Quadrennial Energy Review

Second Installment

Electricity: Generation to End Use
Stakeholder Meeting #4

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Des Moines, Iowa

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Opening Remarks

CHRIS KELLEY: Good morning everyone. I'd like to welcome you to the third public meeting for the second installment of the Quadrennial Energy Review, focused specifically the on the electricity system from generation to end use. Welcome to those of you here in Des Moines. And I'd also like to welcome those of you joining us on the live streaming via the web. My name is Chris Kelley, I'm with Energetics, we are an energy consulting firm supporting the Department of Energy on this QER effort and I have the distinct honor of being the facilitator for today's meeting.

We will be hearing from a number of speakers today and I'd like to review a few housekeeping notes. First, the QER Task Force welcomes comments from the public. If you wish to make a comment, and if you have not yet signed up at the front, please do so now. Second, for those who are joining via live streaming on the web, you may submit comments via web form that can be found at www.gov/QER.

We have an outstanding set of speakers here today. Their comments and presentations can be found also after today's meeting at www.energy.gov/QER. Before we get started, I'd like to read a short statement about the purpose of this meeting. Pursuant to the Federal Advisory Committee Act, the purpose of today's meeting is to ask for your individual input or organization's input regarding electricity from generation to end use. 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, individual advice, information or facts regarding this topic. The object of this session is not to obtain any group position or consensus, rather the US Department of Energy is seeking as many recommendations as possible from all individuals that the meeting.

And with that, allow me to introduce Dr. Karen Wayland, who will be introducing our next speakers. Dr. Wayland is the Deputy Director for State, Local and Tribal Cooperation at the U.S. Department of Energy's Office of Energy Policy and Systems Analysis.

KAREN WAYLAND: Thank you, Chris and thank you all for coming and this is a beautiful facility so I appreciate the opportunity to be here. We are in Des Moines as Chris mentioned for the fourth of seven stakeholder meetings for the Quadrennial Energy Review, which is an administration wide process, to identify and address the challenges facing our nation's energy infrastructure. We did our first installment of the QER as we call it, last April, and we are embarking on the second installment now. The first installment looked at transmission storage and distribution infrastructure; so the wires, pipes – the connective fiber of our energy infrastructure and as a result of that work, we really honed in on the criticality of the electricity system for the prosperity of the country and public health and the environment. And so the second installment, we'll look at the electricity system as a whole and integrated study from generation, transmission, distribution and end use. So, that's why we are here. We are here to hear about how things are -- we were just talking with the Governor and the Lieutenant Governor

and the Mayor about all the exciting things happening in the energy world in Iowa here. The electricity system in the United States is very regional in nature and that's why we are doing these stakeholder meetings out in the country to really learn about the regional characteristics, market forces, state policies, industry, particular interests here.

So, this is the fourth of seven meetings. We are very excited. There will be a public comment period after the three panels and if you are interested, that is very important for us to hear from people who would like to tell us what the kinds of Federal recommendations, Federal actions we can take to help address the challenge and opportunities in this rapidly evolving sector.

We have a very illustrious panel here today. And so I'd like to let the Lieutenant Governor kick it off. She needs no introduction, but we are excited to hear about the state energy plan that she has been sharing. So with that, the honorable Kim Reynolds.

LIEUTENANT GOVERNOR REYNOLDS: Good morning and thank you for organizing this event today and Chris for emceeing this discussion. I'm very happy to extend an Iowa nice welcome to you and Secretary Moniz and the other Federal officials and all of you that are joining us here this morning. Iowa has a great story to tell. We are proud of our leadership and renewable energy, which includes not only wind but the biofuels. The Governor will discuss that leadership in more detail, so I'm going to focus this morning on our own energy planning efforts here in Iowa.

I'm proud to have the opportunity to chair our statewide energy efforts to develop an energy plan along with the Iowa Partnership for Economic Progress, the Iowa Economic Development Authority as well as the Iowa Department of Transportation. The Iowa Energy Plan will be a comprehensive review and blueprint for the future. It will be a means to set not only state priorities and provide a strategic guidance for energy, policy initiatives moving forward. So, let me provide just a little context on why we believe that it is so important for us to put together this comprehensive state energy plan. Since taking office, our administration has attracted over 12 billion dollars of new private capital investment in the State of Iowa. When we meet with business and industry leaders as we travel the state of Iowa, it's been clear their location and their expansion decisions are centered on not only obtaining a skilled workforce, but finding reliable and cost-efficient energy. In fact, companies often cite our low cost of energy and increasing supply of renewable energy as one of the major reasons that they are locating right here in Iowa and a great example of that are Facebook, Microsoft and Google and that is absolutely one of the reasons that went into their decision to locate in the State of Iowa and continue to see the expansions that we have seen with all three of those companies. With a comprehensive Iowa energy plan we will be better positioned to build on Iowa's economic successes, bolster Iowa as one of the most attractive states in the country in which to do business. The energy plan that we are working on will include an assessment of current and future energy supply and demand. It will take a look at all of the existing policies and programs that we currently have in place, as well as taking a look at the emerging challenges and opportunities. The plan is built on four foundational pillars and they include economic development and energy careers, Iowa's energy resources, transportation and infrastructure, as well as energy efficiency and conservation.

Creating a plan of this magnitude is obviously no small undertaking and as we analyze data, we review public input and put together the recommendations we will identify new goals and approaches that will again encourage both economic and environmental benefits and help ensure Iowa remains innovative as an energy leader. So, I appreciate the undertaking that Secretary Moniz and the U.S. Department of Energy team are in leading within the Quadrennial Energy Review. Your work ahead is important to advance the modernization of the nation's electric grid and ensure its continued reliability, security as well as affordability. A modern grid will be important to ensure the further diversification of our nation's energy portfolio and empower future renewable energy growth in the State of Iowa. So thank you for the opportunity to be a part of today's event and look forward to the discussion.

Now it's my pleasure and privilege to introduce Governor Branstad who will further discuss our leadership in renewable energy and give you background on that. Governor Branstad is the longest serving Governor in the nation and has worked tirelessly and from his first run as Governor of the State of Iowa has been a leader in low-cost renewable energy. With that, please welcome Governor Branstad.

[Applause]

GOVERNOR BRANSTAD: Lieutenant Governor Reynolds, thank you for being a great partner and thank you for your leadership in developing the Iowa energy planning effort. We are excited about that. We are proud of the progress we made, but we want to focus on the future and make sure we are positioned to meet the needs of a growing state in the 21st Century. Secretary Moniz, thank you for coming to Iowa. We are proud to have you here on this beautiful day in May. And we are in the midst of corn planting and this is the kind of weather that we love to have and because a big chunk of the corn is already planted and we now are getting the sunshine we need to get it to grow. So, it's exciting.

SECRETARY of ENERGY MONIZ: Are you selling the futures already.

GOVERNOR BRANSTAD: Well, we are always selling corn futures. When you're the leading corn producing state, you can never miss that opportunity. I want to thank you for the opportunity to join you in this discussion. Just a few short weeks ago, we celebrated a terrific announcement. The largest economic development project in Iowa history, a huge commitment to Iowa's clean energy future when MidAmerican Energy announce today will invest 3.6 billion dollars in new wind energy development in the State of Iowa. That is about double the biggest economic development investment we ever had previously which was also by MidAmerican Energy on wind investment. So, they plan to build 2000 megawatts of additional wind power in Iowa by the year 2020. In 2015, just last year, we surpassed 30% of our energy generation coming from wind. We are at 31% above any other state. We are proud of that. With this new development, we will be over 40% of our energy generated by wind, by the year 2020. We think that is going to put us in a very good position. The Lieutenant Governor already told you about the fact that companies like Facebook and Microsoft and Google have chosen Iowa because of that. But we also think for manufacturers and other large energy users, that is a good thing. When MidAmerican made this announcement, they pointed out there will be no increase in their

rates for their residential or commercial users as a result of it. So we are looking at low-cost, renewable, reliable energy and that is certainly what people are looking for. We welcome this opportunity to expand Iowa's renewable energy leadership because when energy in Iowa is also helped to a track -- as the Lieutenant Governor pointed out, over 12 billion dollars in economic development investments in our state. Every wind turbine also means income for the farmer whose property it is located on. Additional property tax revenue for the local governments, and many rewarding careers for Iowa families. There is over 7000 people employed in making component parts for the wind energy industry, including the blades and the turbines and towers. Beyond wind, we are also proud of our growth in solar and geothermal. In fact, the Governor's residence is now heated and cooled by a geothermal. And many businesses are adding solar. In fact, I recently visited a former school that has been converted into a residence in Fort Madison, Iowa, I think 30 something apartments, and they have solar panels on the roof and a carport with solar panels on the roof of that to generate electricity. I recognize that your discussions today will focus more on modernizing the electric grid, but Iowa's leadership in renewables goes beyond the grid. We are the leading biofuels producing state and we are proud of our leadership in feeding and fueling the world. We have 43 ethanol plants, 12 biodiesel plants, two cellulosic ethanol plants and now with the new biochemical tax credit, we expect that there will be a number of other companies co-locate with those ethanol plants and making new products out of new household products and new products out of these building blocks that will replace petroleum-based products. We are excited about that.

In short, Iowa is blessed with tremendous renewable resources and well positioned to continue to lead in this area of renewable energy, which is low-cost and reliable as well as protecting the environment. We continue to draw companies to our state because they like this low cost energy and also the fact that it is renewable. Business leaders say that is really an important factor. In fact, when Google made the decision to locate near Altoona, Iowa, which is just east of here, they made that announcement. And now, I think they are into their third building. Microsoft is in the process of doubling their operation and I think over a billion-dollar investment in West Des Moines and Google is even further ahead of that. I think they are in about their fifth expansion out in the Council Bluff area. So business leaders really like what they see in Iowa and Iowa is seeing very positive affects in the counties where wind turbines are operating. Actually, I think there is one county, Pocahontas County, I visited recently to see some of the quality water projects they are doing, but over 10% of their property tax revenue is now coming from wind, from these facilities that have been located in their county. And that is true in a lot of rural counties in northern and western Iowa. Towns hosting wind generation manufacturers have seen this as a way to grow good jobs in their communities and cities with major data centers are excited about not just the data center but also the other businesses that want to co-locate. So we are very proud of that. In Iowa, we get things done because we work together. We started this whole thing back in 1983. My first year as Governor when I signed a renewable portfolio standard, in fact, Iowa was the first state to enact it. I think it's copied by about 23 other states. And thanks to the many visionary voices in the executive and legislative branches of government, sustained over this whole period of time, and the support of our congressional delegation, most importantly we appreciate the industry and the companies and even individuals that have invested in not only wind energy but now in solar and geothermal. The Iowa congressional delegation fought for the production tax credit to be extended and we have bipartisan support on that. That

was done and that was a key factor in the decision that MidAmerican made to make this huge investment now in 2016. I want to particularly thank Senator Grassley for his relentless work for renewable energy. He was a leader at the very beginning and was instrumental in helping to get this the through. So we have come a long way in the last 33 years and we are not done. Wind farm lease payments and increased tax revenue both helped strengthen Iowa's rural economy and I'm proud of Iowa's leadership in wind energy and encouraged by the recent growth of solar.

As Chair of the Governors -- and we have a Coalition of Governors, both parties, involved in wind and solar energy. It used to be wind energy. We expanded to include solar as well. And the co-chair is the Governor of Rhode Island. So, I recognize the importance work of modernizing our nation's electric grid important to our global competitiveness, energy security and a consistent supply of affordable energy are also vital to our national security. Renewable energy is one of Iowa's fastest growing industries creating home-grown renewable careers, rewarding careers all across the state. And I want to say how much I appreciate the opportunity to collaborate and work with all levels of government, with local governments and with the Federal Government as well as with the private sector to make sure that we have reliable, affordable, clean energy and opportunity to create jobs in our state. So together, we can advance this country's energy future and we look forward to this opportunity to share the viewpoints of our Iowans as well. So thank you, Mr. Secretary.

