report that actually made a recommendation that the Administration should conduct a first ever Quadrennial Energy Review. So he set it in motion and now is bringing it home.

So Dr. Moniz, Mr. Secretary.

SECRETARY MONIZ: Thank you, Karen, for the introduction. There are doubts as to whether a recount of that vote would come out the same way after a year and a half on the job, but we will see.

And, President Bloom, also thank you, first, for the hospitality of hosting this meeting here. I'll get into some of the issues in terms of how we are structuring this QER and what brings us here.

But, first of all, I have to say, at a personal level, it's great to be back in an academic environment, especially an engineering school. I'm now retired from MIT. But, of

course, substitute Massachusetts and New Jersey, we have the same names.

And, in fact, it's kind of -- actually, maybe you don't know. Maybe you do; maybe you don't that you obviously know that you were originally called Newark Technical School. You may not know that MIT started out as the Boston Technical School before moving to Cambridge early in the 20th century and then acquiring its new name.

So there's a lot of parallels there under the research funding. I recommend you plot it on a large scale; it will look a lot closer.

But it really is great to be here. And I'm going to say another thing, you know, our schools -- our school is not my school anymore. But MIT and New Jersey Institute of Technology were both products of mid to late 19th century.

And it's kind interesting that it was a period of really industrialization, industrial revolution, and it was a period of tremendous innovation in the educational system.

To two major directions, the establishment of the land-grant university system, and the beginning of these polytechnic schools, if

you like, all focused on bringing science and engineering in solving real problems. So I think that's a history that brings us to today in fact.

And energy in particular, with energy frankly booming in this country, energy providing clearly not all, but a very substantial fraction of what President Obama refers to as the ladders of opportunity to the middle class, et cetera. And, in fact, engineering has historically played that role of a tremendous way for upward mobility in our society.

So I think that's a great story for New Jersey and Massachusetts Institutes of Technology. In fact, President Bloom this morning, he referred to some of our discussions, and he referred to a recent graduate being well compensated. He must have told me three times this morning it was $101,000 a year for a fresh bachelor's degree going into the energy business. So that really does bring all of these things together.

Let me say a few words about the QER and then a few words about the kinds of questions -- although, you have with you -- I presume, you all have with you the white paper prepared for this meeting, including some very specific questions,

but let me say a little bit more than Karen did in terms of the Quadrennial Energy Review.

Its origin -- well, as she said, it was initially recommended in a report of the President's Council of Advisors on Science and Technology, but then committed to by the president in the Climate Action Plan of June 2013. The -- clearly, that was emphasizing climate and the role of modernizing, updating our approach to energy at the federal level, and in consultation between the federal government and the -- and states and localites and regions.

But I want to emphasize, as has always been the case in the plan, it's not just about addressing environmental issues and climate issues. Those are certainly critical issues for us to address, but, of course, energy security is another critical area, which has different elements.

There are energy security elements, for example, around what's happening today in Ukraine, Russia, our allies and friends in Europe. But there are also domestic security issues such as risks to our infrastructure, risks from cyber attacks, risks from physical attacks, as well as

other issues we'll come back to, such as extreme weather. And people in this part of the country don't have a particular hard time, I don't think, going back several years to remember Super Storm Sandy and its implications for energy infrastructure.

And third, of course, the issues of energy and the economy: Jobs, manufacturing, new manufacturing capacity, another of the president's major thrusts. Those are all elements that must come together in this Quadrennial Energy Review.

Indeed, the motivation for the Quadrennial Energy Review is precisely that, while we are the Department of Energy, essentially, almost every other department and agency in the -- in the government has major equities in energy, whether it's Defense, State, Commerce, Interior, Treasury, Agriculture. We could go on and on. They obviously all have major equities.

And so the basic construct of this review is to have the White House under the leadership of the Office of Science and Technology Policy and the Domestic Policy Council convene this multi-agency Quadrennial Energy Review, but then, of course, to have the Department of Energy

with its specific capacities, for example, in policy and analysis to serve as the driver, as the executive secretariat, if you'd like, of, first of all, addressing the organization of the process, but perhaps more importantly, also providing the analytical capacity to address the various issues.

Now, addressing those issues cannot be done however just at the federal level. We all know that the energy issues in our country are very, very different in different regions. And so right from the beginning, the directive has been from the president to go out to various parts of the country to garner input.

This meeting today, which is our 12th in a series of what will probably top out at 14 regional meetings, is designed to get out and collect information on focused topics. And we'll go back to that today.

But, again, this outreach is because regional issues are extremely important to discuss energy. And secondly, a lot of the authorities in many parts of the energy sector, certainly including energy infrastructure, reside at the state level. And so, while we obviously are interested most specifically in what we in the

federal government can do, what I want to emphasize is, what we can do is not simply support technology development, develop policies at the federal level, but it's also to work cooperatively to provide technical assistance with states and regions as they each develop their energy response to the various challenges that the country faces and that their regions in particular face.

The choice for this year -- I should say, well, first of all, the choice was made that although this process is called quadriennial -- and there were a variety of reasons for thinking a four-year cycle -- it does have a certain parallel to our political process -- has merit. What we did not want to do and do not want to do is in some sense go into a closet for four years and then come out with a wonderful document.

So the idea is, as we think about a four-year cycle, that we want to have focus areas and products along the way. And specifically for this first year -- and this was in the president's Climate Action Plan already in June of last year -- the choice was made to focus on energy infrastructure in the first year, the transmission storage and distribution of energy:

Electricity, fuels, you name it.

That was viewed obviously in June of 2013 as a -- as an appropriate choice. Events since then have only reinforced them, and I don't mean just in electricity, but we know the issues that swirl around things like transporting oil by train, for example, would be an issue. We can go through the cold winter and what it meant for the Northeast. You may have seen a little spike in natural gas prices, for example, largely connected to infrastructure challenges. Propane, especially in the Upper Midwest, infrastructure challenges.

So these infrastructure issues are really have proved to be extremely timely, and that's what we are focusing on as we go around to the regions with these public meetings asking for input from panelists, but also from individuals, as Karen said, the -- we are focusing each of these on a particular area. And was said and as you all know, today's is on the electrical system.

This is a case where we had two meetings -- including today's, we will have had two meetings on electricity; one in the West, one held in Oregon at our DOE's Montavilla administration, and then the second here in New Jersey, in the

Northeast. Once again, two parts of the country which have major electricity system challenges, but also have some very different challenges in these two parts of the country: Different regulatory structures, you name it.

So that's really -- that brings us, as we say, to today's meeting. And we do have a number, in addition to Karen, DOE staff here today who will be listening carefully, hopefully engaging with you in some dialogue.

So let me say a few words now about the electricity sector and today's meeting. Maybe going back to this -- to this discussion earlier about engineering and New Jersey and Massachusetts Institutes of Technology and other polytechnics institutes across the country, to say that many of you surely remember that in 2000 the National Academy of Sciences, I think, surprised a lot of people when they labeled electrification as the major engineering achievement of the 20th century.

You know, a lot of technology in the 20th century, some very spectacular technology, you know, rockets, computers, lasers. You could go on and on. But electrification was chosen as the greatest engineering achievement, combining

the idea of the technology sophistication, kind of a continental scale synchronized system, delivering electricity most of the time, with combining that with the ubiquitous impact in terms of what -- well, we just heard a little unfortunate story from the President, President Bloom, about Camden. But at least almost everybody receiving almost all the time, again, ubiquitous services, whether it's for lighting a house, for industrial applications, for entertainment, you name it, everything we do.

So that was -- that's a pretty remarkable story. And it also then leads us to expect that electrification will, if anything, be more important in the 21st century. And we know that electricity, within the energy system, in fact, is an increasingly dominant part of the energy picture for lots of reasons that you know as well as I do.

However, we also know that the 21st century challenges look different from those in the 20th century. And, of course, what we're talking about is preparing how do we guide or assist or remove obstacles for the private sector in terms of developing at least the majority of

the energy infrastructure in this country.

And here, I would say, ironically, because infrastructure investments are so massive, are so long lasting, ironically, perhaps all of that success of the 20th century also provides some obstacles to change as we go forward. It is not easy to change a system of this sophistication, this massive interrelated set of technologies, policies, regulations, et cetera.

So that's really what -- when all is said and done, that's the core of the questions that we would like to get answers to: How do we move to that 21st century infrastructure that's economical, that enables us to address our environmental challenges, such as delivering large renewables over large distances, as one example, and that is resilient to an integrated set of risks from extreme weather, which we anticipate more of as the planet warms, cyber, physical threats. Many of you or most of you, I'm sure, have followed the story about some of the physical threats to some of our key notes, geomagnetic threats, space weather, as well as ground weather, and the very interdependence of different infrastructures: Electricity, fuels, information

technology in terms of risks to the system.

So that's really the question, how are we going to go forward, and most especially, again, what can we in the federal government do directly and indirectly by working with states to get there. Some of the questions, they're spelled out in the white paper.

I already mentioned long distance, high-voltage transmission, partly there's a technical challenge, how do we keep driving power electronics at New Jersey Institute of Technology to address this, to, again, for example, to deliver wind or solar over large distances.

But part of it, of course, as we all know is also regulatory: How do we cross seems in our regulatory system, how do we get an easier pathway when, for example, one may cross multiple state boundaries. Tough questions.

Distribution systems, how do we get smart distribution systems, how do we get more integration with IT, how do we get more services to the customer, how do we get more transactional capacity enabled technology for new business models of delivering services to customers.

What about distributor generation, we

have, again, technical cost barriers, but we also have, sometimes in state by state, variable regulatory barriers for the consumer to be able to hook up. And you've seen today in many states a, shall we say, tension between utility business models and distributed solar, for example, coming into -- coming into play.

Storage, today, somewhere between 1 and 2 percent of our generation capacity is what we have as storage capacity, and it's very geographically idiosyncratic. Well, if we get the cost down for more ubiquitous utility-scale storage, what is that going to mean for the business model, which always come down, roughly speaking, to who pays for all the services that that storage would provide.

What about an even maybe more aggressive technology target, what about real affordable distributable storage? Big issues for business models.

In fact, in today's meeting, in contrast to the West Coast meeting, we specifically are including a whole panel on this issue of business models. And here in the Northeast and PJM, we know that there are many, many challenges here,

including capacity, how to design capacity markets more effectively, et cetera, et cetera.

So these are really big issues, and as I say, we are looking for as much input as we can get on this to influence our first installment of the Quadrennial Energy Review.

I'll just end by saying that, while I have listed a lot of these challenges, and they are major challenges, I'm going to end by going back and reminding us that we are in a major period of opportunity in the energy sector.

We see that in our production of national gas and oil, oil lowering our dependence on imports dramatically, gas prices where they were not expected, that is on the good side, low, for the consumer, driving industrial development, and resulting in lower CO2 emissions.

We're also seeing it on, say, renewables, dramatic increases in our wind and solar deployments, driven by innovation and cost reduction. There's going to be more of that.

Efficiency is growing. That, by the way is part of one of the challenges, too: how are we going to transform our system in a period of flat to possibly even decreasing demand. That's a

challenge in and of itself in a -- for transformation.

But a lot of this is based again upon the good news that, certainly on the supply side, we are seeing dramatic improvements driven by technology innovation from hydrocarbons to renewables to efficiency. And now the question is how are we going to provide the infrastructure to enable all the good outcomes that we are looking for in the 21st century.

So thank you. And, again, we will be looking forward to your input and that that we've already received from a number of our regional meetings. Thank you.

MODERATOR WELSH: Since we started a little late, I'm going to go just a few minutes beyond what the agenda provides.

The Secretary and President Bloom have kindly offered to take a question or two. So if any of you have questions, please go to the mic in the center of the room and introduce yourself.

MR. GLOTFELTY: Thank you, Peggy.

My name is Jimmy Glotfelty. I'm with Clean Line Energy Partners. I was born in Boston. I don't tell many people in Texas that, but I was

born there.

Thank you, Mr. Secretary, and, Dr. Bloom.

Having served at the Department of Energy, I understand the importance of these meetings, notwithstanding huge crowds. You know, a few nuggets of gold that can be found in these government reports can do really, really good things. And I point to synchrophasors as a really, really good nugget that started at Pacific Northwest National Lab, and was the wide area measurement system in the West, and obviously, after the 2013 blackout has been a really, really good system to understand the reliability on the East as well.

So I commend you in the QER. And, Dr. Bloom, I appreciate your hospitality here.

I am going to talk very briefly with a question about the HVDC. We're about 13 miles from the Pearl Street Station where Thomas Edison first began the HVDC -- or the DC revolution, not HV, but just DC. I might say it did burn, too.

But nonetheless, my company, as you know, is trying to build DC transmission lines to move large amounts of wind energy long distances.

It's pretty much the technology of choice globally for that application, whether it be mine-mouth coal, whether it be hydro or wind energy.

Our competitors around the world, brazil, China, Canada, India, they've all adopted these technologies, and actually, are leading the revolution for new parts of the technology to lower the cost and allow that technology to continue to grow.

Since this QER is supposed to look between now and 2050, the question to the Secretary and Dr. Bloom is, so what does the U.S. need to do to become the leader in HVDC technologies. We obviously have great institutes that can help lower the cost, but what can we do domestically to make the United States the leader in this movement. Thank you.

DR. BLOOM: Just very quickly, the whole issue in investing in technology has to have a critical infrastructure of a work force, a research group, and then partnerships between business and industry to deal with the business end, the economic development of it.

So, unfortunately -- and there is a plus side to this picture, but, unfortunately, if you

look across this nation, we are an underproducer of scientists and engineers. If you travel to the countries you mentioned, whether it's Canada to the North, India, China, you look at the drivers behind them preparing a technological work force from the research scientists to the person serving whatever it is that needs to be served.

We have yet -- the Secretary referred to a report of 2000. On that same period, the academies came out Rising

Above the Gathering Storm. You may recall that report. And it focused on the crisis we are in because we're not producing the work force. To my knowledge, not much has been done since that report was issued about us increasing the number of high school youngsters interested in what we colloquially refer to as the STEM fields:

science, technology, engineering, mathematics.

Worse is we don't see any movement at all of the dial for females and minorities. They're underrepresented in the larger pool that is interested today in higher education. So it's a work force issue.

Very often, we're finding it rather easy

-- I mentioned this New Jersey Innovation Institute that we started -- that we're finding it easier today to partner with business and industry. But for them it comes down to what are the incentives, and for us we always have to cover our cost because states increasingly are not doing that.

So the opportunity to come together and work on this issue of energy, again, where is that. I see it in the farmer industry. We do a lot of work obviously with the farm. Farmer seems to build in more R&D money. I don't see it in the energy industry. And I'll defer because the Secretary, I'm sure, knows a lot more as you do than I do. So that the issue of the partnerships are there, but where are the incentives to get it done?

And, of course, as I learned this morning in talking with the Secretary, energy is very local and very regional. In the Northeast, we're not going to see, in my opinion, the big wind farms as you travel through states like Nevada and parts of California and the Southwest you see it.

So where is the renewable energy per

share? We saw the floor fall out of the glass market for photovoltaics here in the State of New Jersey. Southern New Jersey has been a major producer of the panels. And yet because of whatever it was, overproduction or the competing industries wanting to kill off solar -- I'll leave that to others who know more about this than I do -- that dissipated quickly. We're now again seeing a little bit of a regeneration.

So the work force, the partnerships, the incentives, and I'm going to go back, we have to produce more scientists, more engineers in this country. Less than -- less than 7 percent of the young men and women who chose to go onto colleges and universities chose engineering as compared to the countries you talked about where it's upwards of 30 percent.

So thank you. Thank you.

SECRETARY MONIZ: By the way, Jimmy, were you the first director of the office, right? You were, right?

So I was going to say that Jimmy Glotfelty -- you asked the question -- was the first director of DOE's Office of Electricity Delivery and Reliability.

I might also say that I think the push towards that office started when I was under secretary, and we did an R&D crosscut and felt that we were way underinvesting in electricity issues. So that was great, and it's great that you got that kicked off.

In terms of the HVDC, I would agree with you that this is clearly an area that we need to, I think, move out more strongly in. As you said, in other countries, it's being deployed much more aggressively than we have so far.

You mentioned synchrophasors. And I'll just say that that's not specific to this question, of course. But with the huge Recovery Act funding, we were able to deploy large number of these. These devices really give a new level of understanding in terms of the situation in the grid, in terms of phased ability and other kinds of questions.

I'm going to put in the general context that we need to advance our whole high-voltage grid with a lot more sensor technology and data integration. It's going to be very important. On HVDC, in particular, of course, the major issue, and you alluded to it, is cost reduction and

conversion. DC to AC, AC to DC conversion at high power levels has been challenging.

One example of what we have done in relevance to this on the technology side is that the very -- the president has put forward, as advocated for, and has started the process of establishing national manufacturing institutes that focus on technology development that will underpin future manufacturing. The first of those was a joint DOD, DOE institute on 3D printing added to manufacturing.

But the first fully funded one, which is for $70 million, federal funds, matched at least one to one by the states, is in -- was a DOE-funded one in wide bandgap semiconductors, a direct relevance to a number of technologies, certainly this issue of power conversion at high power. So I think these investments, the type that you are calling for, we are making. And certainly, input on more that we could do, we would be delighted to see.

I'll just end by going back to President Bloom's comment about education and training because I would say it's not only the university level.

We have a serious manpower challenge across the energy industry. A lot of our sectors have a work force that is older than the average in our nation's work force. Partly, it's because, to be honest, there was a couple of decades in there where energy was not viewed as exactly the go-go area.

Now there's a lot of opportunity, as I said earlier the ladders of opportunity, but we need to see that we have the right education and training.

I'll just say a few of the things we are doing at the Department on this, one is that we have had now for a few years what is I think functioning very well. It's a Women in Clean Energy Initiative. I would invite you to go to our website to look at that.

But then in the fall, last fall, it's actually kind of -- by the way, as anecdote, it's kind of amusing that this is something that was literally generated in realtime during a congressional hearing.

Very few think of congressional hearings as being productive in this sense. But in exchange with Congressman Rush, it led us to

establish what's called now Minorities in Energy. And it's a very, very interesting program going around to -- part of it is with HBCUs, but it's more broader than that.

Third, I will just say -- then this will be another slight tie back to your question, Jimmy, the -- we are with our fiscal year 2015 budget starting something at the Department called traineeships, which will be analogist to some of the NIH traineeships, where there are areas for a mission agency like the Department of Energy where we do not see enough people being produced.

One of those areas -- I mean, well, actinide chemistry, you know, et cetera, but one of the areas is power electronics. And if you look at our university programs, there's been -- there was quite a retrenchment in power electronics over quite some time. So we feel that we can get traineeships that not only support students, but also support curriculum development that can be distributed. We can contribute in targeted areas like that.

MODERATOR WELSH: Thank you.

We have time for one more brief question and brief answers.

Please identify yourself.

MR. WHITE: Sure. My name is Bill White, and I'm president at Norton White Energy, a consulting firm. I'm here on behalf of the Energy Future Coalition, Washington, D.C. and Americans for Clean Energy Grid.

And I just want to say, first of all, thank you to Dr. Bloom, Secretary Moniz, Karen Wayland, and Peggy Welsh, all of you, for -- for hosting these meetings, for bringing this process forward. We think it's extremely important.

Our coalition stands with environmental organizations like the Natural Resources Defense Council and the Sierra Club, to transmission developers like ITC Holdings, to utilities, American Electric Power, to wind and solar developers.

And our focus really is on the high-voltage transmission system that we believe we're going to need to get to the very high levels of renewable and low carbon energy that we're going to have in this country in the future, to get the carbon out of our electric system, and to electrify a lot of venues, which is -- some of which is starting today, and hopefully will

accelerate further.

But as Secretary Moniz, as you said, this is a process that's been going on, and it's going to continue, we believe, as you do, to accelerate going forward.

So our focus is on the policies that allow us or prevent us from building the high-voltage transmission network that we need quickly, smartly, efficiently, and to get these resources, to access the best resources in remote areas, to move them to population centers, to balance them over large areas, to balance their nature variability over large areas efficiently, and to deploy all these great new technologies like synchrophasors, high temperature, low sag conductors, automated dynamic line rating, all these technologies that are there that, you know, it sounds like a boring industry, but like every other industry, there's a tremendous amount of innovation. And I'm really glad to see that we're going to hear about some of that today, which is terrific.

So my question to you is: The QER is a four-year cycle. One of the challenges that we see are the time line for building high-voltage

transmission is much longer than the time line for deploying large-scale renewable energy. And we see, you know, a high correlation between the places that have made the decisions and investments to put the high-voltage transmission in place and large-scale deployment of renewable.

So we see Texas as a national leader because of the CREZ process they put in place. We see the Midwest independent -- Midcontinent Independent System Operator in the Midwest having very high levels. California has some key investments, and they have good renewable deployment.

So we see a correlation emerging between places that have made those decisions, and we're looking toward, we believe, much higher levels than we have today in the not so distant future.

So how is the Department thinking about that question, the longer term, you know, levels of 50 percent or higher of renewables on our system, and the kind of infrastructure we're going to need, and how can we work together with you and -- to help speed that process up of getting that infrastructure in place so that we can get that energy deployed?

SECRETARY MONIZ: Well, the very short answer would be: The QER is how we're going to think about this, but maybe to say a little bit more.

And I might just add, by the way, your earlier comment about your coalition coming together with different elements. I want to mention somebody that I'd invite those -- those of you interested to contact, if you want to discuss these things. We recently brought on board someone named Dave Foster, who was the executive director of the BlueGreen Alliance.

Now, that was focused more on pipes rather than wires. But Dave is helping us with this kind of coalition building, so I just wanted to make sure you had that as a contact.

MR. WHITE: We worked with them, too. But that's a terrific group. Thank you.

SECRETARY MONIZ: Yeah, yeah.

So, in terms of going forward to the longer term, clearly, one major part is a variety of technology developments to handle very, very large-scale variable resources, wind and solar.