[Applause]

KAREN WAYLAND: We have the longest serving Governor and the longest serving mayor with us today. Mayor Cownie I first met when he was serving on the President's State Local and Tribal Leader Task Force on Climate Preparedness and Resilience and he actually hosted a large group of mayors and tribal leaders and administration officials here in Des Moines to talk about climate resilience and preparedness. So with great pleasure that I introduce to you the honorable Frank Cownie.

MAYOR FRANKLIN COWNIE: Thank you. It is great to be here and participate in this and certainly this energy review was one of the things that needs to happen as is going on and so, Mr. Secretary, I appreciate you traveling the country and helping to invigorate the efforts on the part of all of our states all of our cities to come together and look at the future of energy and our sources around this country. It was fun to have the Task Force here in Des Moines and show them some of the things we are doing. And on top of all of those mayors that were here, there were 16 mayors and a couple of tribal representatives, there were eight governors and it was a bipartisan effort of everybody to come together and think about the future of this country and think about climate and what impacts it and what our commitments are to have a future for this country and think about climate and what impacts it and what our commitments are to have a future for this company that our generations - grandchildren, great grandchildren, can look forward to that will afford them an opportunity to have at least as good if not better of a life and opportunities as we have today.

As we think about it and we think about what the City of Des Moines has committed to and I want to also give a nod to the Governor also for thinking about Iowa being the healthiest state. It

has impacts not only for health in walkability and things that we are working on in the City of Des Moines, but it also impacts transportation. And any time we can get people to ride bikes and walk to and from work, it is a very positive thing to reduce consumption of fuels that people would otherwise use in single occupant vehicles to get to and from work. We notice as downtown expands and as was remarked earlier by a number of the folks from out of town that are back here that see all the cranes in downtown Des Moines, and to know not only is business expanding here but people are living in downtown. And who is living there? Well, it's millennials and it's also empty nesters. And as we talked to millennials and surveyed them, it's interesting to know and as I as a person of the '60s and '70s, growing up, having a car was one of the first thing I ever wanted to have. And we talked to millennials in downtown Des Moines that are living down here and working down here. 17% of them don't own a car. And I find that to be unbelievable. But you know what? It's just the way things are going. And I think the younger generations get what the future needs to look like much more than some of the older generation that continue to do and have their habits as they have before.

I not only served on the Task Force, the White House Task Force, but also was the U.S. local government representative in Paris. As one of the mayors there along with over 400 other mayors, we signed on a mayor's compact to commit to what we are to going to do and certainly energy efficiency is one of those things. How we are going to reduce greenhouse gas emissions and how we are going to have our cities be more energy efficient and conserve energy. And how we are going to do it and certainly by the way, that walkability and healthy state contributes to some of those efforts.

The City of Des Moines as we looked at it and quite frankly, the efforts of this state and MidAmerican Energy to make the commitment to more wind energy and potentially solar and geothermal, helps us to reach some of the goals that the City of Des Moines and hopefully the rest of the state of Iowa can commit to. City of Des Moines committed to reducing our greenhouse gas emissions, which will be enhanced by the way, by this effort of MidAmerican; 25% by the year 2020, 50% by 2030 and we are hopeful to be net zero effectively by 2050. And I think that quite frankly those are the kinds of commitments that have to be made, but it is only going to happen if we can have energy efficiency and renewables on the grid across this country. And I want to thank the Secretary for working on this, the Governor and his staff and working with our state, local energy distribution providers. MidAmerican Energy and Alliant and others, because we see what the future is and we see its renewables, and I want to thank everybody for their efforts in it and for being here today and Mr. Secretary, continue the review and let's look forward to a lot of progress in these areas. Thank you.

[Applause]

KAREN WAYLAND: Thank you, Mayor. As I mentioned, this is an inner agency process across the administration. There are over 20 agencies that have some sort of equities in energy. Only a few that have deep, deep equities in the electricity sector and one of them is surprisingly, the U.S. Department of Agriculture. So we are excited to have Sam Rikkers here today, who is the Administrator for the Rural Business and Cooperative Service. Sam?

SAM RIKKERS: Thank you. Let me begin with an extension on behalf of your former Governor, our Secretary of Agriculture and my boss, it is a pleasure to be here and join this QER. It is a particular honor for me to be here. I grew up in a little town in southern Wisconsin, so not far from here, and that little town is not very different than a lot of little towns around Iowa. So, that is one of the reasons why it's an honor to be here. And the other is, this QER in Des Moines is a QER that, like Iowa, has particular rural character to it. There are other QER sites that are in other places in the country, but this one for me, as the Administrator of the Rural Business Cooperative Service, is in that place that feels rural even in the state capital, in the City of Des Moines. Karen talked about the USDA being here. It might -- I think I want to frame my brief remarks around why we're here? The USDA's Rural Development mission area deals with housing, deals with businesses and of course does have a presence and a footprint with our electrical system. But, it is two reasons.

First, the legacy of Rural Development came from the REA. So Rural Development didn't exist 80 years ago, but 80 years ago, President FDR founded the Rural Electrical Administration, which had its mission to finance the creation and expansion of member-owned electric co-ops to bring electricity to rural America. And so, the REA then and the USDA's Rural Development now, cares bottom line about the vibrancy of rural places in this country. These 80 years have been critical because what we know is that while only -- and this is today -- only 40 million people live in rural area. So that's no more than 15% of our country's population. Maybe less. But, that's about 70% of our country's land mass and we know the challenges in providing electricity to that low densely populated area is more expensive and more difficult. And so, what was the REA 80 years ago, when founded in 1936, is now the rural utility service. And the rural utility service finances all aspects of the rural energy system across all types of energy and even provides high-energy cross grants for those communities that are particularly low-income and can't afford those loans to those local utilities, to the rural electric utilities we finance and all other types of entities down the chain. The rural utility service loans are so attractive because they are some of the cheapest money that can be financed. The rates extended to our partners through the Federal financing banks at treasury plus an eighth. So, you can't get cheaper money than that. And, you can have it for a short-term period. If you believe that rates may change, or you can lock it in for up to 35 years and you can make those decisions pretty frequently. You can roll over that short-term loan if you're a utility, or lock it in for 35 years if you think that those rates will be going up. So, what have we seen over those 80 years of investments? We have seen a total of 120 billion dollars invested through what was the REA and is now the rural utility service throughout rural America in that electric system. What we know is more than 40% of either this country's electrical infrastructure has been financed through the rural or REA in the U.S. So the current portfolio of that amounts to 46 billion dollars' worth of loans. There are 600 borrowers and the delinquency rate on those loans is a tiny, tiny .04%. So it's been successful.

But as we look back at the legacy of Rural Development, we also want to look forward and that is the other reason we are excited to be here. What we know in rural America and the Governor and the Mayor and the Lieutenant Governor have already spoken to this is that if the vibrancy of the communities, what we at Rural Development care about, diminishes, then people don't want to move back to those small towns. And so, what we have in my shop at the Rural Development, Rural Business Cooperative Service, we have investments for businesses. We have investments

through a program called REAP, the Rural Energy for America Program, where businesses who want to take advantage of energy efficiency grants and loans, or renewable energy systems. They want to invest in that. They are able to do that. We have a program, 9,003, bio refinery assistance program, which is taking advantage as the Governor talked about, the inherent advantage that a state like Iowa has in the biomass to fuel the next generation of energy sources. So, we do that because what we know, and I often hear the Secretary talk about this and I'm sure having been Mayor of a small town and Governor of this state, he seen the number of jobs it takes to fuel production agriculture is going down. It's a fraction of what it was when folks at this table older than me were born and our grandparents were born. So what that means, it means that if we want to maintain the unique vibrancy of the small towns in Iowa and like the one that I grew up in, in Wisconsin, there has to be jobs, jobs different than farming for folks to go away to college and then come back because they want to live in that small town because they are good jobs. So by making incentives for businesses to invest in things like renewables in energy efficiency, in creating new opportunities to grow new bio-based product manufacturing facilities and cellulosic biorefineries, we are creating environments for people not only to come back to, but for communities to grow. I want to thank you and The Department of Energy and the leadership of Iowa for the opportunity to be here. With that, Karen back to you.

[Applause]

KAREN WAYLAND: Thank you. Now it's my honor to introduce Dr. Earnest Moniz, the Secretary of Energy. Before coming to the Department as the Secretary, he served as the Under Secretary and also in the Office of Science and Technology policy in the White House. He is a Professor at MIT and there before he came to Department of Energy, was the Head of The MIT Energy Initiative. At some point, before he became the Secretary, he served on the President's Council of Advisors on Science and Technology and that PCAST, as we call it, released a report a few years ago that recommended that the administration undertake this Quadrennial Energy Review. So he sets the process in motion and then he came to the Department of Energy to lead it. So Mr. Secretary?

SECRETARY of ENERGY MONIZ: Thank you, Karen and I like to add my welcome to all of you for coming here to this Quadrennial Energy Review discussion. Last year we published the first phase of it, which we call now QER 1.1. This is now QER 1.2. And I'll come back to discussing some of what we hope will come out of this meeting. I want to thank Governor Branstad, Lieutenant Governor Reynolds, not just for being here, but for leadership in this clean energy revolution. And in fact, for a long time, I must say, going back to the Governor's first stint in the early ‘80s, Iowa being a leader in moving towards renewable energy – in fact, I was telling the Governor earlier that I find it hard to comprehend, 21 years plus and running as Governor and I know our good friend already mentioned Tom Vilsack, who I guess kept your seat warm for a while between your two terms, is looking like an eight-year cabinet member, which is also a tribute to apparently the persistence of Iowans and I think it is doing quite well. Also want to thank Mayor Cownie of Des Moines and his leadership, especially in the council of mayors and I want to emphasize, and it was true, we saw in Paris and seen it many times, how cities are going to play an increasingly central role how we address the future, including the

energy future. We all know and Administrator Rikkers, who I also want to acknowledge, talked about how cities and towns will be increasingly important as we move towards, for example, a 70% urbanization by mid-century globally.
And so, if we don't address the vibrancy of our cities, we certainly cannot meet our long term goals.

Finally, let me also acknowledge here in the audience, DOE Secretary of Electricity, Pat Hoffman who you will see on a panel. Obviously this subject is important to her in her job as heading our electricity program. I have to say, before getting into the QER, it is great for me to be here in Iowa for a couple of days to be able to pursue several of our priorities. This year, the QER, our clean energy future is obviously one of those major priorities. Just want to say for the Iowans at least that we'll move from here to Ames where I'll have a chance to visit our Ames National Laboratory, a laboratory completely integrated with Iowa State University, so it has great educational value, but it is a lead place for us to address critical materials which is absolutely essential to our clean energy technologies in many areas and just want to say again, I guess it is this Iowan persistence again. I mean, we have been, the Department of Energy and our ancestors, like the Atomic Energy Commission, have been there for -- I guess now it's 70 plus years at Ames. And we are renewing it. It's the first new building in over 50 years that we will be able to dedicate at Ames and then finally tomorrow I'll have the pleasure of giving the commencement speech at Iowa State and addressing that post millennial generation Z, or whatever they are called, for that future.