Two of the areas that we are certainly pushing -- well, one I alluded to in my opening

remarks, obviously, storage. We're continuing -- in fact, we produced a report last fall, I believe, on utility-scale storage. And we're trying to build up that budget to invest on utility-scale storage. That's one.

Secondly, we are looking at hybrid systems, how to integrate systems, for example, renewables of gas, for example, into hybrid systems that can be reasonably economic and address variability.

By the way, we're doing that both for utility scale and for something else that Joel referred to the rural -- the rural context for small -- small hybrid systems that's inside for this -- for this -- this question.

And third, we started in our FY '15 budget -- and, of course, I cannot comment on our FY '16 budget process the -- that we started something called, you know, a transformation of the grid cross-cutting budget involving several offices. That was done in the spirit of building that up. But, of course, we cannot discuss future budgets.

So this is a very, very important problem that we are looking at. I got to say that

we do expect -- we do expect continuing substantial growth of renewables, wind and solar.

I've always said I'm kind of particularly fond of solar, but that's not negative on wind. I think solar, as we all know, has this huge resource, and can be deployed both centrally and -- and distributed.

In fact, the last comment I should make is that, on storage, one very specific storage mechanism is that in concentrated solar. And there is one plant that we supported with our loan program that -- that has storage built in Arizona.

But then, in 2015, we expect to bring on a very, very large CSP plant in Nevada with about six hours of molten salt storage. So, for that particular technology, that's an example again of storage to address -- to address these issues.

Thank you.

MODERATOR WELSH: Unfortunately, we need to move on in our very full agenda. So please join me in giving Dr. Bloom and Dr. Moniz a big round of applause.

And thank you, Dr. Wayland.

For those of you watching live stream, while we're setting up for our next panel

discussion, give us a moment to do that.

But let me say that all the presentations today from our speakers will be posted on the QER website. That address is www.energy.gov/qer. So look for those presentations to be posted this week.

I also want to recommend to you to go to that page and look up the Portland QER meeting, which was held on July 11th. There, you will find the meeting transcript, summary and presentations of the discussion of electricity in the Western half of the United States.

So, with that, I'd like to ask the Panelists for our next Panel to join me here on stage, please.

Well, good morning again. We are delighted and honored to have at this QER meeting a panel of true experts on the issue of transmission. The title of the Panel is Can We Build and Operate the Appropriate Amount of Future Needs for Transmission.

Joining us on the stage here is Michael Kormos, Executive Vice President for Operations at PJM Interconnection; Kurt Bilas, Executive Director of Government Relations with Midcontinent

Independent System Operator; Joseph Welsh, Chairman, President and CEO of ITC Holdings Corporation; David Mullet, CEO, Vermont Public Power Supply Authority; and The Honorable Betty Ann Kane, Chairman of the District of Columbia Public Service Commission and the Board Secretary for the Eastern Interconnection States Planning Council.

Let me welcome all of you, and remind you that we'd like your five-minute summary comments. Again, everyone's presentations will be posted.

Let me remind people that the panelists' views today are their own and do not represent the views of the Department of Energy or the QER Task Force.

And with that, Mr. Kormos, the stage is yours.

MR. KORMOS: Thank you, Peggy.

Good morning, everybody. Hopefully, most of you know who PJM is, so I won't spend any time focusing on PJM.

But as part our process, we have what is called the Regional Transmission Expansion Plan. It's a 15-year planning process that we go out

looking at the future needs of the transmission grid, ultimately looking at those needs, selecting transmission projects then from now -- what is now in an open process, recommending those boards, and ultimately looking to the transmission notice to then build and site those.

A lot of what we do and almost everything we do really depends on having very clear and concise technical requirements or criteria as to how we define the need.

PJM is an independent neutral party. We obviously do not own any assets. But we are responsible for defining the need. And while we have very good criteria, particularly when it comes to reliability and making sure the system will be reliable, we have fairly good ones. Looking at market efficiency is a little harder when you start looking at market efficiency.

To that, I'll tell you right now that are really challenging us and we're sort of concentrating to look at being able to build our need, the first is on public policy.

Order 1000, that we have started to implement at PJM, move the ball a little bit for us, but in reality, hasn't really given us clear

criteria as to how we ultimately decide to build for public policy.

Our process is very much state-centric at this point mainly because we do not have a clear federal policy. And that is one of the difficult things for a system like PJM. We are 13 different states without clear federal policy regarding where we should be taking the transmission system. It is difficult to develop criteria to ultimately look at bringing together transmission projects.

So right now through Order 1000, we are very much relying on public policy coming from the state prospective. But as you can imagine, a lot of that public policy that was mentioned is very localized, state-centric.

In many cases, while there are RPS standards, as much as they're about RPS, they're about jobs in that particular state. So it becomes very difficult when you start looking at multi-state potential projects for states to get excited about it.

In our part of the world, everybody likes transmission until they either have to put it in their backyard or pay for it and then they

don't like it.

And so that is really where for us the clear criteria comes to play. By having that criteria, it is much easier for us to justify the projects, be able to move forward through the siting process.

Again, siting projects, we've had some experience. It took us two to three years to get through a federal park just probably 30, 40 miles from here. It can be a difficult challenge, and without that clear definition of need, it becomes very difficult to do.

The last one I'll talk about is resiliency. Probably our other biggest challenge right now is resiliency as we move the group forward. A lot of that has come down to the new standards in place.

But we've been working very much with our -- our transmission owners to look at the criticality of particularly different substations on our grid. And from a technical perspective, we're probably pretty good at coming up with those studies to look and identify what are the most critical substations.

After identifying the critical

substations, obviously, we'll look at potentially hardening those substations from a physical perspective.

But when you really look at resiliency, one of the best ways to protect the grid is to make the substation less critical. The best way to make it less critical is obviously to move less power through it. By putting less power through it is put up other transmission that, in fact, will run parallel, around or through.

That's going to be a challenge, number one, in developing what that criteria is of how to list how critical a substation is, how to move it down the list, so to speak, from a critical substation, but also from a transparency perspective.

Our processes are very transparent. They're designed to be transparent. State processes are very transparent in siting it.

When we start to talk about criticality of substation and protecting it, it's going to be something we're going to have a very difficult time being very public about.

We have a list of critical substations. I will tell you we do not even leave it with FERC.

When we go down and talk to them about it, we take the list with us.

We're that protective of what our system is. That's going to be the challenges as we go forward as to how we involve that kind of criteria in a very public and open transmission forum.

And with that, I look forward to questions.

MODERATOR WELSH: Thank you.

Thank you. Mr. Bilas.

MR. BILAS: Hi. Thank you very much for inviting me. My name is Kurt Bilas. I'm with Midcontinent ISO.

I have a couple of slides here. I'm going to move through them fairly quickly, but you can look at them later.

To give you a sense of who MISO is, we're in PJM, so you may not know MISO. We're actually a coast-to-coast ISO. We go from Hudson Bay to the Gulf of Mexico. We've got about a maximum demand of 133 gigawatts and a maximum generation capability of about 201 gigawatts.

We've got three regions: We've got the North, which is in blue; we've gone Central, which is in green; and then the kind of orangish red

color is our Southern region, which we just integrated last December.

Okay. I want to talk about three things today just briefly, three things that concern us. I mean, our number one job is reliability. But three things that are going on in the industry right now is resource adequacy, the changing slate.

We've got coal retirements. We've got more gas coming on. We've got about 13 gigawatts of wind already on our system, and more is being added. The second thing is gas-electric coordination.

With an increase in the amount of gas that will be used for generation because of our factors, you know, we're looking at that. That's going to take of lot of infrastructure. That will take some infrastructure. But that system is also changing, so it lends itself to more uncertainty.

And then the third thing is Seams optimization. As you see from our map before, we've got a -- we touch a lot of different people. We have to work with them. And so we want to be able to work with them in an optimal fashion so that energy and capacity can move back and forth,

which will make it more efficient.

Okay. One of the things that we're seeing right now is a lot of coal retirements particularly because of the MATS rule. And so what I've got here is a slide that just basically shows our 2016 resource adequacy numbers.

And what we're looking at in 2016, we've got a shortfall of about 2.3 gigawatts in the North and the Central and we're long about 2.5 gigawatts in the South.

Now, you can't move all those gigawatts from the South to the North and also from the North to the South. But the shortfall of 2.3 does not mean that there's going to be blackouts in the Midwest. What that means is that it's a riskier system; it's a harder system to operate. What it means is that instead of the typical planning standard of one day in ten, it actually goes up to two days in ten. So it doesn't mean a blackout. But these are the kind of numbers that we are seeing in the Midwest and the South right now.

This slide, basically, what it just shows is what I said, we've got a reduction in the reserve margins. It's going to continue down, to continue to reduce. But we also see a lot of coal

retiring, so that we're actually seeing about a 20 percent -- between 2009 and '25, about 20-percent drop in the amount of energy produced from coal in our system.

And then both wind and gas, or renewables in gas I should say because we're also getting some solar, I think the last number I saw was something about 875 megawatts of solar, which I thought was pretty good for an area that you typically get -- typically don't think of as real sunny, but those will increase by about four times.

So we see that the -- and the reduction of coal is just based on business as usual, so that's not including a lot of other things that are going on. Some of those other things going on are a number of different environmental regulations going on right now.

We got the MATS rule. We saw about 10 gigawatts of coal retiring there. There's the Casper and the clean water rule. The clean water rule just came out. The clean power plant, we're analyzing that right now to see what kind of effects it's going to have. That study should be out in the middle of September, the 17th. Though,

we're anticipating, again, significant coal retirements in order to reduce the amount of CO2. And then you've got the MATS and coal ash rules.

So, as I understand it, there's a good chance that there might be another NOPR on ozone coming out in December, and the coal ash storage rule should come out in December, too, from EPA. Again, all of these are going to impact generation that we're seeing in our footprint.

We see that gas demand, we see that continuing to grow. This is for the United States. But continuing to grow across the United States, basically, an historic trend line.

And we did some studies by looking at natural gas and generation within the MISO footprint. And these two charts, produced by others, but also part of our study, as you can see, the gas system on the left-hand side, that's the traditional flows of natural gas, and then you can see that it's really changing.

I am running out of time, so I'm going to just say that FERC is working on natural gas coordination. We are working on Seams with both SPP and PJM.

And we had two recommendations that we

want to provide the DOE; one was to expand the coordination/consultation between EPA, FERC and DOE. There are a lot of things going on. All of these things impact each other. And I know that they do coordinate and talk to each other, but that probably could be expanded.

And then also, that the rule-making processes and the time lines shall allow ample time to explore the -- and address the unattended consequences. There's one policy, you know, a lot of things you'll push down here, and something will pop up over here, so you have to have time to look at those.

And that's my presentation. Sorry I went over five minutes. Thanks.

MODERATOR WELSH: Thank you.

Mr. Welsh.

MR. WELSH: Thank you.

Good morning everyone. I'm glad to be here.

ITC is the nation's first and only largest independent transmission company in the United States. When we started at ITC in 2003, I actually looked down the road and said, you know, this is not a tough business. I couldn't have

been probably more wrong about any one thing.

And I'm always interested in relaying something that I talked about earlier this morning with another colleague out in the audience; that I was in a financial planner's office, and behind his door was a sign that said people don't plan to fail, they fail to plan.

And that's what I see here. And if you look at the transmission grid in the United States, we've got a lot of problems.

We own and operate 15,000 miles of wire across seven states. The systems that we bought, let me give you the stated condition. And if I give you the stated condition of these systems, I'm going to tell you some of them were actually some of the better operating systems at the time we bought them.

We have poles whose average age -- average age of the poles were 65 years old. We have crossarms that fall down in just normal weather. Breakers that we couldn't give away to third world countries because they were so obsolete. I used today wake up every morning to a plethora of incidents that happened on the system because breakers failed, this happened, this

happened, this happened.

We have spent hundreds of millions of dollars just rebuilding what we have to get it up to what I would call fairly good operating standards, and we have hundreds of millions of dollars more to go just to get there.

When we started to address the things like interstate or interregional or really long-term transmission projects that really help to transform the grid, we're behind the eight ball. We're behind the eight ball in more than one way. We have overpoliticized transmission to the point where it's just totally unbelievable.

I heard people taking about high-voltage systems. I came back from China. I went through six high-voltage labs in China where they're actually working on stuff. When you talk at DC, they have operate at plus, minus 800 kV DC. They have thousand sixty-five kV AC transmission lines.

They are moving power today 3000 kilometers across the nation of China. Just take a map out, stick a thumbtack in it, and get a little piece of string and measure out 3000 kilometers, and look how far you can move power.

They have quit building their wind

turbines in China because they don't have enough transmission. They're operating way ahead. They were putting one turbine in an hour every hour of the day when I was there. They've had to back off of that. They're building their second thousand sixty-five kV line as we speak today.

We just absolutely cannot get there. When I look at my friends and colleagues here that are in the RTOs, we have the cost benefits studies in place to try to measure how effective we're going to be when we put something in place, and yet we cannot take into account for the optionality that we need when we talk about the criticality of the grid.

And the most robust grid is the most stable grid. It's the grid that allows us to withstand a tax on the grid. It's the one that's the most secure for this country. And we're failing to do it. We're absolutely failing to do it. We're failing to recognize where we're at.

When we talk about the security of the grid, people get all excited. We talk about cyber security. It sounds really high tech, you know. And it must be really bad. We have people hacking in and getting credit cards and everything else.

Here's the operative of it, if they hack in and they do take control of the grid, we'll probably be able to restore it in 24 hours. A physical attack, and where we're at in this country today, properly -- properly executed will bring the grid down, and we may not be able to recover in certain areas for years.

We can transport these transformers all over and say we're going to swap them out. We don't have the manufacturing basis in the United States, we don't have the warehousing, and we don't have the physicality to protect these systems. When people talk about protecting the grid, they talk about, you know, doing these things.

I've met with all the governors in the states that we operate in. I met -- meeting with their state police force. We're informing them of what we're up against in protecting the grid. And I will tell you this, we are not where we need to be.

We can do all the national studies and say, well, this is really important. Tell that to the people in the Michigan if we lose the wrong transformers. The economy of that state goes

flat, as it does in Ohio, as it does in Kansas, as it does in places where we're at. If we can't maintain the stability of this grid, and we're not committed to building a more robust grid, we've got problems coming ahead of us that are just really too big for us to take.

Thank you very much.

MODERATOR WELSH: Thank you.

Mr. Mullet.

MR. MULLET: Yes. Good morning and thank you. I'm David Mullet, General Manager of Vermont Public Power Supply Authority. I'm also here this morning on behalf of the Transmission Access Policy Study Group, colloquially known as TAPS.

I appreciate, Peggy Welsh, the reminder early this morning first thing that today's meeting was not about achieving consensus, but in sharing experiences.

Many of us, I've noticed, come to this industry as both generalists and journeymen sometimes later in life. Had Dr. Bloom gotten a hold of me 35 years ago, or had I visited this institution, I might have taken a different course, but too late now.

So I'm here to talk about policy. By way of perspective, VPPSA, Vermont Public Power Supply Authority, has 12 municipal member systems with 31,000 total meters. We have about 6 percent of the Vermont load.

When I came to this job not long ago, I would ruminate looking around as to how our typical VPPSA system load compared to this facility, the Boston Hotel I might be staying in, an electric Amtrak engine leaving Boston.

And I was struck in the early -- in the early years of my work how much that made Vermont with vertically-integrated utilities and these small loads seem different. As time goes, I'm struck more by exactly the opposite, the exceptional commonality of the challenges that we share and how much that commonality really encompasses transmission as much as any other subject.

I think all of us have interest in a safe, reliable, secured grid built cost effectively. Anyone opposed? Of course, not. I think all of us recognize that the blend and coordination between the world of physical construction, financing and regulation is inherent

to all of those things.

The three points that I'll touch briefly on today, and have also touched on in my written materials, encompass those three things toward that three-part goal relative to our transmission system.

The joint ownership model, first of all, is one that can work. In addition to being VPPSA's general manager, I'm on the board of directors of Vermont Electric Power Company, VELCO. VELCO is owned by the Vermont distribution utility. That achieves an exceptional number of things. Does it achieve them perfectly? Of course, not.

But we're present in transmission planning on a very holistic level: Customers, utilities all working together to understand what do we need relative to our transmission projects.

Siting, we know the landscape. I mean that literally and figuratively, particularly in Vermont. Having local distribution companies involved in the planning, in the siting decisions, makes a big difference.

Access to capital, sharing of risk, transmission text, as the Secretary rightly noted,

the industry is very diverse by region. But sharing risk and finding capital, I dare say is common to all of us. Bottom line is that we have a capacity through joint ownership to right-size transmission projects in their planning, in their scope, and in their execution. And that can work.

When you live in Vermont for a while, even as what they call flatlander, people like me who've come in, you realize that there are -- you have to take off several zeros to get to the Vermont scale, whether it be meter counts, loads, just about anything.

But going in the other direction, I believe very, very strongly from my experience with VELCO and through VPPSA that the joint ownership model is one that can work, that will work, and has to work.

Secondly, I'd like to touch brief on the FERC November 2012 policy statement relative to transmission adders. Very, very positive development.

I think just to consolidate, it makes a much more project-specific focus. Takes into account how advance technology may fit in the context of a project as a whole. It doesn't make

adders automatic. Creates a more responsible nexus between budgeting and planning for transmission projects and what's actually executed and what it actually cost.

Again, a policy statement, new, its implementation will be vital. And DOE is going to be an important part of that conversation that implementation is going to happen.

Last point, the transmission rate of return on equity, there has been the subject of litigation the Northeast, as most of you are aware, that resulted in modest reduction in the base rate of return, not as low as the 9.7 percent that the administrative law judge recommended, but down to 10.57 percent subject to some hearing. We believe that's a step in the right direction that transmission can still be stimulated with rates of return more appropriately correlated with those in our general economy.

Thank you.

MODERATOR WELSH: Thank you.

Chairman Kane.

MADAM CHAIRMAN KANE: Thank you very much. Thank you for the opportunity to be here. Particular pleasure to be here. I'm a New Jersey

native, and went to college in Vermont.

But I want to recognize several of my other colleagues who are here. I see Mary-Anna Holden and Diane Sullivan from the New Jersey Commission and Garry Brown from the New York State Commission.

As kind of an introduction, I am here in the capacity as a member of the Executive Committee of Ice Pick, as well as, of course, Chairman of the District of Columbia Public Service Commission. Kind of two extremes. I have some very brief information about Ice Pick. You're probably most of you are familiar with it.

But also, as the District of Columbia is unique in that we are totally dependent on transmission is that what happens outside our borders. We have no -- we have no generation, the district, except some rooftop solar.

Our last two peaker power plants, one oil fired, one coal fired, were decommissioned over two years ago now. They're actually decommissioning themselves, falling apart.

So we were particularly pleased when a grant was made and -- by Department of Energy and when the Eastern Interconnection States Planning

Council was formed.

Skip over the acknowledgment there, which always has to go when you have a slide having to do with a Department of Energy grant.

But it was funded by a $14 million grant, the stimulus funds, and it -- it's going to run through March of 2015. There were actually two parts to this grant, one for the Ice Pick, which we call it, and one for EIPC, which was the utilities or the planning authority, and then the EISPC with the states was the policymakers for the states.

The purpose of the grant and the purpose of the whole undertaking was, first of all, to provide some policy input to the EIPC, to the -- to the RTOs, and to the planning authorities, in some cases the individual operators, on interstate transmission issues in the Eastern Interconnection, to convene the state energy opposites and state utility commissions, and to conduct studies and white papers. And one of the important aspects was it's structured so that there is a representative from each of the member states from a state public utility commission. And in most cases, we have been able to have

representation at the executive branch level from the governor's office, the governor's policy office, adviser, or who -- the head of the energy administration in that state.

Ice Pick has forum for 39 states: The District of Columbia, the City of New Orleans, which has its own public utility commission, and six Canadian provinces -- it's really an international -- six Canadian provinces that supply power, and are integrated as part of the grid, really everything east of the Rockies.

And the intention was to discuss and analyze immediate and long-term issues of mutual concern. Ice Pick was not set up to plan transmission, but it was set up to recognize that there was a tremendous value to sharing information, and most important, to providing the states, the state utility commissions, the state energy offices, and in some cases transmission planning, siting commissions in various states, providing them with tools and information that could help make decisions in these areas.

And this is -- the process was part of the EIPC. We comprise one-third of the members of the steering committee. Most important I think

that has come out of the -- out of Ice Pick are the studies and the white papers. And these are not going to be papers that simply get put on a shelf. They're really all aimed at practical information and practical solutions so that the states can -- can have information in their decision making, and so that the EIPC can have information, relevant studies on changing the resource mix.

Energy zones, I'll say something about that in more detail in just a minute, particularly on transmission planning, the energy zones mapping tool, and the state-by-state public policy inventory, low -- low growth patterns, existing transmission, load forecasting, co-optimization. As I said, one of the -- actually, the only real -- that DOE specified they wanted out of it was an inventory and a focus on what's called clean energy zones throughout the Eastern Interconnection.

The group decided to do this primarily by developing a Web-based GIS mapping tool. This tool is used to locate areas with high suitability for clean power generation within the entire Eastern Interconnection, and it includes nine

clean energy resource categories. I'm not certain I can remember all nine of them, but certainly solar rooftop and utility-scale solar, geothermal used to generate electricity, hydro, of course, various forms of biomass, wind, pumped storage, other kinds of clean energy zones.

It's produced as searchable energy policy and regulations database as well as a map. Here's an example of one of the layers. This is for utility scale photovoltaic, for example. And there are like 250 different layers of data pulled from environmental organizations, from fish and wildlife agencies, from military installations, from where airports are, from where actual pockets of various kinds of energy dams, pumped storage, et cetera, exist.

And this shows just an example of some of the modeling layers that were put on this map with slow plan cover population density, distance to transmission, protected land habitat, et cetera. You can overlay, of course, the existing transmission system on that.

And there have been many studies done for the what-ifs, if there were those things. These are the resource links. This will all be on

EISPC website. You can find out -- the mapping tool in particular is eispctools.anl.gov. ANL, of course, is one of the national labs, the national labs and the Department of Energy have been just a tremendous -- probably an unknown resource to a lot of the states, but they have been just a tremendous partner in some of the studies.

And then the appendix here just has a list of all of the studies that were done, that have been done, and who their partners were in doing those studies. And through those time that I did want to point out the clean -- Clean Energy Zone study, which was done with several of the national labs that came out in October, the transmission planning white paper that came out in January of last year. And then some of the underway projects, electric and natural gas infrastructure requirements, which is coming out this month. There will be a Webinar, I believe, next week. And then some risk analysis and other things going on that. And that whole list is there and available. Those are all publicly-available studies.

Thank you.

MODERATOR WELSH: Thank you, Madam

Chairman.

Well, so you all have laid a lot of the table. No easy answers. We heard that one of the challenges for transmission planning is that there's no federal policy on transmission, yet new generations coming on line using a lot more gas and a lot more innovated technologies. We've heard that we must maintain the stability of the grid at all cost, that's the most important issue, that joint ownership is a good business model, and that sharing of information and tools to do planning is critical.

As the Secretary said, all of those issues are moving towards driving innovation, and yet we have real changes with how to get transmission built. So I'd like to ask each of you your opinion of how we can get to a point where infrastructure will enable innovation, what specific things do we need to do to get there, and what is the federal role in terms of enabling infrastructure.

Mr. Kormos, do you want to tackle that multi-question question?

MR. KORMOS: I'm not sure I can remember that question, let alone answer them.

On the innovation side, I know, at least from PJS's prospective, one of the things we've tried very hard to do is look at the ability to monetize technology into our markets, whether it's our capacity or ancillary service or our energy markets.

We found particularly things like storage where we've been able to basically find a way to look at the value that they bring to the transmission grid, ultimately put -- and one of our main jobs is to make sure we're not putting up artificial barriers to those entries.

We had a very interesting one with battery storage and our regulation markets and the fact that batteries were just actually just too fast.

We are very much used to regulating frequency with coal units. There was very much a bias single we sent. When we tried to do it against the battery, we realized we drained the battery in one direction or the other within an hour. But we recognized that technically we could break the signal into two, and, in fact, be able to provide a fast signal to batteries, a slower signal, and that better performance is actually

saving our customers money now.

So not only were we able to find a way to monetize the value for the storage units, and we have now batteries participating in the markets, but we were also able to find ways to ultimately bring benefit to the consumers in basically being able to carry less because of the better performance.

So a lot of what we're doing is looking at trying to look for those barriers, try to remove those. You know, on the -- on the hard core transmission side, it's a little tougher because a lot of it does come down to being able to get things sited and to get things paid for. That makes it a little more tough for us, I think, to find -- and, again, is where for us really having clear criteria of what is the future we need to be studying, what are those -- what is that analysis we need to be doing.

I agree with Peggy that having those tools, having that -- that strategy, we've been doing a lot more scenario planning. But in talking to a state regulator, who had actually sited a very big line for us, we were talking about scenario planning. And I said, you know, we

want to do more, but we want to bring to it. He looked to me and said, no, please don't. He said don't ever bring me a scenario that says you don't need this line. He said that's the worst thing you can do because that's what they'll latch onto, that's what will basically be the entire opposition's case against you.

It was an interesting conversation we had because, one, we didn't think of it as we did it. So there's still a lot of challenges there.

And I may let the others go.

MR. BILAS: As far as innovation, one of the things we try to do, like Mike said, was try to eliminate any kind of barriers. So, I mean, a couple of years ago, we did change our tariff to allow battery storage. Unfortunately, our prices were too low to make battery storage economic, so they put batteries other places. Though, I think we were the first ones to change our tariff to allow for the batteries to participate in the market.

So, I mean, you know, that's another thing with new technologies, too, that they actually have to be economic. And if you've got low price, it makes it harder for them to break

into some of that -- into some of the areas now.

As far as other new technologies, I mean, we work with people who will propose them. I know we've done studies on compressed air storage, and unfortunately, I know there was some geologic problems.

But a lot of these things -- and this is also some of the -- what I mentioned about unattended consequences. You find out if you use more of one technology, it may drive one of these new technologies that you -- everyone says, oh, this is a great thing, may make it uneconomic.

So, I mean, you got this balance going on in some of these technologies that can make it a little more challenging because not only do you have integrate a new technology, but you also have to -- it has to be cost effective. Someone's got to pay for it, and no one wants to pay for something that doesn't make sense to them.

MODERATOR WELSH: Thank you.

Mr. Welsh.

MR. WELSH: Yes. I shutter that I'm going to say what I'm going to say, but it's never stopped me in the past, so why should I stop now.

I find it really interesting when my

cohorts talk about that we don't have an energy policy in this country. We absolutely have an energy policy in this country; we just don't like it.

We have what we call markets. And markets are what they are. They do -- they're very brutal in allocation. They do cost benefit studies and you don't fit the cost benefit study and you don't get what you want.

So then what we try to do next is then we try to superimpose regulation on top of the market, but then, again, we don't like the outcome because we can't get the market to be efficient because the regulation across multi-state lines continues to distort the marketplace.

But we have a policy; we just don't like it. And we don't have the political will to change it. And that's the better for the reason we're not going to get the infrastructure we need to be built for the -- for the future of the country, because we don't like the policy and we don't have the political will to change it.

When we want innovation to take place and we ask for, hey, let's have more innovation, let's talk about battery storage. It's really

kind of a cool technology. Probably isn't going to become cost effective in my lifetime. Thank God I'm old.

But the fact is that we have pumped hydro in Michigan. We have about 2200 megawatts of pumped storage today that works very efficiently. Every day it's about 87 percent full cycle thermally efficient.

I went to -- I was very interested in battery technology. I had people come in and tell us that there's some batteries that you might want to put on your system. And so I said, you know, we need a couple hundred megawatts of storage on our system in Michigan. So I says you got any installed. Yup, got them in Hawaii. It just happens I'm going there on vacation in about a couple of months. Can you arrange for me a visit, you know, look at them. Really nice.

One megawatt of storage today with the battery technology that we have consumes one of these cargo devices that we put on a tractor-trailer that we ship across the country.

The parasitics or the control mechanism to run one them is -- another box is equally as big, and the thermal efficiency of it is around --

really best case is to take everything and account about 50 percent.

So I need 250 of these cargo containers to set them somewhere, and then I need another space to set all the control mechanisms out here to set them somewhere. So, while I would like to put it in, I just don't know where I'm going to get to set them, and I don't see them really being ready for prime time.

But I think we should continue to study them. But the fact is, if you look at the market to support it, because that is our energy policy, it's not going to support it.

And so, without all of the other things that we want to do either through the political environment or through the distortions of the market, I will call them, these devices will sit on the shelf because the market won't support them.

I disagree that we don't have a policy. We have one. If you want to check it out that the policy is implemented by my two friends to the right, go look at how they evaluate transmission projects. It's always on a cost benefit study, always. There's -- there's the market at work.

And if we don't have the market to do it, then we don't do it. So there's where I come in.

MODERATOR WELSH: Thank you.

Mr. Mullet.

MR. MULLET: I think it's a given at this point that technological innovation that influences all aspects of the grid, including transmission, is going to happen and is going to happen faster; some of it generated on the other side of the world, some of it perhaps generated at the New Jersey Institute of Technology, some of it may be generated by three billion high school dropouts in a garage. But it's going to happen irrespective of regulatory regimes and everything else we can think of.

I think the last part of Peggy's question is a particularly important one, understanding what the federal role is and having a conversation and finishing that conversation to a reasonable degree. I mean, all conversations are iterative and appropriately endless, I suppose.

But financing options, how we think about construction, how we site transmission, the relationship of locally controlled small public

utilities to transmission, much of that is so directly intertied with understanding in a cogent fashion what the federal role is or isn't, and I think that's a difficult conversation. But I don't think we finish it until we start it more deeply.

The other thing I would say in follow up to my earlier comments is, I think we as a public power community, speaking in my investor role, have a responsibility to continue to develop what yes to joint ownership looks like from our end.

Public power systems are very diverse, state regulatory regimes relative to public power systems are very diverse. We can bring that to the conversation of what advancing an intelligently-operated, modern secured grid is.

And I think we have that responsibility to say what does yes mean if we partner with anyone in this room around a joint ownership scenario. It may be a little different in Vermont than in New Hampshire than in Nevada, but that's a very important iterative part of our public power work.

MADAM CHAIRMAN KANE: Innovation in terms of technological innovation -- because

states are not doing that. We don't create technology. But I think in policy and in implementing technology, as states have often been the leader, things like micro-grids, like smart meters, things like distributor generation, those policies of using new technology, and encouraging conservation, reduction, homegrown electricity.

All of those things is the roles of the states. The states, again, without the national federal policy, renewable portfolio standards, have been the states that are out there maybe causing problems in the transmission system because of that, because of it being so increasingly decentralized, but still there.

The states are also the only ones who really -- with all due respect, public power aside, it really intersects with the consumer, and has as one of their statutory obligations to make sure that the cost of whatever is put in there, transmission and distribution and generation, is reasonable, and needs to be concerned primarily and significantly -- not primarily, but significantly about cost and about the impact on the individual consumer.

MODERATOR WELSH: So my question on

innovation was really trying to capture what the Secretary said about opportunities.

I'd like to shift and talk a little more about challenges and ask you all, both as system operators, owners and regulators who oversee all of the market participants, what policies need to be put in place to address system vulnerabilities.

Mr. Welsh talked about, you know, we need to get physical hardening of the grid. And Mr. Mullet talked about the joint ownership being one approach to overcome some of those challenges.

Our policies need it, number one, and what should those policies be to overcome some of the system vulnerabilities that we've talked about already today both from a cyber and physical and financial and market perspective, all of the above kind of.

Why don't we start in the middle with Mr. Welsh since you brought up vulnerabilities.

MR. WELSH: This is probably the toughest one to really talk about because the grid is vulnerable.

I mean, if you go into the history of the transmission system or just the electrical system itself, we never built it to withstand any

kind of attack. The first time we started to protect the system, we were trying to keep people from wondering inside and getting electrocuted. And then we kind of had to up the bar a little bit because people are going wonder inside and take the property. Okay. So we've had to up the bar over the years.

Today, we have people who really want to take the grid out, to take it down, and we focus on a lot of things like cyber security, but I will say one more time physical security is the one that will keep me up at night long before cyber security will even cause me to have a moment's loss of sleep.

The fact is is that we have to rethink everything we're doing in this country, and I'm not sure that we're all in that -- in that mind-set yet.

If you talk to the people in Ireland, Israel, you talk to them about how they protect their system, they're -- they're in a different planet than we are. I mean, they're just totally in a different planet.

I find it amazing that we think this grid is so needs security, and yet we have people

out there -- for $25, I can buy you a total map of the high-voltage grid of the United States published there in black and white for you or multi-colors actually.

And as a matter of fact, we can just sit there, and I take probably any first year engineering student and just ask him, hey, take a look at this map and tell me what do you think are some really critical assets here. Let me see if I can figure this out by myself. It's the one that's got the generators and a whole bunch of lines going into it. That might be a big one. Okay? And it doesn't really take any hard core analysis. Yes, we make all this stuff public.

When we had the blackout in 2003, I had the good graces to be in the of it. People didn't even know that we were like a critical piece of the infrastructure. We had just kind of lived in this world so long.

When we reach out to local police and tell them that they should be patrolling these stations a little bit now, there might be some issues, especially some really critical ones, they're like what.

Then when you look at the amount of

money it takes to secure a station, there's no way that you'll ever secure it to a level where you'll be a hundred percent comfortable, but we can do a better job.

And what we really need is not rules and regulations to be put in place, but we need the policies to be put in place that allow the people who are operating the grid and responsible for it to take action without making it all in the public domain, because it's the public domain that's going to be our -- our Achilles heel of trying to get this system secure.

And so I look forward to that discussion, you know, with anybody, but we have done a lot of work at ITC on this, and will continue to do a lot of work.

MODERATOR WELSH: Mr. Mullet.

MR. MULLET: Thank you.

From my generalist perspective,

I wrote two words: Depoliticize and educate. Depoliticize because this is a matter of technical expertise.

The cyber security is more measured to more of a degree than we think. The physical security aspects of the grid as well.

From what I've come to understand from a lay perspective, it's not about putting up some big fences and hoping for the best. It is a very complex issue in which expertise is the key. And take the political equation out of that.

The reason I wrote the word "educate" as well is I think that there's a very broad consumer education that's called for in order to have an unpoliticized debate.

We send an incredibly complex message as a culture to our customers around the grid: Smart grid, interactive, you're a part of it, we're going forward, oh, by the way, really high risk, really dangerous.

It's like the waiter bringing your meal and say this plate is really hot, please touch it. We've got to make sense out of the core message and operate in a context that provides education, what you can do, what you can't do to every kid starting at about the second grade to 57-year-old generalists and journeymen to understand that difference to get to the depoliticized place where the conversation about security is about security.

MODERATOR WELSH: Chairman Kane.

MADAM CHAIRMAN KANE: I'll pick up on

education -- or educate that David mentioned.

It is a growing awareness, certainly as part of state utility commissions, of the vulnerability of the distribution system, as well as the -- of the transmission system.

NARUC has -- our national association put out guidance or guidelines for commissions to use in working with their utilities on cyber security. Essentially, a questionnaire.

I know in the District of Columbia now we have used that guideline, and we have sat down off the record, off the public record, with our electric, with our gas distribution, and with our telecommunications major provider and gone through that checklist, and asked the questions, you know, what are you doing about cyber security, how do you check your suppliers, what do you have in place, what have you upgraded, et cetera.

NARUC also conducts a monthly, what we call, threat briefing that state commissioners can -- can dial into unclass -- nonclassified information. And a number of state utility commissioners are considering or have received security clearance so that they can have access to more of the information that the Department of

Homeland Security has about the threats.

So there's a growing awareness at the regulator level of what the challenges are and what the concerns are both at the transmission level, which probably physically is more secure than many of our distribution systems.

The District of Columbia are putting about 60 feeders underground -- it costs a billion dollars -- primarily for reliability, but it will also help in the visible vulnerability of transformers, et cetera.

MODERATOR WELSH: Thank you.

Mike, do you have any comments?

MR. KORMOS: Going back to my opening remarks, I mean, for us, it is about the policy as to, you know, what is the criteria that we should be looking at, what do you want us to protect against.

Is it the loss of a single substation? We're probably already there. Is it a coordinated attack against two, three, four? We have a lot of work to do. And then how much are we willing to spend?

I don't think, you know, the issue isn't from us to figure out from an engineering

perspective. It is the policy of how secure do you want, how much redundancy, resiliency do you want in the grid. We can design that once we understand what that criteria is. We're designing for it right now; it's a little bit left up in the air.

The one comment I would say is, I think from your first question is a little bit of an interesting dilemma between technology and resiliency in that technology allows us to operate closer to the edge. That's a good thing, except we're operating closer to the edge, which is not a good thing.

One of the reasons PJM came through the 2003 blackout pretty much intact was we had a lot of headroom on our system. We saw the same power surges the other systems saw. We were just very fortunate. We had headroom. The system was able to withstand the flows and ultimately get through that.

If it were to happen today, we don't have that headroom. The more technology we continue to put in place, we will operate the grid closer to the edge, but the less ability we will have to be able to react to potentially unforeseen

and unplanned circumstances.

MODERATOR WELSH: Final word on this question, Mr. Bilas?

MR. BILAS: I'll be kind of brief on this.

I think that the industry and the government actually are doing a lot of work together on this. I mean, there are -- the Electric Sub-Sector Coordinating Council.

So, I mean, that -- that there is a lot of people from the industry working with DOE and the other relevant federal departments, DHS and everyone else. They have regular meetings; it includes all the trade groups, a lot of the industry people. They all get together. They work on cyber security. They work on how to recover, how to -- resiliency, how to protect against it. And so I think that there's a lot being done. I think that a lot of it doesn't get a lot of publicity, and that's probably a good thing.

MODERATOR WELSH: Good thing.

Okay. Well, one of my final questions to you all -- but the title of this panel, Can We Build and Operate the Appropriate Amount, to me,

that's a planning question.

We know that Order 1000 urged regions to talk amongst themselves and with their neighbors. We know that is sometimes going well and sometimes not going so well.

We've heard about Seams issues today: Is there a change in policy that is needed on regional transmission planning, are there answers like the joint ownership model that Mr. Mullet has proposed?

Talk to me about where you think transmission planning is headed and what fixes might or might not be needed.

Mr. Kormos.

MR. KORMOS: I'd probably disagree a little bit with Mr. Welsh on the federal policy.

While I understand the federal government and FERC in particular supports markets, to the most part, I think you just need to look at the Southeast to recognize it's not a federal policy for market. And I think that's our challenge.

We're very much market driven, but our markets -- we're as much a function of our states policies because many of our states have, in fact,

offered customer choice and have deregulated, but not all of our states. We have fully integrated states as well in PJM.

So I think when you start to look particularly at the cross-border interregional problem, you know, the biggest issue right now is coming to cost allocation. It's not -- we can't tell you what projects would be good. We can't tell you -- do the engineering work and tell you what the benefits are. We can't get anybody to agree as to who should pay for it. And then, unfortunately, because of that, we set some very, very high bars that a project basically doesn't get done unless it's even beyond a no-brainer at this point.

And that's unfortunate because I think we are missing a lot of opportunities. I think it's an area we absolutely have to go back and look at, and really could help some policies to make sure that we understand that, yeah, some of these costs have to be shared, they're going to be shared.

And the benefits may not be perfectly well defined in some cases when you're looking at assets that are 30 years. It's sometimes very

hard to predict who's going to actually see those benefits. And I think, ultimately, we have to recognize that just more robustness and resiliency will benefit everybody going forward.

MODERATOR WELSH: Mr. Bilas.

MR. BILAS: On the regional and interregional planning, I think one thing that needs to be recognized is that it is hard work and it takes a long time. But, I mean, it takes a while to start doing the interregional.

But the intraregional part, you know, MISO did what was called the multi-value projects. And we -- there are 17 projects. It's $5 billion. There were no-regrets lines. There -- some of them are already in operation, I believe the Thumb of Michigan. Other ones are being constructed. But that process took six years to get done. From the time that, you know, the state said we want your help, please do this kind of work, we started working on it.

But, I mean, then the last part, as Mike mentioned, was the cost allocation. That took two years. And I mean, we had -- to be able to do that, 13 states sent two people once a month to meetings for two days, for like 18 months, to hash

out how you did cost allocation among the 13 states within MISO at the time.

And they came up with a process, and then everyone else took a look at it and said, oh, no, no, we got to change this and that. So, I mean -- and things got changed. It eventually got approved by FERC.

But, I mean, one of the things that you have -- that I think has to be recognized is that none of this can happen quickly and especially with a cost allocation. The engineers can design whatever you want; you just tell them what you want and what problem you're trying to solve. But even that on the MVP process took a long time because they did various scenarios, and they did 12 different scenarios, and everyone had to -- and they got everyone to agree on like what do you think the growth rate is, what do you think interest rates are going to be.

So it took a long time just to get all of that done. So they had to buy into everybody so that it -- just didn't say, oh, and here's a solution, and everybody just take shots at it. It was like, no, this solution is because of all the assumptions you wanted us to make.

And, again, that just takes a long time. It's a lot of hard work by a lot of people, but it can be successful.

MODERATOR WELSH: Thank you.

Mr. Welsh.

MR. WELSH: Well, I find it amazing that we basically said that it wasn't markets and then we went in to describe exactly how we did cost allocations and how we had to get everybody to agree with them.

And remember what I said in my first statement: First, we have markets. Then we try to regulate them. We had to get everybody to agree to how we're going to run that regulation, and we had to really just politicize it to get the votes to make it happen.

So that's where we're at. This is not a problem of can we build it. It's not a problem of can we design it. It's not a problem of can we operate it. It's really a problem of can we get it through the process that we have here today. I really don't believe that we're going to get a point in the future where we have the future capacity to do what we need to do in this country.

And he's right when he said earlier that

we're running the system on the edge. We are running the system on the edge, and all of this technology allows us to run the system on the edge.

But it is not a substitute for building a robust grid. But the only problem is with the robust grid, we don't know how robust we need it until we have a failure. And then, as I tell people when we have a failure, I get all the phone calls. If it happens to be one of the grids that we're operating that failed, I get all the phone calls I need for the opportunity to pay for my own round-trip airfare to go to D.C. and sit before a Senate committee hearing and talk about what we did wrong.

And I will tell you this right now -- I've said this a hundred times, and my friends on the right can say something different -- if we had the same set of facts and events that happened on August 14th 2013, at 2:05 p.m. it started, not that I remember, we'll get the same result. We will get the absolute same result because we didn't fix the problem.

And we think we can technology our way out of this or smart grid our way out of this,

it's not going to happen. It is not going to happen. We don't have a robust grid. Just we don't.

MODERATOR WELSH: Thank you.

Mr. Mullet.

MR. MULLET: I think the real challenging problematic question here, or what happens in reality is, that we're often changing to the new thing before we tried the old one for better or worse within the regulatory and legal world that we work in this industry.

You think about Order 1000, in some ways to me, that seems like it's been around forever. But the D.C. Circuit Court opinion that I think fundamentally reaffirmed that there's going to be a broad -- broad discretion on the part of FERC and Order 1000 implementation is four weeks old. Three weeks old. So we see these situations where we're reacting not knowing what the next thing is going to be, not knowing how or is it going to be interpreted. And I think that happens on state level. I think that happens on federal level. And it really, to me -- I agree with what's been said here about the risks. Can we build the appropriate amount? I'm probably the last person

on this Panel who knows from a technical or operational point of view. But I do know that a process that is complex, is lengthy, even for those working in the deepest of good faith and with their best efforts, is not going to get it done.