So, anyway, it will be a very, very great trip here in Iowa. Now turning to the QER, again I already alluded to the fact that the first installment was released a year ago and that was focused on the entire energy infrastructure system, the transmission distribution and storage of energy, not just electricity, but of energy. I want to make one simple point first. That report, which really was pioneering in its process of engaging across whole of government, bringing together recommendations based on strong analysis, had 63 recommendations and we believe that the process followed, including major stakeholder outreach has proved its merit in that already 14 of those recommendations have found their way into Federal legislation that has passed the Congress. The Highway Bill, so-called, and the Bipartisan Budget Act, contained a number of those recommendations and the QER was specifically referenced as the source of those legislative initiatives. We continue to work on all of the recommendations. In fact, a number of other recommendations are in the Senate Energy Bill that passed the Senate a few weeks ago, still a ways to go with conference, et cetera, but again, major impacts. One of the recommendations that was put into law in December, was to authorize a two-billion-dollar effort in terms of modernizing our strategic petroleum reserve, something that is again one of these important institutions badly in need of modernization as pointed out in that first QER. I want to say that the -- just a word which is not directly QER, but takes up on the themes that the Governor, Lieutenant Governor talked about, that petroleum reserve, of course, brings up the issue that energy security, in addition to meeting our climate goals, is very important. Now, in the United States one while say, well, energy security, we are producing more oil, more gas, renewables are growing, our energy efficiency is growing and this is not maybe a major issue anymore. Well, we don't agree with that. For one thing, we pointed out in a different context, the G7 context that energy security for the United States is not simply a national issue. It's an international issue. It's

a collective security because the insecurity of our friends say in Europe, for example, directly influences what we can do. So, energy security remains a major issue. And for the United States, we should not lose site of the fact that even though even with the recent decline, we are producing more oil than we used to. We are still a major oil importer. That remains the case. And consequently, we remain very strongly focused on reducing our oil dependence even as we produce more. And that means we continue to emphasize three major areas: One is continuing to increase the efficiency of our vehicles. Secondly, to continue a movement towards electrification of vehicles but third and relevant to this date, is to continue the development of alternative liquid fuels like biofuels, advanced biofuels. These are all central to what we do and with our partners at USDA and frankly the Department of Defense, we continue to work together on this alternative fuel future.

Now, turning back directly to the QER process, I have already mentioned what I would call the great -- we think great success of the first installment. Now the second installment is on the electricity system from end-to-end, from generation to delivery of electricity, storage of electricity, end use questions of electricity, efficiency, distributed generation, and bringing all of this together into integrated whole poses many challenges, many of which will be addressed by the panels today. So, what I want to do is emphasize that we have every expectation that this second installment that we will hope to have finished and published, with some intermediate products published along the way, that we anticipate this will have a similarly very significant impact, including influencing legislation. So I want to emphasize that the input that we get in these regional meetings is very, very important. I guess I'm saying, I think your time is well spent in terms of making the inputs that we will use in developing QER 1.2. Secondly, I want to emphasize that these regional meetings really are regional. We are looking at different parts of the country, because frankly, the conditions, the requirements, the needs, the observations, the input from different regions in the country, will be different. And that is part of the strengths, frankly, in the end of our system, but it also presents challenges in terms of how we develop certainly at the national level of policy and how we work to provide the assistance and the interface with states and communities in developing the future. So obviously today, we are kind of focusing on the Midwest and the plains states. Our Canadian partners and in particular Manitoba. We should emphasize of course that the U.S. and Canadian electricity, at least large parts of the electricity grid in Canada are completely integrated basically with the United States. We work very closely together. That's of course reflected in the fact that NERC is the North American Electricity Reliability Council.

QER 1.2, just like 1.1, will take a systems approach looking at the various elements in the system but then looking at how they come together in terms of integrative crosscutting analysis without which we cannot really address a set of issues like resilience and reliability of the system and certainly like the integration of the system including with more and more -- increasing amounts of resources like wind and solar. We heard the news already today here about the move in Iowa to reach now up to 40% of wind in the grid and clearly things like balancing that storage, smart -- including information technology more effectively in the grid, all will be very, very critical in this systems approach.

Another clarifier here when I say us, again, I already mentioned that while DOE, Department of

Energy, has a lead role, because I guess we are the Department of Energy, and we service the Executive Secretariat and serve as the central organization for providing these analytical analysis, these analytical analyses. That it is a multi-agency effort and in fact, the whole effort is overseeing, chaired, out of the White House over the Office of Science and Technology Policy and the Domestic Policy of Council.

I have already mentioned the regional aspects. Let me just finish by going back and talking a little bit more about climate change and post Paris. I just want to emphasize that Paris -- one can argue various issues but bottom line is, essentially every country in the world has committed to going to lower carbon. That has obvious implications in terms of what we are doing. Obvious implications in terms of market opportunities because that means that the already rapidly increasing deployment of clean energy technologies is only going to increase that much faster. It means economic opportunities and in fact, I applaud the way the Governor emphasizes that this move to clean energy here in Iowa has been very strongly coupled to the questions of economic development and that is exactly the forward-looking way we need to look at this much more broadly. I mentioned regional and I'll just end by saying that the -- our implementation of an initiative called Mission Innovation with 19 other countries, that will seek a doubling of R&D, energy R&D, over the next five years, in our implementation of that the President proposed to establish up to 10 regional innovation partnerships that draws upon what I said earlier. Different regions of our country have different perspectives based upon their resources and needs and clearly this regional approach is something that is core to the way we are looking at this QER 1.2. So, with that, again we are looking forward to collect and integrate and evaluate your input today. Of course, that input today you'll hear more about this but it's not only today. There are various ways of continuing to input to this process. We will have an open door and continue to take advantage of input for as long as we can as we develop this QER over the next half year or so. Thank you very much.

[Applause]

CHRIS KELLEY: So I think we have time for maybe one question before we break, so our panelists have offered to answer a question from audience if we have any. Any questions? You're going to let them off easy? Yes?

AUDIENCE MEMBER: I'm curious about the role of -- thank you. My name is John McClure and I'm from Nebraska Public Power District and I'm curious about the role of existing nuclear, as you talked about energy security and carbon reduction. How do you see the role of existing nuclear power plants in the country?

SECRETARY of ENERGY MONIZ: First of all, the President made clear that we think nuclear has to remain on the table as an option. It will not apply in every country. It will not apply in every region of our country but it must be an option for a low or zero carbon future. So there are two elements. One is there is no doubt that we are challenged in parts of the country, the Midwest is an example in terms of the existing plants, largely because of the challenge because of very in expensive natural gas. We have an interest in preserving as much as we can of that low carbon source. At the same time, we have five new plants being built for next generation plants

in the southeast. Very much because of the regulatory structures that we have that regional component. And we are continuing innovation, for example, we have investments in what are called small modular reactors. Right now supporting a 50 megawatt reactor that we hope can be deployed early in the next decade which, because of its size, can change the financial engineering of introducing a new nuclear. I don't know if the Governor, before he leaves, has a comment on that or not.

GOVERNOR BRANSTAD: I really don't. The Lieutenant Governor and I and also the mayor need to go because we have the peace officer memorial event that is going to be held right away. So, we want to apologize for having to leave now, but that is a real important event. You're aware that we lost two Des Moines police officers here not too long ago, and I think there are four peace officers that died in the line of duty that will be honored today. So that is an important thing for us to attend and we are sorry to have to leave. But we appreciate very much the opportunity to be part of the panel and we thank the Secretary for coming to Des Moines.

CHRIS KELLEY: Please join me in thanking our panel.

[Applause]

So with that, we will transition to our first speaker panel of the day focused on bulk power trip generation and transmission, how can we plan, build and operate the appropriate amount for future needs? So if you're on that panel, I'd ask you to come make your way to the stage and we'll get things set up for you. I want to remind everyone in the audience if you like to speak at the end during the public comment period, please sign up at the entrance and for those of you who are joining via the web, you can submit comments online at www.energy.gov/QER. We will get started in a minute.

So it will be another minute or two as we wait for our final panelists to join and we will get started then.

Panel 1

Bulk Power Generation and Transmission: How Can We Plan, Build, and Operate the Appropriate Amount for Future Needs?

We are going to get started here. Our first panel of the day with experts is the bulk power generation transmission panel on the topic of how can we plan, build and operate the appropriate amount for future needs. Joining me here on stage are Jeffrey Gust, Vice President of Compliance and Planning at MidAmerican Energy and Chief Compliance Officer for MidAmerican Energy Company. Dean Ellis, the Vice President Regulatory Affairs for Dynegy. Joshua Mandelbaum, Staff Attorney and Environmental Law and Policy Center. Tom Heller, Chief Executive Officer Missouri River Energy Services, and we'll be joined by Angela Weber,

the Commissioner for the Indiana Utility Regulatory Commission and Vice President for the Organization of MISO States. So, folks, what we will be doing here is going down the list and having you all present. You have 5-7 minutes. We have a series of colored lights right here and when the light turns red that means five minutes is up and have you two more minutes and then at that point after those two minutes, I may bring out the hook. So if you could stick to your talking points, I would appreciate it. Once we are done it will come back to me with questions. That is the game plan. So why don't we start with Jeffrey.

JEFFREY GUST: My name is Jeffrey Gust, the Vice President of Compliance and Planning at MidAmerican Energy. And I'd like to thank Chris and DOE for inviting me here today. MidAmerican Energy Company, which is part of Berkshire Hathaway Energy Company provides safe, reliable and affordable electric service to approximately 750,000 electric customers and 730,000 natural gas customers in about a 10,000 square mile area of Iowa, Illinois, South Dakota and Nebraska. As mentioned in the previous panel, MidAmerican is experiencing a dramatic change in our generation resource mix. When MidAmerican installed its first wind turbines in 2004, like many Midwestern energy providers, we were heavily reliant on fossil fuel generation. But by the end of 2016, MidAmerican will have more than 4000 megawatts of wind generation installed, which will serve approximately 58% of our retail customer energy needs. With the approval and completion of our recently announced Wind 11 Project, an additional 2000 megawatts of wind generation will be installed by the end of 2019, bringing total energy to 85% of our customer needs. This shift is a proactive response to policy changes and customer demands for more sustainable energy options. The organized markets which we are part of MISO, will continue to play a significant role by making efficient unit commitment and economic dispatch decisions across a broad regional area. A well-organized market should also facilitate capacity market transactions to ensure an appropriate amount of resources are available to meet future load requirements. The organized markets should continue to work together to eliminate seams issue that is exist between them and should focus anew on interstate seams issue that is may arise. For example, interstate seams issues may arise in response to the EPAs Clean Power Plan where states within a single organized market may elect either rate-based or mass-based compliance measures. However, organized markets should not administer emission trading programs unless stakeholders agree they are uniquely positioned for that task. Finally, the organized markets must not be too prescriptive but should anticipate future products and needs such as those needs that may arise as new carbon emissions encourage more natural gas is renewable energy resources. From a transmission system reliability perspective, MidAmerican is participating along with several other MISO transmission owners in constructing a number of multi-value projects or MVPs. The MVPs in Iowa include over 350 miles of new 345KV lines with MidAmerican building approximately 220 miles of those lines. These transmission projects are crucial to maintaining reliability as the new wind resources are typically not located where traditional generation resources exist. At the same time, a number of older coal-fired power plants are retired in response to environmental regulations. And these retirements have resulted in significant local area transmission projects to maintain reliability. As a MISO member, MidAmerican believes that RTO wide planning and cost allocation of projects such as these MVPs are important components of building the necessary transmission facilities to reliably and efficiently accommodate a change in resource mix. MidAmerican's experienced state citing processes are generally adequate to site needed transmission lines, which benefit residents of the

state in which the lines of located. We have yet to see the need for Federal citing processes in our area, but do not rule out the possibility that Federal citing may be needed as a backstop for certain projects. Proactive planning and ability to site transmission lines reduces uncertainties for generation resource developers which encourage new resources to locate in areas that may require them.

And finally as a generator owners make new resource decisions to comply with new carbon emission restrictions or to replace aging plants, the generator inner connection approval process should be reviewed and streamlined. While it is important to evaluate new resources to maintain reliability, it is also important to ensure that the study process itself in the amount of time taken for the study is not impediment to new resources coming online. Again, thank you. I'll turn it over to my next colleague.

DEAN ELLIS: Good morning, my name is Dean Ellis, I'm Head of Regulatory Affairs for Dynegy. Dynegy is currently about the third largest independent power producer in the United States, soon upon completion of our next acquisition, we'll be the second largest independent power producer in the United States. We also have a retail business; we are the largest retail provider in southern Illinois. And with that background, I just like to provide some context from an independent power producer's perspective. So, again, thank you very much to the DOE staff and others for facilitating the discussion today. I took a slightly different tact and put together slides in the form of a PowerPoint that I will talk to rather than a script. So, bear with me. I'll go through the slides here and Chris if you could just help me, I'll try to flip them in a run into a jam, I'll reach out for help.