And it circles back, I think, Peggy, to your prior question about perhaps starting and finishing the federal policy discussion, and all of us bringing the best ideas to that table.

MODERATOR WELSH: Thank you.

Chairman Kane, final words.

MADAM CHAIRMAN KANE: Thank you.

Well, absent of federal policies, state commissions and state commissioners are under a statutory obligation to consider the interests of their state.

And the District of Columbia says that making our decisions is one of the things we have to consider is the economy of the District of Columbia, not of Maryland, Virginia, et cetera. So that's a challenge, and it's always going to be a challenge and a primary consideration at the state level but I think that states also obviously recognize that this is an interstate problem.

This is a regional approach we're seeing with 111 (d) order. More states start to talk about how we can cooperate regionally to work with these things and it's getting more complex. Just as we thought we sort of had it together working with the RTOs or the RTF process or anything else, then you have all of these other mandates that are coming down from an agency that really had nothing do with energy before, which is EPA.

Then you got the effect of the coal -- the coal plants closing, of the -- the MATS, the air. 111(d) is an air quality issue. The air director for the state suddenly is the one importing the water. And so the things you have -- and the moving -- it's a moving target.

Five years ago, when we started, Ice Pick, we weren't even thinking about gas, natural gas, as having much impact on transmission planning, but it suddenly become a very -- you see all three different studies going on by us.

And then there's this traditional just because a transmission system is a big intrusive thing, if you will, physical thing, it is just going to be a difficult thing forever, I think. I think it's going to be difficult.

I contrast it with -- with gas pipeline. I know the -- the big concern about the Alaska pipeline from an environmental point of view. We just announced in West Virginia, North Carolina and Virginia governors when we're going to do this great gas pipeline. They had announced they were going to do an interstate electric transmission pipeline. You would have gotten a very different reaction and a much, much longer process to get it done.

So I think that there's an increased awareness on the states about working together, about cross-border collaboration, about more information, but it's just -- every time you turn around it gets more complicated, and there's something new that's suddenly shifting the playing field.

MODERATOR WELSH: Okay. Well, I hate to end this because I have a thousand more questions for each of you, but unfortunately, time moves on. Certainly, we encourage all of you to let us know specifically what you want the QER to focus on in your written comments.

And please join me in giving this stellar Panel a big round of applause.

We will move right into our next Panel. We are running a little behind schedule, but we will move forward with posthaste.

Thank you. For those of us who are watching live stream, I want to remind people again that our panelists' views are their own today. But we do want to encourage you to go read their full statements, which will be on the DOE website soon after this meeting at www.energy.gov/qer, and look for today's meeting date.

We're going to turn now to distribution and talk about our distribution system and how we cope with challenges and opportunities at that level.

To my left is Sean Trauschke, President of OGE Energy Corporation; then Scott Prochazka, President and CEO of CenterPoint Energy.

And I probably totally messed up both of their names.

Next to him is David Hallquist, CEO of Vermont Electric Cooperative; and next to him is Wes Kelley, Executive Director, Columbia Power & Water Systems.

To my right is Mr. Damir Novosel,

President of Quanta Technology and President-Elect of IEEE Power and Energy Society; and last but certainly not least is The Honorable Dianne Solomon, President of the New Jersey Board of Public Utilities.

So, Mr. Trauschke, the floor is yours.

MR. TRAUSCHKE: Thank you, Peggy. Thank you to everyone for the opportunity to participate in this review.

My name is Sean Trauschke. I'm President of OGE Energy. You know, for those of you not familiar with OGE Energy, it's the parent company of OG&E Electric Utility serving Oklahoma and Arkansas. Roughly, 800,000 customers. It's the largest utility in Oklahoma.

My comments today will focus kind of on three things: One, the value of the grid, and the changing dynamics of our business, the actions we've taken and the results we've achieved today, and the opportunities as we see them going forward.

You know, I think it's important when discussing the value of the grid to understand that the changes occurring not only on the generation side, but also evolving from the

customer expectations and how both of these will impact our grid going forward.

Beyond the increased regulations for generation assets, which put pressure on customer rates in utilities, technology is advancing in the form of distributed generation. We've talked a lot about that already this morning. You know, this is -- we've discussed as well changes in how the grid operates. But we have to understand the impacts and be part of the solution. You know, we are installing a number of solar DG facilities to learn how our system will respond.

But regardless of the economics, you know, I think it's important that we have to accept that there will be customers, regardless of the economics, who are going to pursue some of these options, and we need to understand that to make sure our grid remains relevant.

You know, on the other end of this spectrum are the customers. And I want to emphasize that the utilities are responsible for providing safe, reliable energy to customers.

And our rates at OGE are 20 percent below the national average. But I want to be clear that doesn't mean that we have room to grow

our rates. Rather, we want to keep our rates low and be supportive of the continued economic growth in our area.

You know, at the same time, customer expectations are increasing. You know, traditionally, customers were looking for price and reliability in their decision criteria. Going forward, they're looking more for services and control over their energy usage in bills.

So, as we think about the opportunity for the grid, it's -- I view it more than just an integrator, you know, I view it more as an enabler of an optimization of a system, focus on utilizing technology to enhance reliability, performance, but the same time customer engagement.

The broader engagement of customer providing realtime data and analytics which meets their needs is critical, but the way forward is to bring together traditional generation resources, renewable resources, distributed generation resources, along with customer demand responses realtime. That's the value of this grid. This not only continues the tradition of safe and reliable energy, but also enhances the technology tool that's out there.

You know, in 2007, we had a goal of avoiding any incremental fossil generation, any new incremental fossil generation, to our system before 2020. You know, we accomplished that -- are well on that way by adding 800 megawatts of wind. But we also went through and have fully installed our smart grid program, and that effectively shifted 150 megawatts off peak to us.

And so, you know, it's probably appropriate at this time, on behalf of our company and our customers, to be honest with you, you know, to thank the DOE for their -- their grant for -- to support our smart grid program.

You know, we did receive approval for that from our commission, you know, but that was a partnership. You know, we had to step up and commit to savings as well north of 25 million already and growing.

But, you know, we launched several customer initiatives as a result of that investment, reducing customer demand, and saving customers money. And we call this program our Smart Hours Program.

So we have a hundred thousand customers signed up, and basically, we're sending them price

signals to indicate when they can turn off and on certain appliances, set their thermostat to certain levels, and manage their bill, where they are actually in control. And, you know, we have over 99 percent success rate where, on average, they saved $149 a year with the savings. So significant savings. But more importantly than that, we've moved 150 megawatts off the peak, you know, all with the technology on the system.

The other opportunity that we see is really around leveraging the existing base to provide more products and services to our customers. And, you know, we think in terms of home automation protection, you know, along with other DGT type resources.

You know, we've been viewed as a valued and trusted partner with our customers, and we're focused on enhancing the product we're delivering. And there is significant opportunity for continued innovation, but it must be conducted with the knowledge of the entire process, not just a single point of the interaction. Meaning, solutions can't be tailored to treat just a specific segment, but has to treat all segments equally.

You know, innovation and growth are

achieved when all the segments benefit, not just one segment of benefits at the expense of others. So continued innovation is required, and we're looking forward to that journey.

So, with that, I'll stop. Thank you.

MODERATOR WELSH: Thank you.

Mr. Prochazka.

MR. PROCHAZKA: Thank you. Good morning everyone. I'm happy to be here today. I am Scott Prochazka. As Peggy said, I'm the President and CEO of CenterPoint Energy.

CenterPoint has a number of utility businesses. The one we're here to talk about today is our transmission and distribution utility that serves the Greater Houston area.

I'm also a member of the EEI, board member of EEI. I'm a past board member of the Electric Reliability Council of Texas, which is commonly known as ERCOT. I'm happy to be here today participating in this forum.

You know, the electric industry is undergoing a rebirth. It's evolving from one-way energy delivery systems to become a dynamic energy network transformed by digital communications, distributed generation, competition, and various

forms of innovation.

Consumers are moving from being passive recipients of one-way energy flows to becoming active participants in energy management, even supplying energy back to the grid in the form of solar panels or electric vehicles.

At CenterPoint, we embrace this future, and see tremendous potential in environmental and consumer benefits. For those of you who may not be familiar with us, as I said before, we are the electric transmission and distribution utility. We're in a deregulated market, and we serve the Greater Houston area.

We neither generate power, nor do we actually sell it. Instead, our focus is exclusively on the electric grid and how to provide safe, reliable and resilient energy delivery in a rapidly-changing market and in a rapidly-changing industry.

Over the last five years, supported by a $200 million grant from the Department of Energy, we've invested over three-quarters of a billion dollars in advanced metering systems, grid automation, and the associated telecommunications and computing systems necessary to run that

investment.

Two years ago, we completed the installation of 2.3 smart meters. We've also installed 750 automated intelligent grid switches on our distribution lines. And these investments are making a real difference.

Since 2009, we conducted almost 10 million service orders remotely, thus avoiding emissions of over 8,000 metric tons of CO2. We saved nearly 1 million gallons of fuel, the equivalent of removing over 2500 average commuters from the roads for a year.

Using our smart meter's power-off notification feature, we've restored power to more than 800,000 customers without them ever having to place a call to us. We are localizing outages 50 to 70 percent faster, and we're dispatching crews more quickly than we ever have before.

And thanks to the intelligent grid's fault localization and remote switching capabilities, we've avoided nearly 100 million customer outage minutes since 2011, and approved reliability approximately 35 percent on those circuits in which we've already installed grid automation.

When outages do occur, and we try to keep them as infrequent as possible, our power alert service notifies customers by email, text or phone call of when the power will be restored, and sends a confirmation to them when it is restored so that they can let us know if they in fact have their power back on.

Next year, with the end of our smart meter surcharge, we will have paid off our investment in smart meters and our initial investment grid automation.

Besides directly benefiting consumers, our smart grid investments are providing the infrastructure that's needed to allow other companies in the market, such as retail electric providers, to develop and sell additional value-added services.

Houstonians today enjoy many options for electric products and services that are enabled by smart meter technology, offering such a prepaid electric service, or free nights and weekends, as well as new tools to make more informed energy choices and manage their energy costs.

We are realizing many of these benefits today as I've just shared with you, we believe

these investments in our distribution grid are also essential to prepare for the future.

Emerging technology such as distributed generation, electrical vehicles and energy storage require a robust and resilient electric grid capable of managing two-way energy flows to thousands of generation points.

These new technologies require new training and new operating standards. We're collaborating with the DOE, as well as state and local government bodies, and a myriad of standards boards, technology partners, industry peers, and research institutions on numerous grid modernization issues, including things such as physical and cyber security, integration of electric vehicles, university curricula for smart grid work force training, and much more.

We're sharing the knowledge we've created through these collaborations with stakeholders from around the world. We have an Energy Insight Center in Houston, where we've conducted more than 800 visits from -- that have involved legislators and regulators and peer companies in the U.S. as well as many delegations from foreign nations.

This new electric future also requires commitment from our regulators to support these investments. We need financial recovery mechanisms that recognize the importance of the electric grid, and provide a fair opportunity to recover the cost of operating and upgrading this critical infrastructure.

We're committed to investing in a smart, reliable, resilient and safe electric distribution network. We plan to invest almost $800 million this year and several billion over the next five. We're committed to a smarter energy future, and we encourage our industry and the nation to share in that commitment.

Thank you again for having me here today, Peggy.

MODERATOR WELSH: Thank you.

Mr. Hallquist.

MR. HALLQUIST: I'm Dave Hallquist, the CEO for Vermont Electric Cooperative serving northern Vermont. We're a member of the National Rural Electric Cooperative Association.

Electric cooperatives serve 75,000 of the land mass in this country, and we serve those areas that are difficult to serve from an economic

standpoint. Tend to be the poor areas. And just in our case, we have about 14 customers per mile, so it makes our -- a challenge.

So we serve northern Vermont. We have 35,000 members. It's a beautiful piece of Vermont and a beautiful state. And I would say Vermont's beauty is more than just its esthetic beauty.

One of the things that I love about Vermont is our citizens still trust our government. We all work together, the regulators, the legislation, the governor's office for the people of Vermont. And rarely, do you find us misaligned. We work very hard to align ourselves. And maybe that starts with the fact that we still continue to have town meeting the first Tuesday of March every month to decide town issues.

We're a -- we consider ourselves a technology leader. And I'll back that up in a few moments. We've done an outstanding job of keeping the lights on. Thanks to our investments in technology, we've been able to reduce our outages by about 75 percent over a 10-year period. Our system average interruption frequency index right now is about 1.4 serving a rural area. That's pretty impressive. We're an A-rated company by

Standard & Poor's.

And we're committed to Vermont. Vermont set a goal of 2017 what we call renewables, which are not necessarily renewables according to the Federal Trade Commission because we still have renewable energy credits. But, however, we met our 2017 goal in 2013. We have about 20 percent of our power comes from these, quote, renewable resources.

If you look at where we started several years ago, in the year 2000, immediately when President Clinton allowed the GPS system to be used for domestic purposes, we immediately started GPS'ng our system. We started experimenting with what's called the smart grid today.

It was about 2005 when we implemented two-way metering. We implemented without any public investment, and it had less than five-year payback through the operational savings. In 2008, we integrated outage management system into that two-way metering system.

2009, we designed in house a software to allow our members to see hourly usage. In 2010, the entire State of Vermont together applied for a smart grid grant. We were part of that.

We began a -- in 2011 a DOE consumer behavior study, which was pretty much a disaster because we put our members on hourly spot market prices between the evening hours, and in the past two years, with the polar vortex, some of my members have been asking me did I trick them. There was a lot of public outreach to repair that one.

We implemented GPS tracking, estimated time of recovery, interactive voice response, iPhones to all field personnel. We've developed a utility partnership with IBM, developed advanced weather prediction software. We've given iPads to all of our field personnel, and we also have Smart phone apps. So we're trying to do it all.

Meanwhile, as we're focusing on our operational investments, there was this thing going on with the legislation called net metering. Of course, it was very quiet for many years. In fact, I was personally involved with the first net metering installation back in 2010.

But by 2012, things were running along pretty good. We had set a 4-percent cap, and we had hit our cap at 4 percent in 2012. We had told the legislation that we would really fight any

increase in the cap because 372 installations on our system, it was costing other members $580,000. There was significant cross-subsidization going on.

However, we in that partnership I talked about earlier, we did recognize that the State of Vermont wanted to increase the net metering cap to 15 percent. So we agreed to that increase as long as we were able to do some pilot projects.

Our sister cooperative, Washington Electric Co-op is doing a pilot cooperative with rates. We're doing a pilot cooperative with community -- community solar, utility-scale solar. We're going to demonstrate solar can be done without any incentives cheaper than market power.

We are also providing half of that as community net metering for our members because we've discovered that only about 25 percent of our members can actually do rooftop solar. We can do -- we can do solar for about half the price of rooftop solar. It's taught us an important lesson, and I'll get to that in a minute.

So, anyway, we've now -- Vermont has now increased the metering cap to 15 percent. It has not yet solved the cross-subsidization problems.

But the nice thing about our regulators is that they support pilot projects, and we're going to be able to, A, demonstrate we can do it for a low cost, and, B, our sister co-op is demonstrating that we can set tariffs and rates appropriately so that there is not cross-subsidization.

And, by the way, I talked to Patti Smith, the CEO of our sister co-op, on Friday. And she said members are adopting solar at a high rate even with the cross-subsidization problems fixed.

So I want to say we learned a valuable lesson. And I'm going to summarize it quickly since I'm out of time. But it really is this simple: We've been looking internally. We're now looking externally. We're going to really look and meet or exceed -- exceed our member expectation, not just meet them.

What I'll simply sum it up to say, any business can meet what the customers tell them they want. The smart businesses are figuring out what the customers want before they know they want it.

MODERATOR WELSH: Thank you.

Mr. Kelley.

MR. KELLEY: It's a pleasure to be here today to speak about the challenges and opportunities facing distribution utilities, especially with the rapid growth of distributed energy resources.

My name is Wes Kelley. I serve as the Executive Director of Columbia Power & Water Systems. We're the municipal, not-for-profit utility serving the City of Columbia and most of Murray County, Tennessee. We serve electricity, water and broadband to about 25,000 customers, all of which receive service through advanced meters.

I also serve on the Tennessee Valley Authority Regional Energy Resource Council. That is the engine by which TVA guides our stakeholder input for its integrated resource plan and provides energy policy advice to the TVA board.

The electric utility is placing unprecedented challenges, as we discussed here this morning. We're at the beginning of a significant change in our business model, and it's a business model that's powered our industry for a hundred years. I believe that utilities must actively manage this change if we're to continue providing affordable and reliable eletric service.

I'd like to make two points: First, the development of distributed energy resources has initiated a significant transformation in this industry. The integration of these technology-enabled resources require a thoughtful transition so that existing utilities are not merely reacting to these changes, but are rather able to actively plan and participate in their development.

Second, any transformative policy proposals must maintain safety, reliability and the lowest possible rates for all rate payers.

The bulk electric grid and indeed the local distribution systems were designed for central power plants to provide electricity through transmission, then distribution systems for delivery to customers. Now recent advances in distributed generation make it possible for industry, commercial and even residential customers to supply at least a portion of their electricity needs.

This disaggregation will continue because there's a drive by consumers to adopt distributed generation technology, and the cost central station assets face an ever increasing array of environmental regulation, making it

difficult and uncertainly on the best ways to plan and build these assets.

Columbia Power and my peers in the Tennessee Valley appreciate these advances. In fact, my public power brethren are at the forefront of this trend. Many public power systems have used small-scale, local generation and peak shedding for decades for reliability and cost savings.

In the Tennessee Valley, the Green Power Provider Program has been a model for promoting and integrating small-scale solar into the distribution grid. We're working with TVA and other stakeholders to determine the value of these solar resources to ensure that they can be integrated for a price that is fair to all rate payers.

We also have pioneered Energy Efficiency and Demand Response Program, working hard to engage customers by providing valuable opportunities to reduce demand. Since 2008, within the Tennessee Valley, we've avoided over 1100 megawatts of additional generation. That's 3 percent of the system peak.

With these advances, we must recognize

that a level playing field must emerge, that traditional assets and distributed energy resources are to coexist without compromising electric reliability and grid stability.

The central challenge, of course, can be captured in the following question: How do we as public power systems and utility regulators provide stable rates and ensure electric reliability as DER adoption increases? The scale in which DERs are being deployed is being unprecedented, and made even more complex because DERs are often installed behind the meter, and thus invisible to traditional power supply planning processes.

How DERs are valued in the grid cannot be dismissed. We cannot simply install new DERs and ignore the inevitable shift the utilities must make to accommodate, A, the variability of the new resource; B, the need to recover existing infrastructure costs; and, C, the need to provide reliable backup generation when a distributed generation source is not operating.

Utility rates reflect not just the price of the energy consumed, but they recover the cost associated with building and maintaining the

physical infrastructure. This infrastructure is needed to deliver power every day and all night.

It is essential then the intermittent nature of DERs be accurately valued in the retail rates. Specifically, with distributed generation, I believe that net metering schedules do not fully recognize this fact.

In the Tennessee Valley, we have a dual metering policy that helps ensure that cost can be appropriately allocated to participants and nonparticipants alike. In general, utilities should not have to recover existing infrastructure costs only from customers unable to or uninterested in installing DERs.

In closing, I'd like to make a following recommendation to the Department of Energy for inclusion in its QER report. The DOE should work with utilities to promote and encourage the development of innovative energy efficiency and demand response products and services that enable the efficient and effective management of the grid.

Also, DOE should encourage communication between regulators, utilities, DER developers to ensure that the benefits are not overincentivized

and that existing distribution assets are appropriately valued, especially avoiding undesirable cost recovery models to disadvantaged non-DER customers.

To facilitate the transition to a new model, the DOE should provide equivalent assistance in the form of grants, loans, technical guidance and otherwise to utilities working to integrate DERs into their territories, as well as the developers and installers.

Finally, I'd ask the DOE recognize that public power systems and my cooperative brethren, which serve thousands of communities across this country, are locally-governed organizations; therefore, monolithic and top-down approaches may be difficult to implement and perhaps unrealistic.

Thank you very much.

MODERATOR WELSH: Thank you, Mr. Kelley.

Mr. Novosel.

MR. NOVOSEL: I'm really honored to be here with this distinguished Panel, particularly considering that our industry is in a transition phase.

It's a crucial phase because the decisions that we make now will actually affect us

for the years to come. So the QER efforts are really crucial for the future of the grid.

I do want to emphasize IEEE is the largest professional organization that provides unbias and independent -- I want to emphasize -- technical leadership to electrical power and energy industry.

So that was one of the reasons actually DOE QER asked IEEE to provide insight in some of the specific set of QER priorities. And we have actually delivered that before to QER. It can be found on the QER Web page.

One of the reasons for this because we do provide outreach. IEEE consists saying vendors, utilities, regulators, academics and so on so we can really provide that unbias view.

I do want to emphasize a couple of things here. I don't want to repeat some of the comments that we heard today because the grid is more complex than it was just five years ago.

And you see that the electric power and energy sector will continue to evolve because customers -- we heard that today again. And options will also change. We believe that technology breaks will be happening, and also that

energy sources and their usage will be transformed.

We heard today that, for example, that demand can be reduced. However, if you look into the future of the grid, even the demand can be reduced if energy efficiency and demand response -- you'll see the use of the grid will increase or the -- let I'll rephrase that -- use of electrical power and energy will increase. For example, transportation modes can change and replace, for example, electrical energy with electrical vehicles will replace other forms of energy.

We also heard today that electrical grid is an enabler to support environmental goals. And this is very important to emphasize.

The next point I want to make and we heard a lot about some of the solutions. The importance of multiple solutions.

If you look at my tie here -- I don't know if you can see it from the back. But this tie has -- it has various sources of energy. And this is really the right approach. You cannot push for certain individual single solutions because that's not how it's really going to work going forward. So that's our strong opinion.