But really quick, we are about 15 years into the competitive restructured markets and our view is that the markets remain the best way to efficiently allocate resources as we say here, meet customer needs and spur innovative products. Millions of people benefit every day from the competitive wholesale and retail markets. I believe the ISO RTO council sites about 40% of the United States population is served by the competitive markets. We are in an interesting time right now at the 15-year crossroad despite these successes, some points here are real or imagined, flaws with the competitive markets, question whether the competitive markets really need the intervention of government regulators. Some even question whether return to a monopolistic command and control and vertically integrated form of energy might be better to ensure long term reliable and affordable energy. And how many of these regulators and the thought leaders who now often are questioning this model unfortunately weren't around 15-25 years ago at the start of the debate around the competitive markets. So they often forget or don't have the benefit of the track record of the cost overruns, high price and poor service that precipitated the move away from the vertically integrated structure to a more competitive market structure. Also, sympathetically or empathically, we understand that many are often frustrated with their desired program product or goal is not advancing as fast as they would like in the competitive market and they believe that government intervention is needed to spur customers and consumer to action. So rather than if we continue to allow flexibility and choice, some critics seek out market government solutions as the fastest and easiest way to comply with programs like the clean power plant. And I think of the Clean Power Plan, because that seems to be a really good example of some of the frustration at the state level and competitive markets while some people view the

competitive or clean power plant is a market-based, very flexible approach, particularly the ones in the front line of developing state implementation plans feel like they are limited in how much they can actually control and direct.

So just continuing on and I'll try to flip this slide here. Help me out Chris, if you can. Thank you. So, some states and regions have either not developed competitive markets or they are not considering a hybrid approach and we define a hybrid approach is where you mix vertically integrated utilities with competitive generators and competitive suppliers. What we are seeing that the hybrid markets or hybrid model, just doesn't work. You just can't mix the two. They are fundamentally different and I'll demonstrate that in the next couple of slides. In summary, just think of two baseball teams, one in the American League and one National League, playing each other and the American League team has a designated hitter and the National League Team has to bat their pitcher. That's the situation you set up in a hybrid market.

So while the retirement of uneconomic generations when objective of competition, otherwise competitive generations disappearing in these hybrid market or under threatens hybrid markets, Dynegy recently renounced the shutdown of approximately 30% of generation capacity in southern Illinois. So, also with the hybrid markets, new efficient resources won't respond to market signals because the signals are artificially distorted or suppressed, this includes all resources – renewables, demand response and others. And out of market Band-Aids that are often seen as fixes can create the preverbal death spiral where one Band-Aid drives the need for another and then drives the need for another Band-Aid.

Quick benefits of competition, I stole some of this data from the Compete Coalition website and others from the U.S. DOE EIA website. Real short, the rates decreased about 1.3% over since the dawn of restructuring while increased 10% across the states that haven't restructured. I put on the right side of the slide, the Illinois all sector rate compared to some other states, Illinois is the only competitive restructured state out of the states across the Midwest.

Just flipping through really quickly, I have included slides as background information comparing restructured markets to traditionally vertically integrated utilities. How is independent power producers we rely on both the energy and the capacity markets for our revenue. Some comparisons across the Midwest and how the markets each function.

But, I'll skip right to my conclusions and recommendations. The competitive markets which were driven by consumers are delivering intended results. The hybrid models we are seeing are the worst design and the out of market solution that is are touted as fixes are creating other problems. So two recommendations. The FERC price formation efforts that have been helpful and DOE's engagement leadership would be very welcome. DOE has the expertise and the data to help shape that outcome. Lastly, the next iteration of QER can provide additional thought leadership on how the wholesale markets should and need to adapt to changing resource mix as Jeff mentioned, and I think that would also help a lot of the state regulators think about how the wholesale markets can help shape that resource mix. Thank you.

JOSHUA MANDELBAUM: Good morning. My name is Josh Mandelbaum, I'm an attorney

with the Environmental Law and Policy Center. We are a Midwest based environmental and legal advocacy organization. I'd like to start by thanking the Secretary and the Department for the opportunity to participate. And also for having this particular discussion in Des Moines. I think Iowa is a particularly fitting place to have a discussion about the future of U.S. electricity generation. In part, because we have been a forward-looking state, as we heard the Governor talk about. He was -- he signed the first RPS in the country. Back in his first term as Governor. And today, we have folks at the other end of the table, MidAmerican, talking about serving their Iowa customers with 85% renewable energy and I think more importantly, raising the discussion and talking about a vision for 100% renewables in the future. This illustrates that Iowa is helping lead the conversation on the transition away from fossil fuel generation to clean energy. If Iowa's old fossil fuel fleet retires, it's being replaced with the combination of wind, solar and energy efficiency.

A decade ago in Iowa, we had just over 800 megawatts of wind. Today, at the end of 2015, we had 6200 megawatts of installed wind capacity and that number, as we heard, is only going up. We'll be with the completion of MidAmerican's proposed Wind 11, we will be at over 40% of our state's electricity generation from wind. But we also have an emerging solar market. Since the state signed enacted its solar tax credit in 2012, there have been over 1800 solar projects developed in the state. And just this March, it was announced that 100 megawatt solar project is currently under development in north central Iowa. As a compliment to this, Iowa has some of the longest and strongest running utility energy efficiency programs in the country. So we are seeing clean energy solutions being implemented and at the same time, we are seeing coal plants retire and convert. Since 2012, approximately 1900 megawatts of coal generating capacity has been either retired or converted or announced for retirement or conversion. So Iowa has been successful at making this transition and in particular, we have done this while maintaining reliability, affordability, and safety. Wind energy in Iowa has started to rival energy efficiency on a cost basis. MidAmerican is integrated significant wind resources while maintaining some of the lowest electric rates in the country. In addition, as we heard, our Governor talk about it, it's a major economic driver supporting jobs, the tax base and local communities, while at the same time, helping attract new businesses like Google, Facebook and Microsoft. And these trends towards clean energy as fossil fuel plants retire, will continue. There are a couple of things I'd like to highlight. There is tremendous untapped potential. There is ongoing technological innovation. And there is a demand for these clean energy alternatives. All of that points to a continued role for Iowa in helping to lead this transition.

So first, there is significant potential. In terms of resources, Iowa alone has the ability to produce wind to supply 44 times our current electricity needs. Or solar to provide 150 times our current needs. And we have got achievable energy efficiency beyond, well beyond what the utilities are currently achieving through their successful programs. All of this is to say not that we'll do all of this, but that there is tremendous untapped potential going forward and even a fraction of that would dramatically transform our energenics. Technology is also driving this. In 2009, the cost per kilowatt hour for a wind PPA was almost 7 cents. In 2014, the National Average level cost for wind PPA was 2.35 cents. This suggests that in the future, even with the phase out of the production tax credit, wind will be a least cost alternative for new capacity. At the same time, turbines have become more efficient. We are seeing the same pattern with solar. Cost have come

down. Panels and inverters are more efficient. And solar is, I think, particularly important to mention because it is a bridge between the bulk generation side and the distributed and demand side. In the context of bulk generation, we think it is particularly important to properly account for and plan for increasing amounts of demand side resources. These resources can reduce the need for additional bulk generation while providing other important benefits. Technologies will continue to drive energy efficiency. It will continue to drive the development of battery and energy storage and these technological innovations will be significant and should be incorporated into our thinking about planning for bulk power. And I'd like to close by noting that the future will also only see a demand increased demand for clean energy. Consumers want this. When MidAmerican rolled out Wind 11, they noted that 91% of their customers wanted to see more renewable development. Corporate leaders are adopting aggressive sustainability and clean energy goals. And the clean power plant will also create and continue to create a demand for this clean energy. With that, I'll turn it over.

TOM HELLER: Good morning. My name is Tom Heller, I am the CEO of Missouri River Energy Services in Sioux Falls, South Dakota, and I'd like to thank the Department of Energy for allowing me to participate on this panel this morning.

I submitted my written statements for the record, but I would like to focus my verbal comments on three areas: First, new hydropower licensing, second getting transmission built and thirdly markets in SPP and MISO. But first a little bit of background. We are a municipal power agency that supplies power and energy and energy services to 60 municipal utility members throughout Iowa, Minnesota, North and South Dakota. We are created under Iowa code chapter 28E. 58 of our 60 members have allocations in Federal hydropower from Western Area Power Administration to supply some of their needs to the year 2050. And serves the balance of each of these community needs over and above that WAPA hydro power allocation. In addition to this hydropower, our members are also served by five wind energy projects in Iowa Minnesota and North Dakota. With these renewable energy investments, that means our members are served on average 42% renewable energy. The Department of Energy's Oak Ridge National Lab has recently completed an assessment of the ability of existing non-powered dams throughout the U.S. to generate electricity. They found there are over 80,000 non--powered facilities. The study also found that over 50,000 are suitable to support 12 gigawatts of clean renewable base load hydropower. MRES is developing one such plant in Iowa. MRES is constructing the red rock hydro project, a 36 megawatt, 55 megawatt peak hydro plant on the existing Red Rock Dam on the Des Moines River near Pella, Iowa. About 50 miles southeast of here. Red Rock is expected to be operational in 2018. This project was mentioned in the President's Climate Action Plan in June of 2013, as an example of public-private partnership that needs to be pursued for developing renewable energy. It was also listed on the Federal infrastructure permitting dashboard and demonstrate permitting for hydropower projects. We are pleased to be recognized by the President and what the great job the U.S. Corps of Engineers Rock Island District did in getting this 408 permit for us. However, despite this recognition, it will still take 13 years to get this project done when it is completed in 2018. And energy legislation passed by U.S. Senate 212, contains some language that begins permitting reform, however more is needed. We are also participant in two major high voltage transmission projects that came online in 2015. A 250 mile, 345KV Brookings to Hampton Lime project and 240 mile, 345 Fargo to Monticello project,

both in Minnesota. Both are part of what is called the CapEx 2020 effort which included 11 utilities, building five major projects that will include more than 800 miles of new transmission facilities in the upper Midwest. The CapEx 2020 is a region's largest transmission expansion in more than 40 years and will cost more than two billion dollars to complete. CapEx 2020 have in the works for more than a decade and promised increased reliability and decreased congestion in the region's transmission grid. They also will improve necessary facilities, provide necessarily facilities for moving energy from the reasons ever increasing wind generation to load centers. Jointly owned projects such as CapEx 2020 allowed all utilities in the region a stake in getting projects planned and built and constructed and all utilities receive benefits. We hope that MISO, SPP and state regulators will consider benefits of the CapEx 2020 ownership model when approving who gets to construct transmission facilities in the future. On October 1, MRES joined SPP. We now participate in two regional transmission organizations. We are an SPP and MISO. 27 of our members are in MISO and 33 in the SPP footprint. Prior to SPP and MISO, MRES members had to pay pancake transmission rates for MRES to deliver power. RTOs have exceeded in that effort. Now powers delivered within an RTO and only requires one transmission payment. No more pancake transmission rates. However, power delivery between MISO and SPP still requires we pay transmission both RTOs, creating pancake transmission rates again. We see pancake transmission rates as a barrier to cost effective renewable energy development in the Midwest.

And lastly, I'd like to make one comment on the SPP and the MISO markets. Their energy and ancillary service markets in our estimation are working. They are providing reduced costs of supplying energy to members and retail customers. MISO has a capacity market. SPP has none. In the MISO capacity market, we are able to self-supply through a fixed resource adequacy plan. We can self-supply. It is essential that the self-supply option continue. We do not want to a mandatory market such as the one in PJM in the Northeast. We also supported a provision in Senate 212 to require all states within the footprint of an RTO to approve a mandatory capacity market before it would take place. With that, thank you very much.

CHRIS KELLEY: Thank you, Tom and finally let me introduce Angela Weber, Commissioner for the Indiana Utility Regulatory Commission and Vice President Organization of MISO states.