We also heard about -- also about aging infrastructure. And it is an issue because we had some -- in the last number of decades, we put effort in expansion of the infrastructures: Highway systems, electrical infrastructure, and so on.

But recently, in the last few years, or I would say a decade, the focus hasn't been really, as we heard from Mr. Joe Welsh, investment into the -- into the grade, hasn't been that -- that strong. So we do deal with age of the infrastructure. Very important aspect here is that you cannot look into the age in isolation. We have to look into the -- management.

And there's a big dilemma in front of utilities. When the storm happens, okay, let's put down efforts in storm hardening or investments in storm hardening when there is a physical -- then let's put money into the physical vulnerability, protection and so on.

Then there's the reliability issue -- but really all this issues are related, so we cannot address one individually. You have to look from the holistic perspective and address them all to be as cost efficient and achieve reliability

and security that we want.

There's one subject I can talk about for hours, but I think I don't have that much time. Other efforts I want to emphasize that the business model has -- has really changed. Some people believe that micro-grids will be the grid of the future, but others said there is no business case for the large proliferation of micro-grids.

First, we need to realize that when we started grid, the first electrical grid was a micro-grid. So there was a reason why for micro-grids we turn into large interconnected systems. And it was clear, cost effectiveness -- that's why we have a large power generation -- reliability, the connected -- Eastern Interconnection, Western Interconnection and so on was connected because neighbors can help neighbors and make sure that they have a more reliable grid. Of course, it was used for market, but that's another story. Let's not go into that fact.

So, at the same time, technology has changed. So micro-grids has a tremendous benefit for the grid. So, again, it's that whole balance.

So I do want to emphasize, firstly, when

you talk about transmission, we can, of course, move people from the areas like New York, the Midwest where the wind blows. But at the end of the day, I mean, it's not really realistic, so we do need to have a grid to be able to get renewable energy to the -- load the sources -- or to load to the consumers.

And I want to -- my time has expired, so I just want to emphasize a couple of short points here. One is that the traditional grid and micro-grids need to be integrated because there's tremendous benefits of micro-grids if they are in the context of integration with the traditional grid. And we can talk about it more.

And I do want to emphasize that our policy should support early creation and rewards results based and not unduly favor either non-utility micro responsors or incumbent utilities. This is very important point if you want to achieve safety, if you want to achieve efficiency and reliability, we want to make sure that we don't see a grid as free storage with some of the net zero initiatives and so on.

So that's -- that's my final statement. Thank you.

MODERATOR WELSH: Thank you very much.

Chairman Solomon.

MADAM CHAIRMAN SOLOMON: Thank you for having me here today.

The name of the Panel is How do we Cope with New Challenges and Opportunities. And New Jersey has certainly had its challenges. Seven major storms hit New Jersey since 2011, the most significant, of course, being Hurricane Sandy.

And there were many lessons learned. Utilities and regulators were impressed with the need to avoid power outages of the scale and duration sustained by the storm. Sandy shut down 71 percent of New Jersey's electric distribution system. 2.8 million customers were without power. That's 5 million people. It took the largest Mutual Aid Response, 17,000 workers, from as far away as California in 14 days to restore 90 percent of the grid.

Post Sandy, our four electric distribution companies were asked to submit storm preparedness and response plans, including infrastructure hardening, enhanced communications and smart grid plans, and I'm happy to say that they all did participate.

Then in early 2013, we opened the generic proceeding for all utilities to file mitigation and hardening proposals targeted at improving resiliency. And we are pleased to say that our utilities responded to our requests for distribution infrastructure projects.

The parties, the utilities, our staff, lay counsel worked hard to identify and come to an agreement on the most critical upgrades needing to lessen the impacts from future storms, especially on the electric distribution system. It wasn't limited to just electric utilities.

And the board approved a list of projects crafted by the parties through a series of settlement agreements and rate proceedings. Included in that was PSE&G's Energy Strong Proposal, which I'm sure many of you heard of, the single largest infrastructure investment program ever approved by the Board of Public Utilities in New Jersey.

Now, in a perfect world, I think all parties would have sought a more robust objective, but we don't live in a perfect world with an infinite supply of resources.

As regulators, we must always be

cognizant not only of the reliability, but also the consequences to the economic vitality of our state. It's businesses, annex, residents, all of whom shoulder the cost for infrastructure improvements and investments.

I think we achieve the appropriate balance by ensuring the investments are prudent and cost -- cost recovery was reasonable. We had GE do an initial report reviewing the -- our EDC storm hardening and smart grid and distribution automation plans. We have requested them to update that report and make recommendations. I frankly look forward to receiving that.

The storm also, in addition to the challenges, presented us with a number of opportunities. We recognize, as a result of the storm, the benefits of having distributed resources available when the grid was down. There were locations throughout the state that were able to generate their own power and remain operational. We are interested in making this technology available for the most critical facilities in our state, beginning with water and wastewater facilities.

BPU has partnered with our Economic

Development Authority, Department of Environmental Protection to develop an energy resiliency bank with funding from Community Development Block grant funds. The purpose of the bank is to finance distributed energy resources at critical facilities using micro-grids all in an effort to make our system resilient. A hundred percent of the financing is through a combination of grants, low-interest loans, and possible loan forgiveness, and we anticipate the need for capital investment in the future looking to end -- we're looking to develop that into the market.

New Jersey has some of the highest electricity rates in the nation. And we're always looking for ways to reduce our cost, and we believe distributed generation and the development of micro-grids within the state may be able to alleviate congestion in the number of constrained areas and provide resiliency to the system.

Currently, we have a proposal with DOT for a micro-grid to serve the PATH trains that runs in and out of North Jersey into New York City. A number of our municipalities have also expressed interest in micro-grids. So we recognize there will be changes along the way, but

we are very encouraged by the interest that we have already generated in these program.

So thank you very much, and I look forward to your questions.

MODERATOR WELSH: Thank you all.

So what we have heard was that all of you have been innovators in transforming the distribution system sometimes for the help of the federal government, sometimes privately funded, other times cooperatively, and we've heard sometimes through weather events.

So I'd like to ask each of you, since you've been at the forefront of transforming our what is one of the major lessons you learned we heard one of the lesson know what your customer wants before your customer knows that we heard there is no single solution, but from your particular perspective, what lesson could you give the QER Task Force that could be applied at other distribution systems were your efforts.

Mr. Trauschke, you want to start us out?

MR. TRAUSCHKE: So I think you hit on two of the key points, you know, one size doesn't fit all. And, you know, my opinion on that is that it's not -- we talk about, you know,

innovating the distribution grid. You know, that innovation, it comes in a lot of different forms.

And where I'm going is, we've looked at and we've installed 150 smart reclosers, where we can actually closer certain -- switch certain circuits and isolate many faults, but that doesn't fit for the entire system. It's for a specific segment.

We've also looked at being able to analyze and control fault indications so we can dispatch crews to the actual fault on an outage, instead of the interrupted device, but we do that on certain circuits.

My point is, is there there's a lot of opportunities across the system, there's not one size fits all about you're going to approach this. And I think from an innovation standpoint, we've made progress, but, you know, I think that's the other challenge. You can't stop.

And, you know, we talked earlier about customer expectations are continuing to increase. We've got to keep innovating. You can't stop and rest on those laurels. You got to keep moving forward.

And there's -- there's opportunities

across many different segments of your customer base based on, you know, social issues, based on geography, based on climate. There's a lot of different opportunities there, and so the opportunity is to make sure that you're looking at those and you're listening to your customers. You certainly want to be in front of them, but don't lose sight of the fact that they're your best -- your best voice for opportunities, too.

MODERATOR WELSH: Thank you.

Mr. Prochazka.

MR. PROCHAZKA: I'll try to be complimentary to what Sean said and not repeat his -- his comments, which I absolutely agree with.

So let me focus on a couple of things. One is the -- one of the lessons we have is around the use and value and the criticality around information technology. Utilities have traditionally grown up where IT investments have been, I'll just say, back office type of investment, back office type systems.

Clearly, in this environment, we have evolved to where information technology systems have become operations technology systems. They provide and conduct the actions at the front line.

They're the systems that make things happen out in the field. If they don't work properly, then the field activities aren't being executed on time as we promised our customers. So we have to have a new, fresh look at how to manage those systems. I'd say that's been one key lesson.

The other key lesson we've learned is -- and we knew this going into it, but we continue to remind ourselves, and that is this all has to be done with the customer in mind. It can't be a pursuit of technology for the sake of cool technology. It has to be done in the context of how this improves service to the customer, how you can better connect to the customer, how you can show them the value for this investment either in the form of them being able to make their own decisions around energy management, or being able to tell them about the system -- we being able to tell them about how the system is operating as opposed to having to wait for them to call us to tell them how the system is operating.

Thank you.

MODERATOR WELSH: Mr. Hallquist.

MR. HALLQUIST: Yeah, I would make the observation that, you know, we typically -- we're

in the middle of a radical change in our world. And when I go to these conferences, you know, I look at the age group, and we're typically on -- as any other business, the people that are in control are the older folks.

And what I will tell you is, I think there's -- we're looking at the world through our lens, and our lens is command and control. And I know in our organization, we started to shift that in 2012 because we recognize command and control is really an outdated function.

And when I look at the youth that come into our workplace, I love our youth, and I love our youth because they are not loyal to us. They don't care about us. And what that makes is a very powerful motivation for them because they want it done right, whatever that right is.

Now, you know, one of the things I will tell you in Vermont is, Vermonters are pretty united around their concern to solve climate change. Now, we may be a little different from the rest of the country, but it really is one of those -- but they also want their rates lower. So it's a tension that's -- that we have to always keep in mind.

But I will say that, you know, I do think the command and control is -- we have to seriously think about how we change that paradigm because the -- our consumers today that are -- you know, that are coming into the world are expecting things to be different.

MODERATOR WELSH: Mr. Kelley.

MR. KELLEY: Well, there have been excellent responses so far. I agree with everything that's been said on the Panel.

But I do think that something we can never forget is to communicate and education. And that's especially true to focus on in the local rate payer, because as has been mentioned earlier, we have to provide value to them. If we're not providing value to them, then they have a legitimate reason to be concerned.

Several years ago, one item that a lot of utilities took on, including my own, was the advance metering, smart metering type deployments. That required a lot of customer communication and education.

That's still going on. Matter of fact, I'm sending out a letter just today to a customer who said, you know, before that meter was on my

house, I didn't have diabetes, now I do have diabetes, I think that meter was involved in that somehow. Communication and education is very key there.

When we talk about distributed generation and solar and these other things that are going on in our business, education is a big part of that.

Within the Valley, we have a group that's been formed called Distributed Generation Integrated Value, and it's a group of stakeholders that's been put together by Solar Energy Power Association to try to come up with an equitable value arrangement for those solar resources so that when we communicate it to the rate payer, we can say, look, this is the value it provides, this isn't the value it provides.

So, obviously, there's a lot of give and take on that, but I think it behooves us to do the due diligence to make sure that in every decision we make, that we're representing the rate payer. Because this is an industry dominated by engineers. Engineers like to build things. Engineers like to design things. I have an IT background. If it has lights and cool controls,

then we think it's great.

The rate payer has a legitimate reason to step up and say is that really helping me. Especially, low income rate payers, we can't forget them as we look to strengthen the grid, make it more dynamic, make it more energy efficient, more renewable, greener. We have to make sure that we've not priced it out where a significant portion of our low income customers can no longer take advantage of this world, and then truly we will have a have and have not community.

MODERATOR WELSH: Terrific.

Mr. Novosel.

MR. NOVOSEL: The aspects of -- of making sure that plans are communicated to, we have an example in California, and California has been a little bit of a guinea pig for some of the energy policies and so on.

But after installing meters, some of the bill for the -- for the consumers went up. They were connecting not with the rate that has changed, but with the MIA infrastructure that has been stalled. So there was this real need to communicate and make sure that this is understood

well.

I want to emphasize that at the end of the day, with the consumers, we need to make it simple. So if I would -- I will look into the three factors that are important to communicate, as we are improving the grid and monitoring and deploying different technologies, is simpler, cheaper and comfort. Those are the three things that -- that consumers would like to see at the end of the day. So we can make it very complicated, but if you don't fulfill those three requirements, we don't really reach our targets.

I also -- what Mr. Kelley emphasized, that was very important, is how to treat various consumers. If you put your TVs on the rooftop and you get credit for it and you try to create a net zero house and so, it's all fine. But at the end of the day, as with this, again, in California, that -- that people that don't have as much money, that don't do this, and at the of the day, their rates go up because someone does have to pay for the grid.

Again, I didn't elaborate when I emphasized free storage, because we do need to emphasize importance of still connected to the

grid, and having a business model that properly covers that that grid is being maintained and operated and so on. And we cannot now get to the situation that poor people pay for what rich people are able to accomplish. So you have to be very, very careful with this.

I do emphasize technology as well because grid is complex, as we discussed. And that's why they require now more than for technology. We heard about was synchrophasors in the past and now, of course. But they're not in distribution because people see the complexity. So you really need to have better measurements. You need to have better monitoring. You need to have better models and so on and condition assessment and so on. So that's where some of the standards -- standards and like working with states and so and the utilities to make sure that this is developed in a unified fashion. It becomes very important.

And my last point, I do want to emphasize, we talk about smart grid and technologies and so on. But if a transformer is old, there's no way any smart grid technology can help. So, again, we need to get back to this ask

management holistic perspective; that if you take advantage of the technology, we look into the aging assets, we look into the physical vulnerability, look into the reliability.

MODERATOR WELSH: Thank you.

Madam Chairman.

MADAM CHAIRMAN SOLOMON: Thank you.

As I stated in our case, you know, events were driving very much where we are headed in the future, you know, at the present time. But if we're going to improve our system to, whatever the level, whether it be for resiliency or, as you put, to make it simpler, cheaper or more comfortable, we need to always consider improving communication, cooperation and transparency.

In what we've achieved so far in terms of our resiliency, that was really important in moving those procedures forward in a fast track away as we could possibly achieve.

And I would urge utilities and businesses that are interested in moving these technologies forward to be able to communicate, cooperate and present their proposals in a transparent fashion. I think we as regulators, regardless of what the proposal is that you're

going to present to us, need those basic concepts to be followed in order to move these policies forward in the most efficient way.

MODERATOR WELSH: Thank you.

So one of the things that we've heard is that the deployment of new technologies onto the grid, like micro-grids, energy storage, electric vehicles, DER all kinds, were focused on the Eastern half of the U.S.

Is it possible, can we handle it? The Eastern half is a bit more highly populated. What are your recommendations in terms of deploying those models of systems and installing those new technologies?

And why don't we start with Mr. Kelley, see if you have any opinion, and we'll go down from there.

MR. KELLEY: Sure. Obviously, DER, distributed energy resources, is a big concept. It basically captures anything that happens on the distribution side of the business or even behind the meter side of the business that -- that is sort of pushing power the opposite of the traditional way.

That can be demand response programs,

which I think have applicability almost everywhere, whether it's just peak shaving through an EnerNOC type of arrangement. Or in our area, in our region, we have a tremendous amount of electric water heat, electric water heaters, so we're working on a mechanism now to use those as basically energy storage devices, to heat that water at a time off peak, and then the water is heated, and then, you know, it rides through the peak, and then we heat it again on the backside.

So I think there are some regional innovative opportunities because certain parts of the country use power and use electricity in certain ways. And so you need to look for what is your high peak users and then try to limit those.

In terms of distributed generation, siding is a big issue. You know, in our neck of the woods, the best place to put a wind turbine is on top of the Smoky Mountains. Well, guess what, people aren't real knocked out about putting wind turbines on top of the Smoky Mountains, and so for that reason, we don't have much wind in the Tennessee Valley. We buy it from the Midwest and transport it in, which you can take from our previous panel on transmission.

And then when you talk about solar, it depends, right, it depends on where you are. I tend to think utility-base solar, community-owned solar, as was pointed out by other speakers, may make more sense than rooftop solar in some applications.

I don't want to ever limit a customer's ability to do something that can help them -- financially advantage them, and especially if they're concerned about the environment, we absolutely want to support that. We just have to make sure that the rate schedules and the policies are in place to make sure that the value that they're providing is equivalent to the resources that they're still continuing to draw.

MODERATOR WELSH: Mr. Hallquist.

MR. HALLQUIST: Yeah, when you talk about these new load sources, such as heat pumps and electrical vehicles and the advancing technology, I think it really drives and really -- it drives the importance of technology. Because I think it -- I look for the opportunity to integrate those because it allows us to optimize our load factors and more efficiently -- part of the system that are -- that can be cheaply used.

So, when I talk about getting to those implied requirements of the customer, that's one of the ways we can get there. So I think there's a -- there's a strong role to play for technology in integrating the distributed generation resources as well as new electrical load.

MODERATOR WELSH: Thank you.

Mr. Prochazka.

MR. PROCHAZKA: Peggy, I'll go ahead and answer this question, although we're technically not part of the Eastern connection --

MODERATOR WELSH: It's not the Eastern Interconnection; it's the Eastern half.

MR. PROCHAZKA: I never miss an opportunity to answer a question.

Let me take a crack at it from kind of a combined technology standpoint. I think this applies to wherever you happen to be looking at the use of these technologies. And that is to really consider maybe some larger-scale pilot activities that would combine a number of these different technologies on -- on a set of circuits, and really try to stress the system and see what would be happen. This may have to be a new one that you -- a new kind of test that's developed.

It could be an opportunity to use a certain area.

But I would say the larger scale you could make this, and in conjunction with as many different participants as possible, find a place where you can test these technologies. In particular, test those that are designed to help manage the grid from all these inputs that are coming on.

MODERATOR WELSH: Do you see a federal role in a concept such as that?

MR. PROCHAZKA: Possibly. I mean, certainly a supportive role or something that is supportive of having that formed. Could even be some funding from an R&D perspective that would be helpful in the regard. But I think being able to test these things in advance as large-scale deployment is always a good strategy.

MODERATOR WELSH: Great.

Mr. Trauschke.

MR. TRAUSCHKE: Thank you. I'm glad to be part of the eastern interconnect as well.

MODERATOR WELSH: Not interconnection, Eastern half.

MR. TRAUSCHKE: You know, I would agree with the previous comments. I think it's

important when, you know, we have to recognize that regardless of the economics, regardless of the technology, that there are going to be those customers that are going to utilize these types of resources. Those are going to be on our systems. I think our job is to make sure that we can respond to that, that we understand that, that we've done some pilots in advance of that, to Scott's point, to really understand what are the dynamics that are going to occur.

You know, I think the other piece -- and really to from your question about the federal government, I think it's important that, you know, each state, each community, each system is different, and so what works in one area of the country, or one system, is not necessarily going to work in another.

So I think where -- you know, we have more of a broader approach to things, and recognize that there isn't just one solution out there, that there's multiple solutions, I think is critically important. But I think the goal has to be really around increasing the value of our product. You know, we're delivering electricity to the home. We're expanding that delivery to

incorporate products and services to customers. That's what it has to be focused on going forward.

Thanks.

MODERATOR WELSH: Thank you.

Any comments, Professor Novosel?

MR. NOVOSEL: If you look at interconnection, we talk about Sandy and resilience now efforts, for example, with micro-grids to improve the resilience, I think these are -- these are the very important aspects.

At the same time, when Sandy happened -- or as Sandy was coming, some people are buying diesel generators for their houses. A number of people did that, and lots of people actually made good money by selling those diesel generators. I do want to emphasize now what do you guys think, is it better for each house to have a diesel generator or, let's say, the neighborhood to have a couple diesel generators, so one main one and the backup? So, firstly, it's actually more reliable, it's cheaper, so it's better for the -- for the end user.

Now we can extrapolate a little bit if you go to the micro-grid. So is it good to have a micro-grid that will be serving a couple of

communities and at the same time you can actually have a couple of micro-grids that can cooperate and work together?

So those are some of the, I think, initiatives we need to take to realize that to -- how we can help the end user to provide -- to get a better reliability exactly what I think Scott -- I'm sorry, Sean emphasized to get a better reliability.

And I do want to emphasize safety. We very often forget safety. Think about installing some of those micro-grids and DGs and so on. You know, during the life cycle, equipment gets old, can start failing. You're going to need to be very careful if there is a -- somebody that installed the micro-grid, but then leaves, is not maintaining it for the years to come, what's going to be the safety impact? So I do want to emphasize that as an industry we have to be very careful about this.

And I do also want to emphasize another aspect is the DG. There are some cost benefits, not just resilience, but, for example, if you have in the -- in the eastern -- the Eastern Interconnection, whatever, there is a little

different structure here. We know that. You need to operate a feeder, for example. So it can actually be more cost effective to put the micro-grid at the end of the feeder than to spend money upgrading the whole feeder. So there are some of these very good business cases. Because, again, I'm trying to avoid this one or the other fight. It's really the integrated grid.

Thank you.

MODERATOR WELSH: Thank you.

Final word on integrating these new systems and technologies, Madam Chair.

MADAM CHAIRMAN SOLOMON: Well, you lead right into my comment because I don't see it as an integrated as much as I consider it an inclusive grid, because without all the parties being involved in these discussions, whether I want to bring these new technologies to the State of New Jersey or whether my fellow commissioners want to employ these technologies really rely on a lot of people.

Personally, I need to be informed by industry, consumers, staff, my RTO, and I'm many times influenced by the practices from our other states. One of the most beneficial opportunities

for me is when I go to NARUC meetings or meet with my fellow commissioners to learn what they're doing. I think that more than anything influences how we're moving forward. We collaborate and really examine these technologies and try to find out exactly where they will fit into our scheme.

So I agree with you, in order to -- if you're asking me I'm going to employ these new technologies, all those considerations have to be evaluated in order to move forward.

MODERATOR WELSH: So we're running out of time, but I'd like to ask you each to give me your one specific recommendation that you would give to the QER Task Force. If you had two minutes with the Secretary of Energy, what would you tell him must be in this first year report on infrastructure.

Why don't we start over here with Madam Chairman Solomon and we'll go from there.

MADAM CHAIRMAN SOLOMON: I guess the one suggestion I would have would be to, you know, be willing to have all parties and states and interests involved.

Many times these recommendations come to us, and we don't have the type of input that

sometimes I think the states would like to have or the time. These are complex issues. As we stated here, there's a lot of competing interests. And the states have a unique role to play when talking about the integration and development of these technologies. So I would encourage the federal government and the QER to reach out to states that are innovators in those particular fields to get their input.

MODERATOR WELSH: Thank you.

Mr. Novosel, brief answer, please.

MR. NOVOSEL: Difficult for me, I admit.

I want to emphasize that sometimes technical issues are muddied with political aspects and so on. I would really like to separate technical aspects from the policy aspects and make sure that we make policy and regulatory decisions, we look into the clear and clearcut factual technical issues.

MODERATOR WELSH: Perfect. Thank you.

Mr. Trauschke.

MR. TRAUSCHKE: I would ecco, you know, the idea that, you know, I think it's important that there's sufficient engagement in this. And, you know, I use the word -- I think it's important

that the implementation is really at the local level. And that's not a state versus federal comment; that's really a function of don't lose sight of who the end user is. And that's the customer. And so they're looking for more and more services. And so you've got a very vocal group there that probably is closest to the business.

The other -- the other point I would make is, you know, I think it has to be geared around, you know, increasing that value of the grid to make it more dynamic to incorporate all these things because I believe it's -- it's more than any integration; it's really an enabler of this technology.

MODERATOR WELSH: I think Dr. Wayland would tell you that, though, this year is focused on infrastructure, next year will focus on generation and demand, but the third year, we're focusing on end use.

Is that right?

DR. WAYLAND: (Unintelligible).

MODERATOR WELSH: And for those who didn't hear her answer, she said it would be combined in the second installment. So we're not

going to forget that, and we'll have you back at that point.

Mr. Prochazka.

MR. PROCHAZKA: The message I would leave is that, over the last decade or so, a lot of the discussion has been focused around the need for investment of the transmission level.

And what we've been talking here today is to enable what the consumer is looking for. We got to recognize that we got to make substantial investment at the distribution level. And that's a message that I think needs to be -- needs to resonate.

Our own system is -- when I look at the dollars we spend to date at rate base, and I look at the annual spend we have, we spend twice as much on distribution-level investment today than we do on transmission. And that may be similar or different from the rest of the nation. We're in a fairly urban area. So it may be more like a 50/50 split. But it is a sizable amount of investment that is already on the ground, and we have to make investments to that level and invest in technology to accomplish the things we talked about today.

MODERATOR WELSH: Thank you very much.

Mr. Hallquist.

MR. HALLQUIST: I know what I'm saying is impossible, but, you know, they really have to keep the politics out and stay on the long focus because -- I will give you an example in Vermont.

You know, although we like to solve climate change -- you know, we had this polar vortex problem. We shut down our nuclear plant the end of this year so we won't have more problems next year. So, you know, meanwhile, we talk about solving climate change, but we can't necessarily shut down our coal plants either, so it -- it really is -- somehow we got to make it all work, and that's why my job is easy.

MODERATOR WELSH: Mr. Kelley.

MR. KELLEY: I would say the focus on value to the local rate payer, safety and reliability are obvious priorities. The rates are very different across this country, and they're different because we have different power supply realities and different sources of power.

Local utilities and local boards are the true enablers of a better grid, and so our focus must be keeping our local system strong and our local rates low.

MODERATOR WELSH: Well, we could spend the day talking more about distribution systems and innovations, but we're keeping people from their lunch.

So, with that, please join me in thanking this great group of speakers. Thank you all very much. Thank you.

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(Whereupon, a lunch recess was taken.)

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MODERATOR WELSH: I'd like to ask the Panelists of our Business Model Panel to please join me here on stage.

Thank you all who are watching us live stream while we ate a bite of lunch.

Let me remind everyone that we are going to be taking comments from the public, so we want all of you in the room to be ready to stand up and make a comment to the Department of Energy.

Those of you who are joining us via live stream, we encourage you to submit your comments to the comment box, which is qercomments@hq.doe.gov.

My name is Peggy Welsh. I'm with Energetics. We are a technical support contractor

to the U.S. Department of Energy. And it's my honor to continue to facilitate our meeting today.

We're focused on the Eastern half of the U.S. And our Panel today, this afternoon, is going to be talking about new business models.

Before I introduce the Panelists, let me remind each of them that we would like to hear your five-minute, shortened statement. There will be a timing clock here to keep you on time.

But all of you who are watching, there are full prepared statements by all of our speakers, and those will be posted on the QER website very shortly after this meeting, and that address is www.energy.gov/qer.

So, without further ado, let me introduce our esteemed Panel: Ashley Brown is Executive Director of the Harvard Electricity Policy Group; Ralph Izzo, Chairman and Chief Executive Officer, Public Service Enterprise Group; Steve Corneli, Senior Vice President for Policy and Strategy at NRG Energy; Tom Fanning, Chairman, President and Chief Executive Officer of the Southern Company; Greg Starheim, President and Chief Executive Officer of Kenergy Corporation; and The Honorable Garry Brown, Commissioner, New

York Public Service Commission.

We'll begin with Mr. Brown, and the floor is yours.

COMMISSIONER BROWN: Thank you very much. I appreciate the opportunity to be involved with this.

What I was asked to do was sort of set the context for the discussion. So let me just start off by talking briefly about the characteristics of the old regime that a lot of us think we're exiting from and where we're going and what those characteristics are.

For utilities, of course, the characteristic was very limited upside potential. There would be maybe a less downside than there is in a competitive industry, but on the other hand, there's more downside risk than upscale opportunity. So the symmetries are a little bit asymmetric.

The pricing was such that the customer saw -- the utilities were able to send to the customers were to put it kindly rather primitive, flat, and didn't give a lot of information as to what you could do other than pay your bill.

And there was a limited spectrum for

what -- socializing and privatizing of risk. It's not -- it didn't work at all like an unregulated industry, where a lot of the risk get privatized, but so do the opportunities.

This was a mixed sort of bag. Earlier discussions said it was politicized. That's fair to say. But I don't know that you'll ever get politics out of electricity.

We all like to say let's be politicized. I think all that does just means you re-politicize in other ways. I mean, the two are inextricably linked not for happy reasons, but that's just the nature of the business.

And you have bundled, non-discrete services and incentives. So it was, basically, the utility was the all service provider. That's obviously been changing for some time. But those are the characteristics of the old regime that's being challenged.

What's challenging it? One is rapidly changing technology, whether it's smart grid, whether it's new types of distributed generation or micro-grids, obviously new forms of smart grid, new ways of managing the grid, new ways of providing information to customers, customers

making increasing demands, the changing nature of customer needs.

Certainly, some customers have much more need for a liability than they might have in the past, particularly high tech industries. Consumers have more options. They've always had at least a few, but now there are considerably more in the marketplace. The resource options are much greater than they were before. Of course, that's always changing.

111(d) is hovering over everybody to see what that does to what our resource options are. And, obviously, the public is well aware, is much more aware, than it's ever been of the externalities and the issues that face that.

And the other is some of the legacies of the old regime, where we did dumb things because it didn't have consequences, dumb things like net meter reading, which had no particular consequences, changing circumstance.

Now, that's become a major problem. How do you transition away from people who have relied on subsides and cross-subsides and move in a different direction?

And we've got -- obviously, the biggest

challenge of all is the immergence of competition and on bundling. No longer do we rely on the utility, in most places in the country anyway, to be all things to all customers.

Generation, obviously, in many parts of the -- in fact, in all the country in one degree or another, generation is now competitive industry. That's at wholesale. We also, as we've been talking about, there's more retail -- more generation on the distribution grid than there ever was before.

Transmission is -- as we opened up the market for ancillary services and opened -- and we provided LMP price signals, obviously, the transmission business has changed fundamentally. Distribution has some of the challenges I was talking about.

Plus, now we've got all this new technology to manage the distribution quite well. And I also don't think that the public entirely understands that this is a fixed -- these are fixed cost and don't particular appreciate -- don't understand the full value of the distribution grid.

Energy sales is now separated in a lot

of -- in a lot of jurisdictions from -- from generation. So you've got people marketing supply. Metering and billing, at least in theory, could be opened up to the marketplace, and in some places around the world it already has been.

And so some of the customer intertie with utility either is being challenged or has been challenged. And, of course, demand-side services, which have been around for a long time, increasing emphasis on energy efficiency, demand-side services, which have affect, obviously, the business operations of the utility both in terms of what its responsibility was in meeting supply obligations, but also in terms of possible diminution of distribution revenues and the rate-making implications that has.

And so for utilities now, one has to look pretty carefully at what are the core services that really utility has to provide, and then the non-core services, the utility may or may not provide or regulators may or may not permit utilities to provide.

But, basically, the wires business is a core business. It's going to be hard to relieve at least -- somebody is going to have to be the

default supplier, although transmission is opened up a little bit in Order 1000. But distribution is clearly -- that's clearly utility function.

But just about everything else, at least in theory, is a non-core business that other people could enter into, and utilities are going to have -- are going to have to operate in a way that they're much more -- that they're the best performing entity to stay in the business, assuming they choose to stay in the business. For some utilities, they may -- as many of them have exited the generation business, some may choose to do -- exit other portions of the business.

And then you have a public policy question who's best -- best positioned to perform non-core and core services. You particularly have that in relationship, for example, to smart technology, where utilities are used to recovering on a depreciation schedule.

But now you've got the possibilities of assets being fully depreciated technologically long before they're fully depreciated economically, and that doesn't fit into the traditional regulatory paradigm as well as a lot of other things.

So I probably have exhausted my 15 -- my five minutes. Like a lawyer -- like a lawyer, I figured 15 -- you literally mean 15, not five, but I'll stop there. Thank you very much.

MODERATOR WELSH: Thank you very much.

Mr. Izzo.

MR. IZZO: Yes. So the topic as I understand is do the utilities and how we are regulated need to change. And the answer to that is emphatically yes.

However, I think it was Mark Twain who once said, however, the rumors of my demise have been greatly exaggerated. I think that would apply to us as well insofar as I believe utilities have a vital role to play in the energy future.

I say that because I'm a strong believer in the economies of scale. I'm a strongly believer of the economies of networks, and I'm perhaps an even stronger believer in the importance and value of universal service and universal access to service that is low cost, highly reliable, safe and environmentally advantaged.

I'll focus my comments on three specific areas. The first, I will just dispense with

quickly. And that is the core wires business, the basic distribution and transmission business. I think the major change that needs to take place in that arena is one of a regulatory nature.

To simply make -- make every effort possible to have a less adversarial structure around regulation, one in which allows for greater predictability of capital deployment, with the appropriate safeguards for consumers that -- that cost that are being incurred are indeed prudent but the days of the consistent one, two, three years of regulatory lag simply do not fit any longer with the need to invest in an infrastructure that has to be far more robust than it needed to be in the days of integrated resource planning.

The next two topics I'll touch upon are really related to a carbon constrained future and the need to be more efficient in how we use our electricity. And -- and -- and my favorite topic among these next two is that just that, energy efficiency.

A recent report from the American Council for an Energy-Efficient Economy ranked the United States 13th out of 16 in utilization of our

energy resources. The reasons for these are many and varied and legitimate.

I would offer you -- I would refer you to a report put forth by McKinsey that describes the very many ways in which the market conspires to -- to minimize and limit the amount of energy efficiency that's deployed.

It may seem strange as the CEO of a company that makes its money by selling electricity and natural gas to be an advocate for this.

I will simply leave you with this tease, that 50 percent of what we get paid for by customers goes to fuel, and I am not in the fuel business. So the key here is that for a reduction in energy use, the revenue decrease that my company sees, as long as that is less than the decrease in my cost of goods sold, I could take the obvious win for the environment, the obvious win for the consumer, and turn that into a win for my shareholders as well.

So energy efficiency, if properly regulated, can be a truly triple win for all parties involved, and it simply means that a 10-percent reduction in energy use cannot coincide

with a 10-percent reduction in revenues.

The third and final topic I will touch upon is that of renewable energy technology, in particular distributed energy technology.

I don't have the exact number, but I believe the median per capita -- the median household income in the United States is a number like $48,000. The median household income in New Jersey is $69,000. The median income of net metered customers in New Jersey is $130,000. The median income of solar loan customers of PSE&G, which is essentially a grant program, not withstanding the fact that we call it a loan program, is $150,000.

So those folks who are really at the economically disadvantaged end of the spectrum are all subsidizing people at the quite economically advantaged end of the spectrum. That is not -- that is not -- I repeat, it is not a knock on renewable energy. It is a knock on the way in which we encourage renewable energy.

And the change and the shift has to come from passing subsides through grants to individuals, and instead, focusing on grid-connected solar that allows utilities at a much

lower cost in capital to deploy these subsidized technologies in a way in which the subsides that are collected from all customers result in power that is distributed to all customers.

So, to the extent that we're giving rise to a new and a very important industry, at least the benefits are realized by all customers.

So I will pause there to simply -- and simply reiterate that I think the role of the utility in terms its ability to stream together customers, its ability to capitalize on economies of scale, its ability to be the -- the one who is most focused on universal access encourages me to say to regulators that whenever a subsidized product needs to be delivered to a customer, that one think carefully about how that subsidy is delivered, and by default, rely upon the utility to be the entity to do it, because the utility will do it with equal access to all customers.

MODERATOR WELSH: Thank you very much.

Mr. Corneli.

MR. CORNELI: Thank you. It's great to be here and an honor to be on this Panel and speaking to this audience about something as important as the business models that are in our

power sector today and how they may need to evolve in the near future. And for the Department to consider that in light of their QER work, is a great opportunity.

NRG -- just briefly because I think it bears on the discussion that the power sector representatives here will be having -- we are a -- not really a utility in the sense of being a regulated company.

We're a merchant or a competitive power company with 52,000 megawatts of generation, all of it essentially merchant or IPP generation. About some 3 million retail customers, all of them, customers, who choose us in a competitive market where states have decided to have that kind of program. And we are, I think, the third largest developer of renewables in the U.S. power sector. We have very active solar, wind.

Just last Friday, we had the ground-breaking ceremony for our 250-megawatt post-combustion CCS project in Texas. Large amount of distributed solar, both large-scale distributed and rooftop solar, and a number of reliability solutions like micro-grids, resiliency, backup generation, and EV charging networks. All of that

essentially done as a merchant or on a procurement model, as opposed to any of it being in our rate fix, which we don't have.

So my perspectives may be slightly different from my colleagues from -- who have regulated assets that they are stewards of. But in terms of the business model, I think the key -- the key thing to keep in mind here is -- the two Panels this morning pointed out -- is the distributed energy resources, including distributed generation, energy management systems, smart thermostats, little widgets you can buy to help turn on and off your lights when you are not at home.

These things today and potentially energy storage tomorrow are becoming widely available, increasingly cheap, and increasing attractive to consumers, who have more and more demands for resiliency, and to avoid the kind of outages that I know have -- have helped color Ralph's, you know, perspective on life and maybe his hair color a little bit, too, as he's running around taking trees off of people's houses and power lines several times in the last few years, including my house. And thank you very much for

that.

The modern consumer demands more and more -- more and more continuity of power, more and more, resiliency, more and more affordability across the income spectrum. And distributed energy resources increasingly are able to provide that because they're getting cheaper and they're getting to perform better.

At the same time, as we heard on the distribution panel this morning, the costs of T&D, but particularly the D, the distribution systems, are going up as people harden them, improve them, replace aging infrastructure, replace poles that broke off in the last windstorm, and basically meet growing populations that are extending service territories.

So this is a recipe for business model change. Because in the utility business, to simplify a bit, if costs are going up and sales are going down because people are generating more of their own electricity or consuming less of it because of energy efficiency, there's a bit of problem in that rates have to go up to recover the same amount of revenue requirement.

And as there's more and more cost to

recover from smaller and smaller number of sales, the revenue requirement in the regulated utility system not just in our view, but in many analysts' views, are increasingly at risk.

Now, this poses a significant challenge to all of us in the power sector because we all depend with our current business models on selling stuff through wires and through meters to customers either as regulated utilities or as merchants who sell to utilities or sell directly to customers ourselves.

So, in a sense, what I think we're seeing, going back to, Ashley, your sort of your actual overview is -- is the economies of scale and the economies of scope in the electric -- electricity sector being eroded and the pricing power or market power of a monopoly provider being eroded by the emergence of competitive alternatives.

This essentially has the potential to put revenue requirements at risk by imposing a sort of natural limit above which a utility cannot charge more without people just saying, gee, I'm going -- I'm going to go down to Home Depot or Lowe's or some other big -- that can buy equipment

that allows me to use a lot less energy, generate more of my own, and just save some money on this. And that, in our view, imposes essentially a kind of soft cap on the revenue requirement, future revenue requirement, of regulating utilities.

There's good news and bad news in this in terms of the business models in the sector. The good news is that because consumers and competitive firms that are providing these technologies and services can actually save money and enhance their own resiliency by spending your own money, there's less of a need for utilities to grow their revenue requirement and to spend more and more money on their system. Which is good news because it's -- that helps contain and make more efficient the money that utilities do spend.

And protects the revenue requirement for being at risk and the risk of stranded costs, and actually creates a more sustainable business model in our view for the regulated utility by allowing the private market to substitute capital where possible.

Dr. Novosel made this point about micro-grids on an earlier panel. Obviously, it is a huge savings if somebody else will spend money on a

micro-grid instead of a utility having to spend everybody's money on a feeder line extension or substation enhancement.

MODERATOR WELSH: Can you wrap up.

MR. CORNELI: So that's the good news.

The bad news is that right now we don't have a good incentive system or a good regulatory system for actually sorting out what the utility needs to do and what the competitive market can do.

Although, I will say a number of states, including New York -- and it's great to have Garry here. Maybe he'll talk about it a bit -- are going through regulatory sort of restructurings or re-envisioning of these roles to make sure that there is a way to get the most amount of private market capital injected into the market where -- into the distribution system where it can do so, and to refocus utilities on these more sustainable and more efficient uses of regulated capital.

So I'll stop there.

MODERATOR WELSH: Great.

Mr. Fanning.

MR. FANNING: Thank you. I'm going to give some really abbreviated remarks here. If you

want the more fulsome stuff, it's all over You Tube, it's all over Google. Look it up, it's there.

I'm going to speak from a perspective that is shaped by some of the roles I have here: Vice chair of the EEI. I co-chaired, along with Dave Cody of Honeywell, the North American Energy Security plan at the business round table. I'm Deputy Chair of the Atlanta Federal Reserve Bank, and I'm also Chairman under the Department of Homeland Security of Electricity Sector Coordinating Council, which is responsible for all things kind of to protect America from cyber terrorism, physical terrorism, and responding effectively to natural disasters.

Given that, I would say that the United States right now is in a position unlike any of our lifetimes and arguably your parent's lifetimes where we can set energy policy based on not shortages, but abundance.

And if we can develop a position of energy security, which I think we can, all we got to do is the right stuff, the United States can be energy secure by 2020; that is, a net exporter, not independent secure. Energy security breeds

national security breeds economic security.

When I think about the right policies that will underpin that position, it is to balance -- and that's a key word when you think about the right models to employ. We must have models that balance clean, safe, reliable and affordable energy for America.

Now, I come from the Southeast. Actually, I come from New Jersey, but I work in the Southeast. And we had an integrated regulated business model, and it has worked exceeding well. Our business model is predicated on delivering value to customers every day. That measures our success. We define success by providing the best reliability, the lowest prices with best customer service.

When you look at our ability to provide reliability, it is arguably number one in the United States. Our performance of our fossil hydro fleet is terrific. Our nuclear fleet, terrific. Our wires business, transmission, distribution is at now 12-year lows in terms of frequency of interruptions and duration of interruptions as they invariably occur.

I just last week got the latest customer

satisfaction surveys from our national polling processes. And the top four companies in the United States in customer satisfaction were Alabama Power, Georgia Power, Mississippi Power and Gulph Power. Those are our four companies. And our prices are significantly below national averages.

Now, I know there's a lot of science and interest and everything else around different models. I would argue you should really first think of the question what are you trying to fix, who matters at the end of the day here? It is the national economy, it is customers.

Forty percent of -- 46 percent of the customers we serve make less than $40,000 a year. Those folks make tough kitchen-table economic decisions every day. They want their kids to live in a better place, eat better, better medical care. They want a better education. Electricity is so foundational to that. Let's keep that as the face on the decisions we are about to make here in terms of models and structures.

When I think about the electricity policy that underlies this, I'm going to go really fast and put it into three buckets. The first

bucket is what is the kind of taking advantage of America's blessings in terms of a portfolio of energy resources.

It just so happens that because of the model we live in, Southern Company is the only company in America that is pursuing the, no kidding, all the above energy policy; that is, we are leading the United States in the renaissance of no nuclear.

We are building a coal plant we developed ourselves that will have a carbon footprint less than natural gas. We have made a huge shift away from coal to natural gas.

We have turned into one of the biggest developers of renewables in America, particularly solar, which is what I'm most bullish on. And in fact, the State of Georgia is the largest voluntarily solar program in the United States. We also have built for the benefit of the citizens of Texas the nation's largest biomass facility.

And then finally, energy efficiency, you hear a lot of talk about energy efficiency. In any element of strategy, there is always offense and defense. Our position is to take offense there. I don't think about energy efficiency as

something that is bad or negative or effectively may reduce sales. My argument is, if I can produce a product that on a per unit basis is more efficient, then I can convince people to use more.

Eighty percent of electricity consumption in the United States since 1995 has been electricity. It's the digital economy. We're going to continue to use more, and I'm going to play offense there.

The second policy position is really energy innovation. For a lot of reasons, people have withdrawn from innovation. We're the only company that does proprietary robust research and development.

And I'm a recovering CIO. Right, that was one of my career jobs. And the big joke is that Southern Company, most days, I thought CIO stood for career is over.