ANGELA WEBER: It's a pleasure to be here to do a prospective on the organization of MISO states and explain what we do and so I'd like to give an overview of what OMS is and then a brief explanation or discussion of things we find to be important. The organization of MISO states, or OMS is a non-profit self-governing organization comprised of representatives from 17 regulatory bodies with jurisdiction over entities participating in the midcontinent independent system operator or MISO. It serves as the regional state committee in MISO to allow members to share resources and coordinate input on issue, as appropriate. The stated purpose of OMS is to coordinate regulatory oversight among members, make recommendations to MISO and the Board of Directors, FERC and other relevant government entities and State Commissions as appropriate. To do these things, OMS actively participates in the MISO stakeholder processes, provides comments and positions on issues to MISO, makes filings at FERC to express the positions of the OMS member agencies. The vast majority of the states in OMS are vertically integrated or employ a traditional regulatory structure that is OMS members are concerned with

the provision of safe and reliable service at just and reasonable rates. The primary way states alleviate these concerns is through your exercise of jurisdictional resource adequacy. States in partnership with their load serving entities should ensure that there are sufficient resources to meet resource adequacy standards. Transparency, access to information, and robust analysis is increasingly important and enabling states to meet these standards. OMS has been working with MISO for the last three years to perform a 10-year survey of load serving entities. The third installment of what we call this resource adequacy survey will be released in June. The survey has been valuable in the regulators in the MISO region because it has allowed us to see the adequacy of resources regionally and not just locally. And reliability goes hand-in-hand with resource adequacy. Regardless of implementation of regulations like the Clean Power Plan, the resource mix is changing to the use of natural gas and renewables which can have a significant effect on reliability. Construction of new transmission facilities may be necessary in order to accommodate the changing resource mix and maintain reliability. The construction of these projects will be costly and should be well vetted so the appropriate projects are built and expenditures are prudent. Voltage control and frequency support may also be need to be provided in order to maintain reliability, which can be accomplished through the use of non-transmission alternatives like energy storage and these non-transmission alternatives like energy efficiency, demand response, battery storage, and distributed generation, should be given equal consideration in the RTO planning process to help with reliability and avoid issues associated with transmission construction. Planning properly for the future while ensuring resource adequacy and maintaining reliability requires a transparent process that permits participation from stakeholders, including OMS. The states in RTOs should engage with one another because the decisions can affect each other and finally just a word about OMS. The way we established policy is through board vote. And sometimes we don't have a policy on something because it hasn't been presented to the Board. So there may be something presented today where we just don't have an OMS position so I may not be able to give an answer but I will certainly try to give perspective from just a general state regulatory position. Thank you.

CHRIS KELLEY: Thank you. So, now we turn back to me for a few questions for you all. Why don't we go ahead and start with something that I heard you bring up, Jeff, in the beginning, and that was the concept of seams issues. And so I'll open this up to everybody but maybe start with you. So, when you talk about seams issues, you said a challenge that needs to be faced. Can you talk a little bit more about that and maybe give some context?

JEFFREY GUST: Sure. As I mentioned, we have been -- MISO has been very successful at identifying projects that help the MISO region through its planning process and develop these MVP projects but since OR1000 has been passed, we have not seen any major project between the markets such as SPP and the MISO or MISO and PJM. We have been talking a lot about them and analyzing a lot of projects but nothing has been identified to continue to help address constraints between the two markets and help to reduce prices for our customers and such. So, that is the context of my comments is that I think we need to encourage these regions to define projects that will help everybody.

CHRIS KELLEY: Thank you. Anyone else have comments on seams issues?

TOM HELLER: Yes, if I could please. I did mention we have a problem with seams. We are half in SPP and half in MISO. Most of our capacity is in SPP. So we got stranded capacity. We looked at buying firm transmission service to get it through SPP into MISO. We got transmission twice. So we ended up with stranded transmission. So I would like and would hope that SPP and MISO can get together and work out the seams issue so you don't have to pay pancake transmission rates in your reporting capacity from one state to another in other in energy. It would be a benefit to the renewable energy development in the region.

ANGELA WEBER: It seems as an important issue to OMS. I know with our varying or diverse membership, there are differing opinions. So the seams policy is something we intend to sit down and address very soon to come up with an official OMS policy. The reason we are doing that is because it is so important. I can say from Indiana's perspective, we have a concern with the MISO and PJM in the northern portion of Indiana and one of our utilities in particular is affected, it is the Northern Indiana Public Service Company, or NIPSCO. And what happens is when those flows go across the MISO- from PJM to MISO over to Chicago, it affects that utility because it has to power down its energy and then go to the open marshal to replace it to alleviate congestion concerns. And they recently went back to FERC. There was a FERC decision very recently that probably useful here. This issue hasn't been addressed, so what you have is in order to get an interregional project built you have to get that project approved in MISO's process, PJM process, and then a joint process. And one thing FERC did is eliminated that join process and I don't have the order in front of me of a decision but they also lowered the cost of those projects. There as a hurdle on how much it had to cost and so how much it had cost to be approved. And so, hopefully we'll watch that and see if that helps alleviate the lack of construction of projects and the ability to address some congestion issues and I think I'd like to add that something I saw happen that was helpful was OMS and other stakeholders pushing MISO and PJM to the address the issue and then we saw MISO and PJM actually communicate and get-together and try to address the issue with the projects. So that's been helpful.

CHRIS KELLEY: Thank you. Any other comments? Okay. So, let's turn to the subject of reliability. So I found it interesting we heard earlier today from the other speakers and even earlier on this panel, about increasing investment in renewables. But in other areas of the country we had these panels, the intermittency of resources has raised questions about reliability and affordability. And yet we heard about MidAmerican maintaining affordability. We heard a lot about reliability. Angela you brought up new technologies to ensure continued reliability. But I guess I'm curious. What is different in this region that these issues aren't present? Or do you see any issues associated with the intermittency of renewables? Anyone care to take that?

JEFFREY GUST: I'll start. We have a large footprint of renewable energy - MidAmerican does, but we are also a part of a very large market - organized market. And so, that market is very valuable in allowing us to add this generation while not adversely impacting reliability. Now, we also know that you need transmission when you build these projects in somewhat of a small area. So transmission is very important. But we are also looking at flexible resources, quick start resources, battery storage. We are very interested in investment in storage. And we'll continue to look at solar. We have been analyzing solar projects and that can provide some diversity to our renewable resources. But, I think the organized markets, transmission and then some of these

new flexible resources.

CHRIS KELLEY: Thank you. Dean?

DEAN ELLIS: Thanks, Chris, and I think that goes to one of the points that we tried to make in our presentation, is that going forward, the markets will need to adjust to this changing resource mix. The resource mix is a result of a number of initiatives, just simply market forces. Traditionally, we relied on central-based load generation to provide the majority of power. Now we need, as Jeff mentioned, we are going to need quick start, more flexible resources and I think going forward, we will have to figure out how to value those flexible attributes, say natural gas fired plans to balance the intermittency of renewables. We also will need greater insight in the dispatchability and predictability of the intermittent resources. A number of the ISOs across the countries had implemented wind forecasting and central dispatch systems for renewable systems such as winds and that is helpful in smoothing out and observing the predictabilities. California of course is the poster child for this issue with its high increase of penetration of renewables, its created the infamous duck curve whereas the load changes in the afternoon and renewables drop-off, now resources are having to be brought on. Sometimes multiple times. Other resources have to be brought on multiple times a day to switch on and off to balance the renewable energy. So going forward one of the most critical aspects will be, how do we incent value, how to get the price formation right for the resources that have these flexibility attributes? Currently, to contrast, there are efforts to save the base load nuclear fleet because of its carbon-free attributes and I wonder if that is counterintuitive? Are we saving base load nuclear, when base load nuclear doesn't offer the flexibility that other resources do? And will that actually be impediment to changing the resource mix going forward?

CHRIS KELLEY: Thank you. Josh, did you have a comment?

JOSHUA MANDELBAUM: I think when talking about reliability and some of the resources mixes, I think the theme of technology comes into play again. And the role of battery and energy storage as a potential way to help address some of these issues and one of the things that we have seen with battery technology in other arenas, in personal electronics, for example, is we have seen very rapid improvements in cost effectiveness, efficiency and deployment. And that is coming. That model is coming on a larger scale and energy storage is an interplace here. It will be something to get right and plan for and to appropriately value because it will make integration of renewables easier. It will allow customers to respond to price signals and distributed level. And it's an important factor to consider as part of that discussion.

CHRIS KELLEY: Thanks. Tom?

TOM HELLER: Two points. First the transmission is critical for reliability of the future and I mentioned a model in which joint ownership, I think can help, and it has in the State of Minnesota. A more public acceptance because of multiple owners. We hope that model would be pursued and accepted. Secondly, storage is needed. There will be more and more wind that is being built, intermittent resources and solar will start to take off. We are studying a pump storage

project in South Dakota called the Gregory County Pump Storage Project, it was originally studied by the state of South Dakota at 2400 megawatts. It's not a lot of places in the Midwest that it can be done but there are some. And we need to look at those resources because that is the ultimate in storage. Pump storage provides or will provide stability for the electric system in the future. But what needs to take place before you can build an expensive project like that, first of all, we are looking and we have several partners we are studying this with. RTOs need to put value on storage so that these projects can be economically built.

CHRIS KELLEY: Thank you. Angela?

ANGELA WEBER: One brief comment. Renewables are intermittent. I think that is what people are talking about. I don't know anyone who doesn't support renewables but they are intermittent. It's not base load generation. And just to give you a perspective from Indiana, I think 86% roughly of our generation comes from coal and the coal plants will retire. Regardless of the clean power plan, they are planned for retirement at some point in the future. And so you have got to figure out a way to replace that base load generation. I agree that batteries are interesting and they are key. Indianapolis Power and Light one of our local utilities, is trying to – has a source project, is wanting to integrate into the system, the MISO system, but its capability right now is 20 megawatts. So I think battery is not there yet, but it's a possibility.

CHRIS KELLEY: Thank you. So now I would like to turn to the subject of markets. Tom, you touched on that on one of your final points. So we like to use these meetings to explore regional differences and especially differences in the markets in different regions. What do you see, and Tom I'll open up to you and then to others as well. But what do you see or can you expand on what is working in the SPP and MISO regions and then do you feel the market mechanisms are working or are there challenges present?

TOM HELLER: I would be happy to. As I indicated, we are half in SPP and half in MISO. I think we have seen in the years we have been in MISO and in SPP, the energy markets are working. We are reliant on only one single coal fired power plant in SPP, Laramie River Station, in Wyoming, which creates a whole other slew of problems for us with the clean power plan. But it is the only resource we have. When that plant went out prior to the markets, everybody else knew it too. Prices would go up. So for price transparency perspective for the day ahead in real time markets, we see real benefits to the consumers because of that market transparency and the price that is set. Ancillary service markets are working. We can build all the wind Jeff is talking about getting built, because the market is now responsible for ancillary services of supporting and I think those two areas is working well. We are participating in the MISO capacity market. It's some people don't like the word "voluntary" because it isn't really voluntary in the sense you have to supply all your information, but can provide your own resources. You can self-supply through what I mentioned as a FRAP – a Fixed Resource Adequacy Plan. And we are doing that. And one thing we don't want is we don't want the mandatory capacity market that exists in PJM. Market Public Power Association and others have submitted information upon how expensive mandatory capacity markets are and how disadvantaged those who own resources that they want to self-supply their capacity like small municipals do, end up paying for capacity twice. Their own resource plus the market.

CHRIS KELLEY: Thank you. Others? Angela?

ANGELA WEBER: I'll add something that OMS is watching is MISO's proposal for what we consider zone for Illinois. The only state that is fully deregulated in MISO. I think there is a small portion of Michigan that is affected also. They are trying to come up with a different capacity market for Illinois that maybe would send better market signals. That is something we are watching. Not sure how, it will be a three or four capacity market and some other specifics around it but we are not sure how that will affect the rest of the region to have these two sort of contracts and so we are just watching that. That might be something interesting to watch.

CHRIS KELLEY: Thank you, Dean.

DEAN ELLIS: Sure. Both Tom and Angela touched on our number one issue in the Midwest here, is the MISO market, specifically the capacity market. The independent market monitor, David Patton, has testified in front of FERC that unfortunately no one has really defined the purpose of the MISO capacity market. Is it a voluntary residual balancing mechanism for the utilities? Which is fine. Nothing wrong with that. Or is it meant to be the primary revenue source and capacity for power producers? And as Angela highlighted, there is extreme difference between Illinois, one of 15 states in MISO, and the 14 other traditionally regulated FERC states, so creates this tension that both Tom and Angela and others are pointing to. There is a couple of different solutions. Illinois -- some companies are bifurcated amongst or between different ISOs and that creates problems within their companies and it also creates problems for the states where they are bifurcated. No state is more bifurcated between two markets than the State of Illinois. You can almost drive across I-80 and on one side of I-80 is PJM and the other side is MISO and they are two very different markets beginning with the capacity market. So, I think going forward we need to think about how those markets are designed. We advocated in the past to simply put in the entire State of Illinois, in one market. At this point, the State of Illinois has two choices. It can either move southern Illinois to PJM or reregulate to put southern Illinois on the same playing field as the 14 other states. We are working on some interim solutions as pointed out. MISO is working on zone 4 Southern Illinois only fix. It will be interesting to see how that plays out. I think that creates a number of challenges. It's a carve-out strictly for Southern Illinois. Again, I think this hybrid market model illustrates a number of challenges and we need to either go in one direction or the other direction otherwise we create all sorts of not just physical issues, economic issues and potentially reliability issues.

CHRIS KELLEY: Thank you. Jeff?

JEFFREY GUST: We talked a lot about the capacity market. One other item I want to mention and I know MISO has been active here trying to change it, unfortunately FERC rejected their recent generator interconnection cube process – streamline process, but we do think that needs to be improved on. It takes quite a bit of time to get projects that are proposed – generator projects to get through the interconnection process and we just think there are a lot of improvements that can happen.

CHRIS KELLEY: Thank you. Did you have comments, Josh? Okay. Well, earlier, Josh, you mentioned the concept of introducing new technologies, specifically on storage technologies. So I guess I would like to ask a broad question about investment in research and development of new energy technologies. We do have folks from DOE here, that is a primary objective of Department of Energy. We have recently seen deployments on the transmission system like phasor measurement units as smart part of DOE's smart grid investment. But Angela talked about technologies to support demand response and energy efficiency. I guess my question is a broad one about investment and Research and Development of new energy technologies. Do you see that as an ongoing critical role for the Federal Government? I'll open that to whoever would like to take it. Josh you get the first right of refusal.

JOSHUA MANDELBAUM: Sure. It's a critical role. I think it has been important in the past, it will continue to be important as a driver in terms of identifying where we can go in the future, in terms of accelerating some of these developments and addressing critical needs and it will allow storage to develop although there is also significant private sector investment and storage at this point. It will allow utilities to work cooperatively and test out some of these technologies. It will continue to help drive energy efficiency and demand response and so there is a critical role and it will make the transition to what we are seeing as an energy future easier and potentially much more rapidly achievable. So I think it is important for all of those reasons.

CHRIS KELLEY: Thank you. Others?

TOM HELLER: I could mention the fact that Electric Power Research Institute appreciates the partnership with the Department of Energy. I sit on the board of Electric Power Research Institute. Many of the electric utilities in the United States do. They recognize the importance of future R&D. But there are some who don't and we hope those who don't would step up and start helping to support that. But the partnership between the labs and the Electric Power Research Institute is very good. EPRI right now is looking at the integrated grid of the future, putting a lot of time and energy into what say grid going to look like? What are we going to have to do to operate a grid when we have a lot of distributed generation out there? It will change the way we operate our grid on the distribution side as well as the transmission side. So we support the factor like to comment that The Department of Energy's funding has been very, very helpful.

CHRIS KELLEY: Thank you. Jeff?

JEFFREY GUST: I just mentioned too, NERC is active and understand the changing resource mix and have identified reviewing essential reliability services. So I would encourage the DOE to work with NERC on this part and then look at potential projects that could provide those services whether it is storage or types of flywheels or any kind of new technology that can provide those services as we change over our generation resource.

CHRIS KELLEY: Thank you. Anyone else? So, our last panel that we held in Salt Lake City for the QER, stakeholder meeting, we did a deep dive into the subject of cybersecurity, the importance of cyber and physical security. I guess I'm curious to know and you don't have to get into too many specifics, but if your organizations are involved in the concept of cybersecurity for

operations on the generation or transmission side, do you feel that enough is being done here? Are there opportunities to improve in that space? So I'll open it up to whomever.

JEFFREY GUST: I'll start. First of all, electric industry, I think is the only industry that has mandatory standards that are backed by law on cybersecurity. So we have what is called a SIP standard. And they have been in place since about 2009-ish as far as mandatory requirements. MidAmerican has been compliant with these standards ever since and they are changing. We are implementing some new standards here to increase the security. But there is more that can be done outside of the critical parts of the system. Also on the physical side, what happened in California at MetCal substation, many utilities are identifying critical stations and doing more to protect them. So there has been quite a bit done already. Maybe the industry's is not very good at communicating that out to the broad audience but we have been -- we take this very seriously. And we have done quite a bit in this area.

CHRIS KELLEY: Thank you. Anyone else?

DEAN ELLIS: Just real quick, I think the cybersecurity standards have been really helpful developing a standard platform for everybody to get on and provide guidance and minimum requirements for everyone. As an independent producer we don't have the same exposure as the utilities do given our infrastructure is relatively limited to our generation stations but we also do have a 24 by 7 dispatch floor that falls under the cybersecurity standards. So, we are affected in a number of ways. By the standards and we are responding to them and again, having centralized minimum requirements and criteria for everybody has been very helpful in moving the industry in the right direction.

CHRIS KELLEY: Thank you. Angela.

ANGELA WEBER: I know a lot of states are participating with the Emergency Management agencies and RTO's and the grid exercise conducted by NERC and that is where it simulates a coordination with your command center about responses to varying degrees of incidents. Whether a hurricane or cyber-attack. And I can tell you from Indiana's perspective, we have the benefit of having a Commissioner who was a chair of the Critical Infrastructure and Cybersecurity Committee. And so what she would do is emphasized that the NERC standards, SIP standards are baseline standards. If you want your utilities to do more, you have to meet with them and communicate with them. So she would bring them in and we would have these secure sessions where all the utilities would be in a room and discuss what they are doing with respect to physical security and cyber security and the problem I think is that a lot of the -- you're in this reactive mode where you have your security in place if something happens and you react and then that kind, attack changes. So you always seem to be reactive. So communication amongst the utilities has been key to get them to do more than the minimum. And that's it. Just basically sharing information is really important.

CHRIS KELLEY: Other comments on security? Okay. Let's turn to a comment that has come up in previous panels as well and that is the concept that transmission and distribution operators have kind of operated independently of each other or seen each other as unique entities. There is

no blurring of the lines between them. But in the recent past, we are seeing with all of these new innovations that is are occurring on the distribution system downstream, it is having impact on transmission system. To what extent or can you comment on the extent to which those lines are getting blurred and if your organizations are doing anything about addressing the blurring of those lines? Jeff?

JEFFREY GUST: I would agree the lines are definitely getting blurred as we add more distributed generation to the distribution system. And we are changing the flow. The system was designed as mentioned earlier, from large power generation down on the transmission system down to the distribution system to the load. Now that is being flipped and generation is located at customer's homes and businesses and that flow is changing. And it's changing I would say, parts of the U.S. drastically. So, not only coordination is needed, but I think we are going to have to install new infrastructure, switch out transformers or new technology to handle that change in flow. We are very aware of that. We haven't seen in Iowa, haven't seen as much distributed generation as places like California and Hawaii, but we are very active here in and are watching this carefully.

CHRIS KELLEY: Thank you. Other comments?

JOSHUA MANDELBAUM: We see it as an opportunity. There is tremendous opportunity with distributed resources, distributed generation, energy efficiency, demand response, storage, and it's important that it be taken into account. I think folks are certainly aware of it, but being more aggressive about looking at what those opportunities might look like, trying to stay ahead of what technology will do and the role it can provide. It is an important part of we think the planning process and it should be accounted for.

CHRIS KELLEY: Thank you. Tom?

TOM HELLER: In our sector, we are a municipal joint action agency that typically has only been generation of transmission. Our member's cities have done distribution themselves. But because of some of the small size, a lot of small municipal electric utilities, we are offering things like AMI, coordinated demand response, that we are doing ourselves. So those lines that used to be very firm line that you're there we are here, but now it's creating an opportunity for us to do it more cost effectively for some of these smaller systems that couldn't afford to do some of these technology upgrades that they wanted to have do and couldn't do in the past.

ANGELA WEBER: MISO and OMS is trying to get out in front of issue too, like demand response and what it's going to do to the system. It's a great opportunity, but it could affect reliability. So OMS and MISO has communicated and OMS has kindly agreed to do some modeling on demand response. And increasing levels of demand response and how that will affect reliability in the grid. That's one way of being able to get out in front of it.

CHRIS KELLEY: Thank you. So with that, why don't we turn to closing comments here. So what I'd like to do is give you all a chance, two minutes a piece, to just kind of wrap up your statements. If you want to summarize anything you're welcome to do that. If you have any new

points you'd like to raise, please do so. Also encourage you if you have policy recommendations, you have the QER Task Force here representing Federal Government at large, the legislative branch as well as the executive branch. I want to remind you that as Secretary Moniz mentioned, the first version of the QER resulted in 63 recommendations and many policy decisions that are being made as a result. So, with that, let's open it up to your two minutes a piece and why don't we start again right here with Jeff.

JEFFREY GUST: Sure. Again, thank you for inviting me here. Just want to make a few closing points. So as mentioned, MidAmerican is experiencing rapid change in our resource mix. We are also very, very busy building new transmission to address this new resource mix. And are looking at new technologies also to integrate more renewables on the system. And then finally, we think the organized markets will continue to provide value but must address the seams issue and improve the interconnection request process. Again, thank you.

CHRIS KELLEY: Thank you.

DEAN ELLIS: Thank you. So, I think we all agree that organized markets to varying degrees provided results and benefits to the consumers and at the end of the day, it's what the purpose of the markets really are is to provide the benefits to consumers, be it economics or flexibility, choice. So the markets largely seem to be functioning properly and delivering those results. I think now 15 years into restructuring we are to the point where we need to think about the framework and is the framework appropriate? And then how do we address this changing resource mix in the markets and how do we value resources that participate in the markets whether it is all the way from central station generation that is base loaded to central station generation that has a great deal of flexibility, down to distributed energy such as roof top solar. How do these different pieces fit together and I think that is where the next version of the QER needs to go and needs to address?

CHRIS KELLEY: Thank you. Josh?

JOSHUA MANDELBAUM: Sure. So we think the future of energy generation is going to look very different than it does today. We think there are already utilities like MidAmerican helping to set a framework for what that future will look like with their vision of 100% renewable generation for customers. And the Iowa example illustrates that there is more than enough potential to meet this vision with a mix of affordable, clean energy technologies. So future generation will undoubtedly include significantly more wind and solar generation. It will also include better accounting for and integration of energy storage, energy efficiency and distributed resources such as solar and combined heat and power. In technological innovation, is already facilitating this and making this transformation quicker and more affordable than previously imagined. Consumer demand is also going to continue to drive this. Consumers are going to continue to ask for clean energy technologies. Both at the smallest level consumer residential consumers but also large industrial consumers. And then there is going to continue to be a need to curb carbon pollution and those things will continue to drive this. So we should recognize these opportunities. We should recognize and embrace this and facilitate this transformation going forward.

CHRIS KELLEY: Thank you. Tom?