But when you think about all the innovation around -- actually, think about our business as make, move and sell. Okay. Distributed generation, I think is something that will naturally evolve. I think it's important. I think it's good for everybody. The game changer will be in storage. I think distributed

generation is a good thing.

Electricity vehicles, good things. Atlanta is the second largest EV market in the United States. It's the number one Leaf market in the United States.

The other thing that I know Ralph has spoken about in the past, and I agree with, we kind of define electricity services stopping at the meter. Why don't we think about extending products and services, and then finally, the whole information around energy consumption may in fact be worth some large segment of the energy product itself.

To wrap up then, the third area that still is really just kind of what is this right regulatory and political model. I think we have very tough regulations in the Southeast, but I think it is one which has been for us constructive, and I think it takes customers at the heart in balancing clean, safe, reliable and affordable energy policy. They've done, I think, a terrific job.

I think the fact that we have complete accountability, any time there's a problem, they know who to call, and any customer has a problem,

they know who to call, and when there's a problem on the grid, we solve it. And so therefore, you get for any big issue tremendous political buy in.

And I know there's important social issues out there today. We can wrap those up in our model. Finally, I think we can do great long-term planning as a result, which is really challenged in some of these deregulated markets. And I think it's worked well for customers. Keep customers in the middle of everything you do.

Thanks very much.

MODERATOR WELSH: Thank you.

Mr. Starheim.

MR. STARHEIM: Yes. Thank you for the opportunity to be here today. I represent the electric co-ops on this Panel today. My name is Greg Starheim, and I'm the President and Chief Executive Officer of a utility in Western Kentucky by the name of Kenergy Corp.

Together we serve about 56,000 members, and have been able to over the years to offer some of the lowest electric rates in the country. And as a result, we've got a very strong commericial and industrial base that we're very pleased to be able to serve and will -- are very pleased that

we're able to support some very energy businesses.

This Panel is about business models. Kenergy is one of the 900 or so electric co-ops across the country. We all share a very common business model, and that is to have the primary business objective, and that's to serve our members.

We do that as a sole business objective, and we do that across 47 states, some of which represent regulated states. In Kentucky, we do -- Kenergy is regulated by the Kentucky Public Service Commission. And approximately two-thirds of the electric co-op states are not regulated.

We'd like to share a few comments about offering distributed energy services. First of all, I would say that the co-ops take our business objective very seriously, and that is we are there for one purpose and one purpose only, and that is to serve the needs of the members in a safe, reliable and low cost way. As a result, Kenergy is very supportive of providing members information that allows them to better understand their energy use, and provide information through smart grid technology, software and through various mechanisms at which we can communicate

with them ways that we can analyze their energy usage, and make informed decisions on their ability to reduce their energy costs.

Secondly, we feel that we have a responsibility and obligation to help our consumers with that to come up with creative solutions that allows us to do this more on a more centralized basis, whether it's aggregation of demand response programs not just for power supply savings, but also perhaps to sell into RTOs as a product to further reduce operating costs, or to create community-solar opportunities to gain economies of scale where consumers, members could buy into those type of products in lieu of doing these on a distributed basis.

Another point I'd like to make has to do with rate design and rate structure, and that is whether or not current rates are fully designed to allow the electric cooperatives to fully recover their fixed cost of operating a utility plan.

If it is true that we'll see increased energy efficiency penetration as well as renewable energy penetration, then revenues should go down and energy sales should go down from electric utilities, and therefore, it's paramount that the

utility has the ability to recover fixed costs in their fixed man charges or energy service charges.

And that leads to a question whether or not that would lead to a discouragement or less incentive for consumers to be energy efficient, or it changes the economics relative to energy efficiency investments and also in renewable energy. I think those things need to be considered very carefully.

Lastly, I agree with Mr. Izzo's comments earlier. It is Kenergy's experience that those consumers, members, owners, what you call them in an electric co-op world, those that are participating in our energy efficiency programs, in our renewable energy programs are those consumers that are most able to afford those programs. And I think some serious thought needs to go into socializing the cost of some of those programs where those consumers that are least able to afford those costs and least likely to participate in those programs are paying for them.

Thank you.

MODERATOR WELSH: Thank you.

Commissioner Brown.

COMMISSIONER BROWN: Thank you, Peggy.

It's very difficult being the last person of the day to come up with anything that hasn't been said already.

But let me put it into a context from New York. The question was business models and regulation of regulated utilities, do they need change, and if so, how. The first half of the answer from New York's perspective is, yes, they need change. And the second half of the answer is, we're trying to figure it out. We're trying to study, but maybe we can provide a case study of getting ahead of this from around the nation.

So last April, we launched a proceeding called the Reforming the Energy Vision Initiative, nickname REV. Apply your own pun at will.

We currently have 259 parties participating in the proceeding, so I'm not concerned about variation of input. And what we're trying to do is really trying to take a look at the utility delivery system and all the pressures that are happening, whether we like them or not, that's changing the traditional model.

In 1900 in New York states, the Pan American Exposition was lit up but from 25 miles away at Niagara Falls. The first time

transmission was used to light up the exposition. We've been building off that model ever since. The exposition went well until President McKinley got shot, and that kind of went down the drain.

But the idea of this unidirectional power flow has been the model. The Hub and Spoke system has been the model that we have used very, very well. It's been a safe, reliable system for over a hundred years.

What we're looking at now is a series of events that we believe may be changing these dynamics. One thing that we've seen is certainly a greater desire for power reliability and power quality. And that's one that hasn't been mentioned today.

We've got a variety of microtechnology chip fab plants that require a very high level of power quality. So therefore there's a lot of additional equipment being put in.

The old one size fits all, you can have voltage fluctuations, ones that didn't hurt anything; it would work out well. What may not hurt your TV, may hurt a chip fab plant. So there's a lot of different that utilities need to do.

We see -- certainly, was discussed this morning -- the cyber and physical threats, and that the unidirectional system makes you more prone, quite frankly. You do a lot of redundancy to try to protect yourself, but there's a lot of key spots in any system that's designed like that.

We, of course, seen storm after storm after storm. I got on the commission in 2007. We've had seven or eight once-in-a-hundred-year storms. That math doesn't work. Either we've been extremely unlucky or something is happening.

The impending federal carbon reduction rules, the 111 (d) rules, depending on what the final requirements are is going to perhaps require a change. You just may not be able to do this in the old Hub and Spoke system, meet all the requirements of reductions that you need, and you're going to have to do more localized efficiency programs, demand response programs, et cetera.

Again, whether you like it or not, renewables are more and more providing power to the system, they are variable in almost instance, and you're going to need new reactions to be able to deal with that variability.

We've heard all of the different technologies that may be moving: Solar, energy management technologies, certainly storage, electric vehicles, all the different things that may be imposing some new requirements and new opportunities on the system.

And certainly, we've talked about smart grid and all the potential things that it can do with smart appliances and things like that. So it's going to be increasing use at the demand side to try to accommodate for all these things.

What we're trying to do is align the regulatory practices with these changes. That it doesn't necessarily equal that for utility to make more money they have to grow and they have to grow on peak and they have to put in more infrastructure. Why can't they make money by running their system extremely well using the demands response sources?

We need to kind of change our paradigm from capital expenditures to some of those operational costs that Mr. Izzo described that make up 50 percent of his bill. If he can help control those costs, why wouldn't we want to reward the facilities for doing that?

We're taking a look at the regulatory paradigm to see if there are some changes that should and will be made in order to make this happen. There's a lot, a lot of tough questions.

I give to you -- go to our website and there are pages and pages on it, but a recent staff proposal from August 22nd, I think you'll find extremely interesting as we begin to tackle some of the questions that we're going to have deal with in the short term and some of the more difficult questions that we have to deal with in the long term.

And finally, the red light is on, but I just want to say in this entire time, we have to be concerned with safety and cost. This is not done at any cost. This is not done at the jeopardy of the system, the workers, the utility workers. That is paramount, and it has always been paramount. But we believe you can achieve a lot of these objectives without jeopardizing cost and safety.

So, with that, I'll wrap it up. Thank you.

MODERATOR WELSH: Well, thank you all. I have couple of observations and then a question

to start us out.

What I heard from most of you are an outline of what you consider to be desirable characteristics of the grid in this changing environment that we need universal access to service, that deploying things like more DG and EE is desirable, but yet we need a portfolio, we need less adversarial regulations, and we need to socialize costs where we haven't before, and we need to look at regulation in light of newer requirements on the system.

I'd like to ask Commissioner Brown and then Ashley and then those who are actually practitioners in the middle to give your opinions on whether or not new regulations are needed to incentivize what you describe as the desirable characteristics of this new business model. If we do need regulations, should they be at the state level or at the federal level or should government step out?

Garry, you're already looking at that, so you may have easy and quick answers.

COMMISSIONER BROWN: Yeah. And I think the obvious answer from my perspective is, yes, we do need to look at the regulatory paradigm in the

way it's traditionally been used.

You know, you described things that are desirable or undesirable. You may just want to describe it as things that are going to happen.

If there are breakthroughs in storage technologies, it may not be whether it's undesirable, it will be that it will save consumers money, and they're going to start using them, then how is, again, the system going to accommodate it.

Again, I think what we need -- it has worked well, the system, but New York has increased from 25,000-megawatt peak load 20 years ago to 35,000-megawatt. And basically, we haven't really grown that much in population, and our manufacturing has gone down. We spent billions and billions of dollars to maintain this peak load. Our average is under 23,000 megawatts.

So you maintaining 12,000 megawatts of capacity for a couple of hot days that happen every other summer, that's a bazillion dollars that you're spending to maintain all of this. Time to look at some other approaches that deal with some of these issues, taking into account the technologies that tend to be a emerging at this

point in time.

MODERATOR WELSH: Ashley, do you want to comment based on the characteristics that you outlined?

MR. BROWN: I think regulation is always going to be change. Regulated industries and the investors in them are always arguing we need predictability. Well, there's nothing predictable about marketplaces. I don't think you can expect the regulation is going to be anymore predictable. It may be slower than markets.

But the fact is, I agree with what Garry said. A lot of these changes are going to occur anyway. So the question is how does regulation get out of the way or how does regulation accommodate them in ways that work.

So it seems to be the real focus of regulators needs to be on what are the incentives we're putting in place? Are we putting incentives to make things more efficient? Are we putting incentives in for utilities to do the kinds of things that Tom was talking about, encouraging more efficiency? Or are we actually blocking them?

And I think -- I think a lot of times,

regulators don't think through the implications of what exactly they're going to do. I think that's more important than whether you need new regulations or not, is thinking through what are the inherent incentives.

You know, Peter Bradford, one of Garry's predecessors of New York, always said, you know, when people said we need more incentive regulation, all regulation is incentive regulation. The question is an incentive -- the question is an incentive to do what, and I think that's what really needs to be thought pretty carefully through.

The other piece, Peggy, and it's in response to something you said about increasing more socialization. I'm not sure that's the direction we want to go in. There are certain costs that need to be socialized, but I think we need to get away from the idea that cost causers should pay for the cost they cause to be incurred.

So I don't think that leaping to the conclusion let's socialize the cost -- that may be easy, it may be politically easier to do, but it's the wrong thing to do from an economic standpoint. It's the wrong thing to do from an efficiency

standpoint.

So we now need to think broadly about incentives, but incentives for whom to do what, and what is it we want, what is it we want to see happen. There are always things we're not going to participate, and we need to be pretty facile and try do that. Although, I have to say, my profession of lawyers seems geared to make sure that nothing happens quickly or easily or intelligently.

But the point is that I think that -- that I think that your regulators need to also rethink through the processes by which they make decisions in ways that are open and fair and transparent, but are also reasonably fast and reasonably well thought through.

Thank you.

MR. FANNING: Yeah, Ashley, I think you're right on the money with most of what you said there.

I would argue that this socialization idea is a terrible idea. It's short-term gratification at the expense of long-term wisdom.

In general, I think we're much better off not having any new federal regulations. It's

not to say that there's not a place for federal regulation. NARUC has been terrific. FERC has been good.

I think the DOE broadly has been terrific. They are our research and development partner. We run the nation's carbon cancer research center. They do a lot of good things, so I think DOE has been a terrific partner.

I think right now with this GHG regulations being put out by -- by EPA, forget the wisdom of what we want to accomplish with carbon, the way we're going about that is just not workable.

At the end of the day, there's been a great example. I remember when -- of this kind of federal approach one size fits all versus the regional approach in where the states have, I think, the central role, which is also supported by law. And that is the response to Waxman-Markey. I remember when that was getting proposed, there was, I think, a initial response out of the Electric Power Research Institute, which came out with something called Prism. And if you were to accomplish 80 percent reductions in carbon by 2050, there was this answer for the

United States.

But very quickly we realized that every part of the United States was different. And so EPRI responded effectively with something called Prism 2.0, which came up with regional optimizations for how we might think about decarbonizing this nation's energy future. And I think that is a perfect example of where taking regional, local approaches is a much better answer than kind of a national one-size-fits-all approach that so much regulation looks like.

MODERATOR WELSH: Mr. Izzo.

MR. IZZO: So, specifically, to answer your question, I think at the state level two important things on the core business are more predictable and less time consuming and more promptly cover investments for the core infrastructure.

Number two, at the state level is a greater focus on bills and not rates. I think that it's the rare highly, highly educated customer that knows what their rate is. I would argue it is the customer of one who knows what their consumption is, but every customer can tell you certainly to the dollar, if not to the penny, what

their bill is.

So it's a greater focus on the customer bill than the customer rate. And the way we achieve those lower bills is by the utilities working in partnerships with the entrepreneurs, with the technology creators to cross beyond the meter into the home to use less energy.

At the federal level -- and that's -- by the way, I believe in the power of and, not in the power of or. Many of those technology providers can't sell direct. That doesn't mean that they can't reach out to preferred customers. What it does mean is they can't do that and conceal the subsidies that typically come from the economically disadvantaged to the economically advantaged.

Lastly, at the federal level stop picking winners and losers. Create a block grant program with clear policy objectives, and ask the states to tell you how they propose to implement the dollars that they receive, come up with the metrics what do you want to see done: Do you want to see pounds of CO2 reduced, do you want to see the greatest number of people at this end of the economic spectrum assisted so they can have some

opportunity to get on their feet and progress and lift up the middle class, what are the policy objectives you want to achieve, whether it's loans to nuclear plants, investment tax credits to solar, production tax credits to wind.

Stop with the dislocation and the distortions that you're creating in the marketplace.

MR. CORNELI: Peggy, just on this, there's been a lot of focus on this Panel and previous ones about -- about incentive subsidies, rate design, net metering, all that kind of stuff.

And I don't mean to minimize any of those concerns or insights because those are clearly big deals. I think all that discussion tends to overlook something incredibly important, which is that as the cost of distributed things like rooftop solar or like battery storage come down as the DOE gets closer, as the industry gets closer and closer to achieving goals for solar costs, just for one example.

No kind of right design, you know, no kind of right design or the elimination of subsidies is going to be sufficient to prevent the substitution of large amounts of distributed

energy production, management and conservation. It's done without people even thinking about their utility or their utility rate structure or utility programs from happening.

And that -- that points out, I think, one critical thing, which is I think is one of the motivators of New York's REV effort, is there has to be a better way to identify how the regulated infrastructure that we depend on for universal service, for connectivity, for safety, how it better integrates and supports consumer choices about things that will save them energy or produce energy or store energy or manage energy in their homes and businesses.

It's like, you know, we -- we regulate airports, but we don't regulate -- you know, we have competitive airlines. We don't have a competitive market providing airports; we have a competitive market providing airlines. We don't have a competitive market providing roads, but we have a competitive market providing cars and hotels and gas stations.

And so I think we need a regulatory context both federally and statewide, especially with the states, a way to better define what it is

that -- that basically utilities need to do to support the infrastructure, and what -- how that infrastructure in turn can support these competitive alternatives that are emerging.

MODERATOR WELSH: Thank you.

Mr. Starheim.

MR. STARHEIM: I agree with the concept that -- that we need to keep our eye on the ball, and that's how do we deliver electricity safely and reliably at the lowest possible cost.

If there are technologies or business models or third-party service providers that are developing that look attractive, Kenergy, for one, and I'm sure most electric co-ops, would be interested in working with them quite cooperatively -- no pun tended -- to provide that service to our members if -- if we believe that the true cost of that technology and program has been fully evaluated and does represent a savings for the member.

I would also just like to emphasize something that I said earlier, and that is the issue of subsidization. And that is I do believe that -- that those that do participate in these programs should be the ones that do fund those

programs and the cost associated with that service, and not socialize across all -- all consumers.

MODERATOR WELSH: So we heard on the last panel a promotion of a new business model that incorporates a high degree of micro-grids to hedge against and leverage against threats and vulnerabilities to the overall grid.

I wonder if you all could comment on what you think the vulnerabilities and threats are to the desirable utility business model, if there are any: Does micro-grids answer it, does lots of storage answer it, what's the most optimal way to address those issues?

Ashley, you want to start out?

MR. BROWN: You know, to the extent to which micro-grid means grid, I mean, I think a lot of those issues -- micro -- what micro-grids are good at is for people that need additional levels of reliability. It can provide that particularly if you've got voltage fluctuations and things of that nature.

But I'm not sure in the case of a hurricane, if you have a number of customers hooked up, that that does you -- how much good

that actually does you.

And, in fact, even the usual underground thing, as Con Edison will tell you, may not work as well as you think it works in theory. It protects you against wind all right, but there are other threats.

But in terms of having backup generation, you know, like -- solar isn't much of a backup either, I should say, because if there's a storm per se, there's no sun, there's no generation.

Gas fire generation or diesel generators may in fact actually provide some backup to individual customers, but to the extent to which you're relying on moving that to other places, you're vulnerable to a lot of the same forces. So I'm not sure -- or the same natural forces.

So I'm not sure how much of a benefit that is. There are benefits in other forms, like I said, voltage fluctuations so forth.

Storage, of course, is a whole different question. Storage has huge reliability benefits. It has huge economic benefits. I agree that you, Tom, said that it's a game changer. I think that's true. However, storage, A, is expensive;

B, it's still somewhat embryonic; and, three, it's -- it has its own set of environmental issues that are going to be difficult to resolve at least some forms of storage do. Certainly, batteries do.

So I think there are a lot of issues, but in terms of providing reliability, storage clearly provides an added level of reliability that we don't currently have.

Micro-grids, as I say, in some cases, I can see it; other cases, I remain to be convinced of that.

MR. FANNING: I would even argue that micro-grid is a manifestation of a problem rather than a solution to a better future.

There are some areas I would argue that the Department of Defense has long-term initiatives for a variety of things, but they're able to carry generation on their own sites and do that sort of thing. Otherwise, you're much better off having the resiliency of a network grid providing the needs of your customers.

The other thing you should just understand that, even in the event of kind of distributed generation solution, without the latent charge in the grid, which balances out the

power of quality fluctuations you're likely to see. If all you had was a solar cell in your house, you will burn up all your major engines and everything else. The fluctuation of the power quality will be very bad for the electricity function there.

You need something like a grid even in the sense of a so-called micro-grid. I think -- I think micro-grid is one of these ideas that it's sexy and it's kind of fun to talk about, but I think it's largely overblown.

MR. IZZO: I really want to zero in on something Tom said because it is so important because it applies not only to micro-grids, it applies to combined heat and power, plus there's so many other areas, which is there are places where it makes sense, number one.

Number two, there are no impediments to those technologies, be it micro-grid or combined heat and power or something else being deployed in those places where it makes sense.

Where I think policymakers go astray is when developers come to them and say and if you only give me this grant. And what they don't finish is by saying to overcome the natural

economic advantages of the grid, of the economies of scale, then I can make this work. Then whatever reasons -- the sexiness is perhaps an overarching term -- when the policymaker say yes, they fail to recognize what they've done. They've created an economic dislocation that will tend to remove the most preferential customers from the domain of the customer base, and threaten the very universal access that took us a hundred years to build.

So many times when I hear new entrance saying there's this movement, customers demanding it, my response is Godspeed. But they're demanding it after a 30-percent ITC, after a $200 SREC, after -- go on with the alphabet soup of subsidies that you're -- that you're putting on the back of the middle income and lower economically disadvantaged customer.

MR. CORNELI: You know, maybe for the first time on this Panel I feel like we're living in really different worlds than -- than our colleagues to my right and left.

I think what's motivating resiliency solutions, whether you think of it as a micro-grid or a nano-grid or a peco-grid, but, you know,

something that's -- where a customer can actually continue to have power after a hurricane or a flooded substation or a squirrel in a -- in a transformer substation someplace shuts off their power.

What's motivating that is people like having electricity, and they can't get it reliably from the grid no matter how much money people spend --

MR. IZZO: Then why do they need a $150 million grant to be able to do it?

MR. CORNELI: I don't -- I think, first of all, people like money. You know, like, that's econ 101. I don't think -- we're certainly seeing lots of interest in resiliency solutions where people don't need and they're not predicated on subsidies or grants -- I agree with.

And in terms of power quality and voltage and stuff, I mean, smart inverters, the thing on the Honda generator, you buy them at, you know, Costco, those -- those things work. I mean, they keep -- they keep the voltage at 120, and they -- they follow all the load in my house, and you pull the rope and you pour the gas in, and it follows the load, and it has all the inertia it

needs.

The thing that I think is missing in this is the notion that consumers are more and more dependent on electricity: The Internet, the smart electronics in the home, the way we communicate, not to mention freezers and refrigerators and furnaces and sump pumps.

And resiliency solutions are as mundane as keeping your basement from flooding and your furnace from being destroyed, and consumers want that, and they're there and they work and they're getting cheaper.

So to me the answer is, it doesn't have anything to do with avoiding subsidies. It has to do with giving customers what they want, and making the technology accelerate to do that, and do that in a way that doesn't undercut the ability to get electricity, and that actually synergies the grid. But not to say you can't do this because it doesn't work, because it does work, and not to say it's driven only by subsidies because it's driven mostly by people wanting to use electricity. So that's the way we see it.

MR. FANNING: Yeah, if you're in the business of serving millions of customers, I think

you will find that the micro-grid idea in a broad scale is not an idea that is economic to most of those customers.

If there is a national imperative, for example, DOE or somebody else will have, because the presumption is if you've got a micro-grid, somehow you've got generation that supports your micro-grid, right? Because you could have solar, but when Sandy hit, how good was that solar working during the middle of the morning or at night? You know, you had to have some sort of backup generation. You're going to have backup generation on your -- on your micro-grid, too.

You know, that's where I think the real disruptive idea -- I don't think micro-grids are a disruptive idea at all. I don't think distribute generation is disruptive.

What is disruptive is a long-term, especially local, storage solution for electricity. Now, it's too expensive right now and everything else, but that is the issue that our scientists and our R&D shops are working on, and I know a lot of people are, too.

Maybe there's some synergy between electric vehicles like people like Tesla. I don't

know. But that's the real thing we ought to be talking about, if you want to talk about what's disruptive.

MODERATOR WELSH: Mr. Starheim, any --

MR. BROWN: Let me add just one quick thing.

MODERATOR WELSH: Okay.

MR. BROWN: Because when I listen to Steve about what's driving it, I agree that there's a lot -- that aside, I agree with Ralph's comments about the subsidies.

But what's interesting -- and this is always a problem for regulators -- when you listen to Steve talk about what it is that's driving this, these are generally -- generally being driven by upper income people or businesses.

And so the case regulators are always going to be concerned with what's the equity, what's the -- and a lot of these subsidies that are pouring into these programs are socially regressive. I mean, Ralph has pointed that out. And I think we -- that's one area where regulators really have to step in and discipline.

I mean, one of the things that's interesting, there's always been a debate about

who ought to be looking at subsidies, should it be regulators or elected officials. I mean, both should be, but regulators are in a better position to do it because I think they're not completely free, obviously, from political influences, but also because a lot of this stuff is special interest driven, and somebody has -- somebody has to look out for the public interest, which is usually not driven by a particular special interest.

MR. STARHEIM: I mean, look at America's tax policy, that's another speech, and I'll save you that. But we need comprehensive tax reform in the United States. EIA's own data would suggest that renewables get something like a hundred times on a per unit of energy basis, a tax preference item, and recorded coal, oil and natural gas something like 35 times what's recorded nuclear. That's -- that's just not sensible.

MODERATOR WELSH: Commissioner Brown or Mr. Starheim, any comments on this one?

MR. STARHEIM: I think the question was do micro-grids potentially solve the security or a grid resilience objective, and I, frankly, can't make the connection there. There are niche

applications where I can see they do make sense.

Earlier, in one of the panels there was some discussion about NARUC encouraging state regulators to pursue vulnerability and resiliency and security efforts with distribution systems. And I think that's a great strategy, especially if we can borrow from what is being done with critical infrastructure, and Kenergy is very pleased to be working with the Kentucky Public Service Commission on that project.

COMMISSIONER BROWN: To begin with micro-grids, one size does not fit all. During Sandy, both New York and New Jersey had the experience of -- Princeton, New Jersey had to maintain their system. NYU in New York City was a bastion of light in the darkness of Manhattan because they had micro-grids.

One of the reasons I was really fascinated while we were in Princeton, they did it because they wanted to maintain a lot of research that was 40 and 50 years old that would be lost with an extended outage.

So it wasn't done because it was a cost-effective option, it was done for other reasons, and it had the benefit that during Sandy they had

lights out along when everybody else didn't.

Also, regulators and utilities can be a roadblock. Maybe laws can be a roadblock. Right now in New York, I know if you cross a right of way, you face all sorts of different regulatory responsibilities than if you're an island in site that doesn't cross the right of way.

Many, many years ago, when utilities weren't as progressive as they were today, we saw examples of gold-plating interconnection costs that discouraged the load from dropping off the system, and because the utility had economic incentive not to lose that load, so they -- they have discouraged micro-grids.

So it's not the be-all, it's not the end-all, it is -- and I want to emphasize, you know, the inverter may work pretty well on the home system. Having a micro-grid means most of the time when the system goes down, you go down, unless you spend a lot of money to put in protective equipment that maintains the viability of the system. So it's not a simple answer on micro-grids.

MODERATOR WELSH: Okay. Well, in the time we have left, I want to ask you all, the QER

Task Force is going to be writing this first year's report focused on infrastructure, as has been said previously, and we're talking about how business models can influence that infrastructure.

I want to give you a chance to tell the QER Task Force what one specific recommendation you would give them as they write this report.

Mr. Izzo, you've been very articulate on what you think policymakers should and should not do. So let me start with you, and then we'll give Ashley the opportunity to set the stage and conclude our discussion.

MR. IZZO: Thank you.

I guess what I would leave you with is, simply, if there's one point that I could make, it's that we do not spend a enough time thinking about how we could make energy efficiency the centerpiece of our energy policy.

Inherent in energy efficiency is the opportunity to lower the bill for the customer, reward the investor, and improve the environment, as well as diminish the future demands on the system. That balance can be achieved if all parties recognize their shared benefit. If the customer wants it all, if the investor wants it

all, it won't happen.

The role of the federal government is to direct its granting of funds, its policy pronouncements, its creation of standards in EPA and DOE and whatever other places towards reducing the energy demands of this country so that we're not 13 of 16, but we're number one of 16.

MODERATOR WELSH: Mr. Corneli.

MR. CORNELI: I think the single biggest thing probably for the QER to -- to consider is, is right now, I think the federal energy policy, like most of our thinking about energy policy, really wants it all. We want really cheap distributed resources. We want really cheap grid scale resources. We want more transmission to connect the chief grid resources with load centers. We want more distributed resources in the load centers. We want harder and more resilient distribution systems all because we want a healthy economy, and we want cheap, affordable, clean, sustainable reliable energy.

I think the issue to consider is that there are positive and negative tradeoffs between those, particularly, when people -- when energy efficiency is successful, when distributed energy

is cheap and successful, that will be -- it will be harder and harder to pay for the regulated infrastructure.

And there needs to be more thinking about how to integrate both those kinds of clean energy, you know, grid-connected and customer-connected clean energy, with a resilient, robust distribution system, and the business models that are necessary to pay for that.

MODERATOR WELSH: Thank you.

Mr. Fanning.

MR. FANNING: The United States has this opportunity to create for America an unassailable advantage to grow the economy versus any other worldwide economy, to create jobs, grow personal incomes, and make American lives better. To do that, we're going to have to not rely on single-issue politics or policy setting, but rather balance this notion of clean, safe, reliable and affordable.

We're going to have to truly take advantage of the -- of the portfolio. We're going to have to set as a national priority the reinvestment, re-energization of innovation in this business. And I think to the largest extent,

where there is a key role for America to play in terms of setting reliability standards and in terms of investing in R&D and energy innovation, my sense is allowing the states the most flexibility to decide what's best for their state, their region is the most effective way to go.

MODERATOR WELSH: Mr. Starheim.

MR. STARHEIM: Yeah, I would just add two points, and that is, regulators, as they consider any of these programs, to consider the true cost of these programs, and allow the utility, particularly electric co-ops, to work with third parties on implementing them.

MODERATOR WELSH: Commissioner Brown.

COMMISSIONER BROWN: At least one area that I believe should be a focus is this paradigm shift from the unidirectional grid to something a little more complex. It's going to happen at different phases in different areas.

I can guarantee Kentucky will move at a different phase than New York City, and that's appropriate, the effects of this is going to be.

But we really do need to understand if we go to this more diversified, less unidirectional type grid, what are the

ramifications of this on system reliability, safety, cost and customer satisfaction, at least those.

Times are changing. Technology is changing. I mean, all of us that are regulators went through this with the telecom industry over the last 20 years. We couldn't have predicted it. We wouldn't have predicted it. We would have gotten it wrong, but it happened despite regulators. And I see the same sort of thing evolving in the electricity industry, and hopefully this time we can think about the ramifications of it before it hits us.

MODERATOR WELSH: Mr. Brown.

MR. BROWN: Trying to summarize, at the risk of missing something, I mean, there's several themes that could come out of this that would be useful for the Department to think about. One is that Ralph has articulated over and over, which is the need to contemplate the role for energy efficiency, and that should play a premier role. And that means a lot of things. It means pricing needs to be right, the incentives need to be there.

The second is we need to enable

innovation, encourage it, get out of the way of innovation occurring, but beware of the subsidies you used to do it. Not because you should never ever subsidize, but rather, if are there are going to be subsidies because for some particular reason, then they need to, A, have a public policy rationale to them, and then they need to be designed to be that, and not a permanent system of support for some particular interest groups. So encourage innovation, but use subsidies in a very -- in a very guarded sort of way and you use them intelligently.

Two is to the extent to which you can -- we can move things. We try to use market mechanisms because markets tend to produce sufficient results.

That being said, the flip side of that is regulators always are going to be concerned about equity and the impact on the customers, and that's always going to be part of it. The electricity system has the universal service as a goal, and that means that one has to think about impact.

I'm reminded of a decision -- an opinion of Justice Douglas in the 1940s, where he said,

you know, the question is not how regulators do things, but what's the impact of what it is they do. And that is a more important measure of how to do of looking at what regulators do. So you've got to balance the use of the markets with -- with the -- with equity and the impact on customers.

There needs to be an overlying discipline to everything in the industry, whether -- and there's only two kinds of discipline that really apply; one is market discipline. The competition does it. And where the markets are imperfect -- we know they're usually always perfect -- usually always is not a phrase to -- but in any event, the other is obviously some sort of regulatory oversight that is designed to replicate what a market would have otherwise produced.

And then finally, not to ignore the value of the basic infrastructure, particularly the distribution grid or the transmission grid. Their value is important, but it often gets overlooked, and it's often used as leverage to do other things. I think we need to value it more and look at it and look for its intrinsic value.

Thank you.

MODERATOR WELSH: Well, I know we could spend the afternoon on these issues, but we're out of time. Thank you all very much. We've learned a lot today. And please join me in thanking this great group of speakers.

We will turn immediately to the open mic session, so please stay with us. We'll just set up for that momentarily. Thank you.

Dr. Wayland is the Deputy Director for State, Local and Tribal Cooperation in the DOE Office of Energy Policy and Systems Analysis. She heads a large team of analysts who are responsible for all of the outreach and analysis going on on the stakeholder input.

And so with that, Dr. Wayland.

DR. WAYLAND: Thank you, Peggy.

I first want to thank all of the Panelists who took time out of their busy days running companies and working for state governments and elsewhere. I know that this is not a -- we didn't give you a lot of planning.

But I want to tell you how incredibly useful this has been for us. These meetings continue to be useful. I'm taking copious notes. But you should also know that we have transcripts

of all these meetings that will be posted on our website at energy.gov/qer.

I have found myself saying many times saying not only to the Secretary, but to the White House and other people in the Administration here's what we're hearing in the stakeholder meetings. So these -- these meetings actually will not only inform our analyses, but be part of the recommendations that -- that we put forth in the QER.

I want to thank the DOE staff that are here: Larry Lancelleti (ph), Matt McGovern, Lauren Morton and Alex Reckel (ph), and Peggy's wonderful Energetics team with whom we would not be able to do this without them, and, again, to thank the New Jersey Institute of Technology for hosting us.

And with that, we are looking very much forward to the public commentary. Again, we have transcripts of the entire meeting, and any comments that are made by the public will become part of the public record and, again, will inform our recommendations.

MODERATOR WELSH: Thank you.

So we have three people who have signed

up in advance, but we want to encourage any of you in the room to have the guts to come to the microphone.

And for those of you joining us via live stream, we would really like to have your written comments.

So our first commenter is Jennifer Chen.

If I could just say something, if you've got prepared written comments, we would love to have you share those with us as well because the Court Reporter is going to be taking copious notes. But if you actually got a prepared statement, that would go a long way in helping her make sure she's captured all of your notes.

Okay. Thank you. And I'll be keeping watch. You have a timing clock there. Five minutes.

MS. CHEN: Good afternoon. My name is Jennifer Chen, and I'm an attorney with the Sustainable FERC Project.

The project is a coalition of states, regional, national, environmental and public interest organizations working to expand its deployments of cleaner and more efficient energy resources into America's electricity transmission

grid.

We advocate at the Federal Energy Regulatory Commission and regional transmission organizations, and are housed in the Natural Resources Defense Council, the organizations' energy usage patterns and resource generation portfolios are evolving to embrace a more lower carbon and renewable resources as well as market mechanisms to increase energy use.

EPA proposed Clean Power Plan will further this progress on this meeting on transmission storage and distribution is an important step in understanding how electric grid infrastructure and related markets should adapt to facilitate or continuing adoption of cleaner and more efficient energy sources. This will benefit consumers, businesses and the environment.

The Quadrennial Energy Review had the opportunity to help us transition to clean energy most cost effectively by providing a comprehensive road map for the electricity sectors.

Our recommendations today to the QER pertain to three points: Expanding access to renewable energy, broadening the geographic scope of regional transmission

planning, and including modeling the playing fields for demand-side resources in the transmission planning process.

First, investing in and modernizing the transmission system is critical to expanding clean energy resources like wind and solar power.

A well-connected diverse grid is also vital to reliability and the efficient operation of wholesale electric markets over large regions. So long as transmission is smartly sited, there is broad stakeholder support for transmission expansion into -- to integrate renewable energy into the grid.

Second, Order 1000 is an important step in the right direction because it requires grid planners incorporate grid needs driven by public policy requirements such as state renewable portfolio standards and the pending Clean Power Plan into their system plans.

However, Order 1000 can and should go further. Order 1000 requires that the regions develop a plan for themselves, but that neighboring regions only coordinate with each other, not necessarily develop an interregional plan.

FERC could require more interregional planning that will enable transmission projects necessary to integrate renewables to move forward in a timely manner.

The Eastern and Western Interconnection Planning Collaborative, for example, have demonstrated the value and potential of interconnection wide planning, and that should be continued.

The misalignment between the political boundaries of state and regional policies, and the geographic boundaries that the interconnected transmission grid is also a problem worth emphasizing.

The Quadrennial Energy Review could compliment Order 1000 planning by providing guidance, and help planners and policymakers can reconcile state renewable portfolio standards or carbon pollution standards with grid and RTO footprints that do not respect state boundaries.

Third, the QER should recognize the value of demand-side resources in not only distribution, but also in transmission system planning. Demand response, energy efficiency, storage and other energy saving, non-transmission

alternatives can enhance grid flexibility and reliability just as well and at equal or lower cost than traditional transmission, reducing and optimizing generated and capacity -- and capacity maintained, but also the amount of transmission capacity that needs to be built.

Also, non-transmission alternatives can help provide flexibility to the grid needed to integrate higher penetrations of renewable energy. Currently, most planning processes are bias in favor of transmission solutions giving demand-side solutions short -- in order to fully take advantage of non-transmission alternatives, demand-side resources, distribute generation, and other non-transmission alternatives must receive comparable treatments in the markets and planning process, and regional planning must more accurately account for load reduction from demand-side resources in the forecast.

In conclusion, we respectfully request that the Quadrennial Energy Review emphasize non-transmission alteratives as a means of providing flexibility and reliability benefits that will enable efficient use of existing transmission, in addition to allowing electricity demands to be met

at lower cost. We also request -- request the QER to recommend further study into interregional planning processes.

Thank you for the opportunity to provide these comments.

MODERATOR WELSH: Thank you.

Our next speaker is Jimmy Glotfelty.

MR. GLOTFELTY: Thank you very much. I appreciate the opportunity to speak here. I won't take five minutes because I will submit our written comments later on this week.

But I wanted to talk about HVDC. I know that comes to a shock to all of you all since my company is developing four HVDC lines.

Nonetheless, I'm going to talk about HVDC lines, some as they pertain to clean line, but most as to how they pertain to getting to a cleaner generation going forward.

As you all know, we have three HVDC projects in the East. I won't talk about the one in the West, but northwestern Ohio to just south of Chicago, southwestern Kansas to the Illinois border, and the panhandle of New Mexico to Memphis, Tennessee, which would serve the Southeastern United States.

The goal of all of these projects and the goal of most of our -- the other DC projects around the country are to move low cost wind energy.

If your goal -- part of the goal of the QER is get to lower cost cleaner energy to load centers, then some type of a transmission system has to be built because the underlying AC system is not there and is not robust enough to move that.

Even with the closing of many coal plants, there are still voltage and other issues that have to be resolved if you're going to try to move that much on the AC system.

If another goal of the QER is to reduce CO2, wind, utilizing wind in the center part of the country, and moving them via DC line, you move a huge amount of power. So you can eliminate a big slug of CO2 pretty quickly if you can get those lines built and that power into the resource mix.

For our three Eastern projects, you'll be reducing, if we're successful, combined, the three projects, you'll be reducing 31 million tons of carbon on an annual basis, so about 10 million

dollar -- or 10 million tons per -- per line. So you're getting, you know, quite a big slug of CO2 reductions.

That goes for projects in the

West also because these HVDC lines allow for moving huge amounts of power: 3000, 3500, 4000 megawatts of power.

You get huge economies of scale. DC lines are also important when it comes to right of way management. If you were going to move lots of wind energy or even solar along the AC system, you need to use a lot more right of way.

Again, the economies of scale of a DC line, 3500 megawatts of -- on our 600-kV line can be moved in a 200-foot right of way. If you're going to do that on a comparable AC system, it will have to be three or four times that. So you're dealing with lots more land owners if you use just the AC system or have to build a new AC system.

DC makes perfect sense in this regard. Utilizing DC lines obviously helps the manufacturing base here in the U.S. not only on the wind and solar slide, but those who make components for transmission lines, the conductor

manufacturers, the insulator manufacturers, the steel manufacturers, concrete, rebar. I mean, that's really what a DC line is, and then you have some semiconductor components called varistors.

But the majority of all that is a local homegrown manufacturing job. So DC is a not an international business, while it is an international and a high risk side, much of that is just the transmission piece, which is really a homegrown business.

I know you all as you're writing a report have encouraged folks to put citations in their documents to make it easier for you all, and you'll see that in the documents, but -- that we submit.

But I wanted to go, point you back to the Joint Coordinated System Plan, the EISPC, which DOE funded. You all have done a lot of this work or your dollars have funded a lot of what needs to be done or considered for DC lines going forward.

The EISPC said that six lines should be built if we want to move as much wind as we need to the East. The JCSP, the Joint Coordinated System Plan, which was PJM, MISO, SPP, a handful

of utilities on the Southeast, they said seven DC lines they were -- SPP has said that DC lines are more economic to move large amounts of wind. It just makes sense.

We are not the global leader in this space, but we can be. We don't need to follow China, India, Brazil. We can lead in the space going forward. As we drive down the cost of DC converter accelerate, it can be used on a short and shorter basis to improve resiliency and other issues that have been discussed today.

Thank you all very much.

MODERATOR WELSH: Our next speaker is William White, who otherwise goes by Bill White.

MR. WHITE: I do, I do go by Bill White.

And I'll start by identifying myself. I'm Bill White, President at Norton White Energy, and here on behalf of Americans for a Clean Energy Grid, a project of the Energy Future Coalition.

Americans for a Clean Energy Grid supports policies to modernize the nation's electric power network, and unlock clean energy and economic opportunities across the country.

As we said by many speakers today, the value of the network is difficult to overstate.

The backbone of a clean electricity system in a strong national economy is a resilient and reliable transmission grid.

Electricity is a necessity of modern life. Any of us who's been through a storm or you've lost power for several days in recent years, and many of us here have, knows how different our lives are with and without electricity. It's not a luxury. We have to have it to conduct our daily lives. And it will become even more important, as Secretary Moniz said today, going out into the future.

Smart state and federal policies improve the way the grid is developed, planned and paid for to accelerate the process of making it more robust, reliable and secure, and support expansion of renewable energy, competitive power markets, energy efficiency, and lower cost for consumers.

We hope the Department -- we're very supportive of state efforts, of regional efforts, of local efforts to promote energy efficiency, distributed degeneration, storage, smart grid technologies, demand response, all of the demand-side resources that are happily proliferating around the country.

That said, we're looking to the Administration and to the Department in its role as Secretariat for the Quadrennial Energy Review to deliver a national vision for what we need, one that obviously respects the role of the states, the role of the regions, the role of the RTOs.

But to give us a vision for what that network will look like and what are the best ways that we can move toward getting there more quickly, it's going to involve HVDC accelerate, it's going to involve high-voltage AC technology, it's going to involve a lot of new smart technologies from the top of the system down to the bottom.

But of all the investments that we at Americans for a Clean Energy Grid see that we need to achieve reliable, clean, low carbon electricity going forward, the network, I'll put it, the value of the network, is really the one indispensable investment that we have to have going forward. And we look to the Department to help deliver that message as part of the Quadrennial Energy Review.

Thank you.

MODERATOR WELSH: Thank you. Is there anyone else in the room who last minute decided

they wanted to make a comment to the QER?

All right. With that, let me turn it back over to Dr. Wayland for closing remarks.

DR. WAYLAND: I don't have any closing remarks, other than to say this has been another fabulous meeting, and I thank you again for all of your participation.

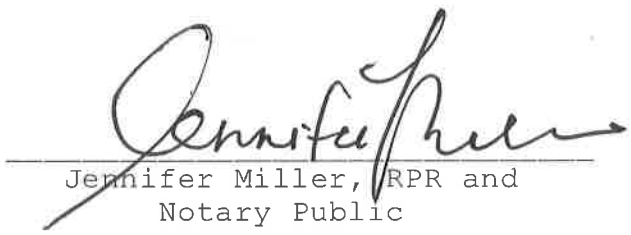
With that, this concludes our 12th QER meeting. Thank you.

MODERATOR WELSH: Thank you all.

(Whereupon, the meeting was concluded at 2:53 p.m.)

CERTIFICATE

I HEREBY CERTIFY that the following proceeding on August 8, 2014, was taken by me and contain full and accurate stenographic notes, and that this is a true and correct transcript of same.



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