TOM HELLER: Thank you for the opportunity to be here again today. Three points. Number one, new hydropower licensing. There needs to be reform. It shouldn't take 13 years to build a hydropower facility on an existing dam at a core storage project. And that is how long it is going to take us to build Red Rock. We supported elements in the Senate bill 212 which starts that reform but that needs to be done. There needs to be more value placed on storage in the market for hydro to get built. Secondly, transmission is one of the most important things that we need to do for long term investment in the reliability and the future and moving renewable energy. There needs to be joint ownership of facilities. That is how to get public acceptance. That is how you get them built. CapEx 2020 model shown that and hopefully regulators and MISO people look at that the in the future. The SPP and MISO markets, thirdly, my last point, SPP and MISO markets, the energy markets, ancillary services, are working. We are happy with them. There are some things that have to be reformed a bit, but by-and-large prices are being reduced for the consumers. We don't want mandatory capacity market and that's what I'll close on.

ANGELA WEBER: Not to belabor the point, but the resource mix is changing so it's important to consider how we are going to integrate the new technologies into the system, maintain reliability and make sure resources are adequate and keep those prices at a reasonable level. I think the way to do that, one way that we feel at OMS is to have that partnership with MISO. To be able to communicate and to ensure that the process that we are participating in is transparent and open.

CHRIS KELLEY: Thank you. So with that, please join me in thanking our distinguished panel.

[Applause]

Panel 2

Electricity Distribution and End Use: How Do We Manage Challenges and Opportunities?

CHRIS KELLEY: I want to remind you if you want to provide comments at the end of the day today, please sign up at the front of the room, entrance to the room. And again if you're joining us via the live stream, you can submit your comments at any time at www.energy.gov/QER. So we'll get start here in just a moment.

Are we ready? Shall we get started? So, our second panel today is focused on electricity distribution and end use. How do we manage the challenges and opportunities? So I'm very pleased to be joined up here on stage by a few folks from industry and others so we have Kenneth Grant, Vice President of Sales and Marketing from Oklahoma Gas and Electric. OG&E. Brian Bowen, Regulatory Affairs Manager for First Fuel. Nora Naughton the Director of Policy for

Midwest Energy Efficiency Alliance. Becky Bradburn, General Manager Franklin Rural Electric Cooperative and Executive Vice President, Prairie Energy Cooperative. Joel Schmidt, Vice President for Regulatory Affairs at Alliant Energy and Mark Schuling, the consumer advocate for the State of Iowa at the Iowa Department of Justice.

So, again, just to remind you all, the routine is you all will have a chance to give opening remarks, you will have 5-7 minutes to do that. We'll go through one by one and then come back to me and I'll I have chance to ask questions. Why don't we go ahead and get started with Ken?

KENNETH GRANT: Thank you. So first I would like to thank the DOE for inviting me to participate on this panel, it's a pleasure to be here. I'm going to talk this morning a little bit about how we applied technology to the distribution grid and how that helped us to provide innovative programs to our customers and improve the operations of the grid. So a little background. OG&E is the largest electric utility in the state of Oklahoma, we serve around 835,000 customers in Oklahoma and western Arkansas. Over the course of the last 10 years, I had the opportunity to lead development and deployment of many of OG&E's customer-facing programs, as well as our energy efficiency programs, demand response programs and the technology innovation that is enabled by our smart grid technology platform. OG&E's deployed automated metering infrastructure across all 30,000 miles of service territory including two-way communicating digital smart meters and proprietary local area, wide area and back hall networks. The work was partially funded through smart grid investment grant provided by DOE. While we already had a business case and a project case for full deployment, the grant further improved the positive business case and allowed the company to accelerate deployment and the resulting customer benefits. It allowed us to deploy about half the time that we planned, so we appreciate that partnership with the DOE. One of the objectives of our smart grid deployment was to provide customers with better price and usage transparency, something they didn't have the in the past. And now all of our customers can enroll in the MyoGE power portal to track usage and cost. The portal allows customers to perform rate comparisons to see how their usage compares to others, learn how to better manage usage and cost and through a statistically valid study that we performed, we had participants compared to a control group and we are able to show that just the portal alone with no rate allowed customers to reduce demand and energy usage by 2 1/2% on average. Just through the information provided in the portal.

Probably the most notable program that leverages the smart grid platform is our award-winning Smart Hours program. Smart Hours is a technology enabled demand response program that not only assist customers in reducing on-peak usage during weekday hours of 2:00-7:00, June-September but provides a financial incentive for them to shift usage to non-peak hours. The program uses a variable peak pricing rate and customers can choose to have a programmable communicating thermostat installed or use a programmable thermostat of their choosing. Advantage of the PCT we provide is that customers can automatically set the thermostat up to automatically respond to price signals that are sent over the network. One of the things that makes the Smart Hours program unique is that customers maintain control of power at all times. It's not a direct load control program, nor is it just a straight time of use program. Customers can choose how much, if any, they want to adjust usage in order to achieve savings. So we have been able to show that if customers are provided technology and the price and usage transparency, they

will be able to reduce on-peak demand while achieving desired balance between cost and comfort. As a result, we have approximately 115,000 customers participating in the program with about 69,000 PCTs installed. The company has seen a peak demand reduction of 147 megawatts and participating customers saved around 15% annually on average. The program continues to be overwhelming success and consistently achieves net promotor scores between 50 and 60%. OG&E continues to develop other programs that will further leverage the platform. These programs could include prepaid billing, looking at electric vehicle program that would likely involve some level of charging infrastructure and a smart grid enabled LED program for street and security lighting. The smart grid enabled LED program would not only reduce energy consumption but will also allow us to turn lights on and off remotely. Will notify us when lamps have failed allowing us to return lights to service more quickly and allow us to adjust light usage which is important in some jurisdictions that have exterior light level ordinances. The AMI network is also enabled operational benefits including automated meter reading and remote connections and disconnections which has eliminated hundreds of thousands of truck rolls annually, which has resulted in reduced manpower, fewer vehicles, and significant fuel and vehicle emissions savings. The network is also enabled the use of automated switching on distribution circuits, reducing the number of customers impacted by circuit operations. OG&E has also leveraged the network to deploy volt optimization across 319 distribution circuits so far, which has provided an additional 54 megawatts of demand reduction so over 200 megawatts of demand reduction associated with the smart grid in infrastructure. Data from the smart meters is also helping OG&E identify and respond to outages more quickly. We are currently implementing a project that combines meter data with our outage management system and work management systems, in order provide customers with estimated times of restoration during outage events. We'll continue to look for additional ways to leverage technologies and data to improve operations and to reduce the frequency and duration of outages and take additional cost out of our business.

In conclusion, I hear a lot that utilities are facing unprecedented change at an unprecedented rate. Which is true. But it is also true we are much better positioned to respond to this change today because of the technology we have been deploying over the last 5-10 years. We are engaging customers in ways we never have before. We are providing product services and programs that customers tell us they want. We have made significant technology improvements again which will help us to facilitate distributed energy resources and better manage the power flows on the grid as distributed energy resources start to really proliferate on our network. As an industry, we need to be cautious of increasing regulation or mandates that could slow progress and hamper our ability to continue investing in technology and innovation. There are still many challenges to overcome, but we have benefited and will continue to benefit from the support of strong partnerships with the public and private sector and industry groups such as Electric Power Research Institute, Edison Electric Institute and agencies such as the Department of Energy, which has been a partnership that we have valued and has helped us to advance technology on our system. Thank you and I'll go to Brian.

BRIAN BOWEN: Good morning everyone. And I'd also like to begin by thanking the Department and Secretary of Energy for convening today's session. First Fuel is very pleased to be a part of it and I think it is really hitting on a number ever issues affecting the energy sector. I

entitled my presentation, Utility of The Future and Customer Engagement but as you can tell from Ken's remarks, this really isn't the utility of the future in some cases. It's the utility of today. So I'll be talking a little bit about how utilities like Ken's are using data analytics and increased customer engagement to deliver services that consumers really want. So First Fuel, if you're not familiar with the company, we provide an intelligence platform for energy industry. What we do is we harvest the insights within energy metered data. We focus on commercial customers. We don't work with residential customers. And the main reason we did that is that there are is interval data for most commercial customers all across the country and increasingly AMI data for both commercial and residential customers. We use that information and we combine it with additional insights about that particular facility. If it's a small business, is it a nail salon or a pizza shop? These are the kinds of things we can easily tell what are the square footage, and then what are the opportunities to save energy within that facility? We have an algorithm that can disaggregate load and understand how energy is being consumed and what ways it can be saved. I was at a convening similar to this a few week ago and a Chief Executive Officer of a large Midwest utility was asked how he tends to communicate with his customers. And he said, well, they complain a lot. And it was a good line for a chuckle. But I think increasingly what we are finding is that looking at this information about how customers actually use energy is say way to have a much more nuanced and productive conversation with customers.

So, just to speak to that point, we have looked at research from Navigent and Pike and other places and what we find is 90% of electricity consumers want more energy information. And only 5% of them feel like they are being actively engaged today. Of course if you look at that 90%, the flip side is that only 1 in 10 customers are not interested in more information. Oftentimes we hear about customers who are concerned that if there is a demand response program that is proposed, they'll be automatically opted in and the lights will go off when they are having a party and a barbecue. That's not kind of thing we are trying to do. We are trying to serve the 90% who would like more information and more options. So, we have started small when it comes to more information. What you're seeing here is a download of interval data. For most customers, this is difficult to interpret. In states like Texas, they have created a statewide platform called Smart Meter Texas where there is a way to download and sort of see charts and graphs that provide a little more intelligence and a way to link up to third party providers who could analyze this information. And increasingly customers are hearing from outside vendors who are sending them mail showing up at their door saying, I have a great deal for you on a solar panel system, storage, maybe you want an electric vehicle. The result of this is even though there is more information, there isn't necessarily more intelligence on the customer side and they are looking for someone to guide them and to advise them and help them make the right choices based on their consumption profile and their needs. And oftentimes we are finding the utility is very well positioned to do that. Here are the principles that First Fuel takes when we analyze meter data on behalf of the utilities. First of all, we want to make it very clear and engaging. So, this is a screenshot of our platform. Customers can click around, mouse over, understand when we say what is the miscellaneous usage, that's going to be plug load and give them examples of what it would be. We also personalize the insights, so we don't just sort of provide generic recommendations. We actually look at a specific building model for that commercial facility and are able to also compare it to similar facilities and make it relevant to the customer. And then the third thing, I sort of blew up this button in the bottom corner, but we also try to make it useful

and reduce the friction from a customer having insight about a way to potentially save energy let's say and actually doing it. There is a button that says, I'll do this and that connects them to the right person at either the utility or the program implementer who can help them get that service they need.

So, these are sort of the utility of the future aspirations to increasingly personalize energy service for each customer to tailor it to their needs. Utilities are becoming increasingly digital given the incredible growth of information that is out there. And also with this information, help customers sort of serve themselves, maybe reduce some of those complaints, make them understand what the options are that are available to them. And I'll just offer a few ways. This is the how to get their slide, but of course it's all easier said than done. One of the keys is coming up with ways to reward performance and I put "not sales" in parenthesis there. Sales are important, but other ways utilities can be rewarded for providing great customer service. When it comes digital engagement, many policymakers are trying to understand what is a metric of success? So we have submitted some comments through the rev process in New York and other jurisdictions to create some basic terms to understand if a digital engagement product is succeeding. Thinking beyond this one size fits all rate plan or all the options that is Ken is elaborating on here, enabling options and experimentation for customers to really understand what they want and need and then finally as has been mentioned several times, in the earlier panels, looking at ways to value distributed energy resources that increasingly customers can provide and in all of the interest in solar and storage, we want to make sure energy efficiency is also given its full due. So I want to leave my comments there but very interested to hear from the rest of the panel about the exciting opportunities the grid edge.

CHRIS KELLEY: Thank you, Brian. Nora?

NORA NAUGHTON: How do I get this in slide mode.

CHRIS KELLEY: They are putting it in for you.

NORA NAUGHTON: Thank you. Hello. I want to thank DOE for allowing MEEA to participate in this conference and holding it. I hope that we all benefit from it and so far it's been very, very interesting. I just want to give you a little bit of an explanation as to what MEEA is. It's Midwest Energy Efficiency Alliance. A not for profit membership organization. We have a lot of members, very diverse. We are a collaborative network and our purpose is to advance energy efficiency to support sustainable economic growth. Throughout the Midwest region we have a 15-state region and – sorry, 13-state region that we end up supporting and bridging the gap between policy adoption and program implementation.

So, just to begin with, a couple of introductory remarks. Energy efficiency, to make sure that we are all on the same page, I'm not talking about energy conservation. Energy efficiency, you still use the energy that you need to in terms of getting benefits of that energy, but you do it more efficiently, so there is energy savings that are derived. Just as an example, we participated in Earth Day and Earth Day Challenge where you were to turn off everything for an hour and we disconnected our house from the grid by turning off the breakers and interestingly, some

unnamed members of the family adopted maybe a different view of what conservation was by using their smartphones and laptops on battery mode. Maybe that is energy efficiency. It certainly shifting the peak perhaps. But, not conservation. So just to make that differential.

So, in the Midwestern states, we find that many states are pursuing energy efficiency through the adoption of statewide energy efficient standards and other policies aimed at reducing energy consumption at the state level. Now I'm mostly talking about utility programs. So the utilities are running these programs and they are meeting the energy efficiency standards. The graph I have here shows you that in states where there is a standard, they have the most savings achieved. When they don't have a standard that is mandated, you see that their energy savings are reduced and no state has ever saved or has saved 1% without a standard. So, they are quite important. But we are seeing a change now in the Midwest and there has been a few states that are moving away from standards and we are seeing reduced, moving to more of a voluntary participation in energy efficiency and integrating it with planning. While that will can work, it is also something that we are seeing reduced energy efficiency usage. I also want to point out that industrial is very important. Industrial and commercial sectors use quite a bit of energy. They have a lot of potential particularly in the Midwest, but elsewhere, and as the top consumers, they need to be engaged in energy efficiency for us to see real benefits. Again, we are seeing across the Midwest, a couple of states now allowing their industrial sector to opt-out of utility programs. And what that does is two things. It has shown that it is reduced energy efficiency savings, but even in cases where the industrials maintain their programs on their own on a voluntary basis, what we are seeing is they don't measure or verify the savings. Certainly not to the same degree as when they are participating in a utility program. And that does have ramifications. There are many ways in which you can introduce energy efficiency appliances and yet not install them properly and get the -- may not get the benefit they are intended to get. So measurement and verification is important. It's also really important if the Clean Power Plan goes forward because that sector needs to participate through verified savings. Another way in which we think that we can get a little bit more bang for our buck is to have utilities incented so that they also have shared savings. While there have been a number of regulatory changes that allow decoupling of revenues from usage and lost revenue recovery, some of these have really only removed the disincentives. When you're looking for innovation, looking for greater participation, energy incentives -- I'm sorry, incentives and shared savings programs with utilities have shown that that has produced greater savings and more innovation.

So I think we talked about this a little bit. I just want to mention again that the future of EE is looking at systems. We are looking at the not just the component, not just the machine, not just the motor, but the whole system and making sure that it -- that as a system it gives us the energy savings that we intend. Also the CPP including in particular its CEIP program, will start to give some incentives for lower income. We see a lot of opportunities there as right now they are not able to participate as well in energy efficiency due to the capital investment. Also multi-family buildings with the different incentives of owners and tenants need to be brought into – get greater energy efficiency from that group.

And then finally, I have been talking about utility programs, but energy efficiency is more than that. It goes -- I'll mention briefly, to emphasize that building codes and building data have really

done a lot to increase energy efficiency, not just now but for many, many years in the future as buildings that are more efficient because of building codes that include those kinds of measures. That savings is derived over many, many years. So with that, feel free to contact me after if you do not get all of your questions answered and there is my contact information. Thank you.

BECKY BRADBURN: Good morning. I'm Becky Bradburn, I manage two electric cooperatives in Iowa. Prairie Energy and Franklin REC. I also like to thank DOE for the opportunity to be part of this conversation and like to thank Secretary Vilsack and USDA, their programs have been beneficial to the electric cooperatives. I just want to share a few stats and explain how we are different from IOUs and municipals. Talk about our differences, some of the challenges and opportunities we are seeing and end up with a short little example of how we are embracing technology. As you know, electric cooperatives are non-profit entities. Our member owners are Board of Directors. At Prairie Energy and Franklin REC, I have seven directors and all of them receive electric service from us. Very quickly some stats. We serve over 650,000 Iowans across all 99 counties in Iowa, which gives us a very unique geographic footprint. We own our generation transmission and distribution assets rather than leasing those. We have 3 billion invested in plant. We employ 1200 people all of our cooperatives in Iowa. We are more residential than IOUs and muneys. Their residential sale is roughly 30%, versus for electric co-ops, we are more in the range of 50%. Or for some co-ops, even higher. We are also very geographically spread out. Co-ops average 3.5 members per mile, versus IOUs have 27 customers per mile and municipals are at 56 customers per mile. At Prairie Energy we have two members per mile. Franklin is a little higher at 2.3. But still very spread out. This low density and of course the corresponding lower revenue per mile is a big challenge for us. Not only in our investment to serve our member owners but also in the program that is we offer such as energy efficiency programs. In the last 30 years, Iowa's electric cooperatives have invested 220 million dollars in energy efficiency. In our current 5-year plan, that runs from 2015-2019, we expect to invest 16 million per year in energy efficiency programs. This is 2 1/2% of our retail revenues. If you look at the state of Minnesota, they require 1.5%, so we are 1% higher than what is required in the State of Minnesota. Another difference for us is our peaks. Our peaks are normally early morning or late in the afternoon. This corresponds to our higher residential membership. They obviously are getting ready for work early in the morning and they come home after 5:00 so they don't start to use energy until later in the evening. Obviously this solar generation in the prime-time for that is 8 a.m.-5 p.m. So while solar has value, there is less value to the electric cooperatives just because makeup of our membership and when they are home and when they are using their electricity. You might have seen in the *Des Moines Register* or on politico.com a couple of weeks ago, Iowa's electric cooperatives are being touted as champions of solar and renewable generation across co-ops, several are looking at or have already installed community solar projects. The nice thing about each of these projects is it's a unique response to our memberships and our communities. There isn't a one-size-fits-all approach to community solar programs. We have 700 renewable generators across Iowa from our members, primarily in wind, solar and biomass. You have also seen some press and criticism lately that the utility business model is outdated. I have a little difficulty with that. I think the more proper framing for that is, is it obsolete or is it simply broken? I think there are some places where we have opportunities to improve our utility models. But I think some of our utility models are working very well. A great example of that is the model that I work in at the cooperative model. We are

very consumer centric. And our member satisfaction scores reflect this. Our recent ACSI scores rank in the upper 80's. This puts us in the same level with companies like Apple, Lexus and Amazon. So I think we are clearly doing something right. And we need to expand on it.

Finally, I talked earlier about our Board of Directors. It's important to note that our Board of Directors are mainly farmers. And you might wonder how that correlates to technology. If you had the opportunity to sit in a new tractor combine and watch that machine drive itself across a field, you realize that farmers are embracing technology and those same farmers sit in my board rooms and embrace technology at a cooperative level for our utilities. At Prairie Energy, we have invested smart grid technology and similar to Ken's comments, we have integrated that with an online platform where our members can log in and see in near real time their daily energy usage which helps make them or helps them make better decisions. So in closing, Iowa is not for profit co-ops are very engaged in renewable energy development. We are investing significant amounts of resources in energy efficiency. Our culture embraces technology and innovation. And we are committed to serving our member owners with local solutions to power their lives and their communities. We are committed to providing safe, affordable reliable and environmental responsible energy. Our wholesale generation and transmission co-ops from whom we purchase our power have been doing this for a long time as well. And my one request to the DOE is to understand that each co-op is unique. We were created by our member owners to serve their needs. If we are to continue to providing essential electric service to rural America, we need flexibility and time to adapt to the new regulations. To that end, as you develop Federal energy policy, I would urge you to keep the how of achieving those goals at a local level. Thank you again for the time.

CHRIS KELLEY: Thank you, Becky. Joel.

JOEL SCHMIDT: Good morning, all. Again I'd like to thank the DOE for facilitating this and not only here but across the country. I think it's going to be some rich data and some insights. Also like to thank my fellow participants on this and the other pages for their insights. Also like to welcome our out of town guests, out of state guests to our fine state and we welcome you with open arms and hope you return.

Before I get into my comments, I'd like to give a little bit of background but from a personal and a professional level from Alliant Energy, so you have an idea of the context of my comments. I'm an Iowa product. I grew up on a small dairy farm in eastern Iowa. I have never known gasoline without ethanol. The first acres of corn I planted many Mays ago, but on a day like this, was on contour strips in about two foot of cover crop. That was technology at that point. We did have to drive the tractor. We had to pay attention to stuff but it was the high-tech. Both of those decisions were driven by two things that are going to come through the discussions here. The economics. What was cost-efficient? What was best to improve your life? And also the environment. I have been working in this industry over 30 years. I have 28 here in Iowa and in the Midwest. And demand response, energy efficiency, the environment, which is now moved from kind of compliance focused to renewable future focused, has always been part of the discussions. I can't remember as a new staff member to now as an executive, not having those items in our Strategic Planning, in our execution plans, in our thought process. Alliant Energy,

we serve 1.4 million customers in Iowa and Wisconsin. Roughly equally divided between there and that's gas and electric customers. We serve about 53,000 square miles of territory, that encompasses over 1000 communities. We continue to strive to provide the most reliable, economic and continually greener energy to our customer base. That has to be on an affordability platform. We realize our customer base, almost 50% of our customers, have net incomes of less than 50,000 dollars a year annually and 25% have 25,000 dollars a year or less. So we have to keep affordability at the forefront and many of my colleagues have talked about that before. Technology is really what is driving change. It's hard to think about your life be it on the personal level, professional level, or community involvement level without energy and technology. It is changing faster than ever and we embrace and look forward to it. So to summarize where my background is coming from, it's similar to the Governor and Lieutenant Governor comments. We are working from a proud past and embracing an exciting future.

Three areas I want to talk about is cost effective clean energy, innovation and flexibility and operations and modernization of the power grid. First off, on cost effective clean energy. We have already retro fitted or re-purposed almost a third of our traditional power fleet. We have added highly-efficient cost-effective natural gas facilities and are in the process of adding more. We also have close to a gigawatt worth of wind that we either own or we purchase on long term contracts as well as a lot of wind as we talked that comes from the MISO market on a daily basis for the benefit of our customers. And we know and look forward to expanding that portfolio and pacing that appropriately for the affordability of our customers. We are very proud of the emission reductions we have obtained. By 2025 we expect to have 90% reduction in mercury, 80% in [word] and significant carbon reductions.

As we have moved to this current future, and into the future, we have worked closely with our partners in the industry, in government and most importantly, our communities and customers. Now I'll talk about where we are on the innovation scale. We know customers want more options and more solutions so we are working to harness this technology and data for their benefit and our benefit again for that reliable, affordable energy. We are partnering with the Electric Power Research Institute, EPRI as has been mentioned a couple of times. This week, we had the ribbon cutting of our own learning lab in Madison, Wisconsin at our corporate headquarters. And this has a lot of attributes. One, we have over 10 types of solar panels in the small array so we can understand the differences how they work, what data comes from them. We have battery in that. We have solar parking cover. We have electric vehicle charging stations.
And I think as important, we had probably about 6-900 construction supervisors peering out of the windows of the general office on a pretty continual basis, watching this. So it wasn't a spreadsheet. It wasn't a white paper. This was real activity happening and they can embrace it. We built walking trails for the public so they can learn about this. A similar idea is being put in place at the Indian Creek Nature Center in Cedar Rapids and we are proud to be a partner of that. And this again goes back to the past. We were their partner 20-25 years ago when they put solar panels on their old facility. They are now building a new state-of-the-art sustainable facility and this is not just state-of-the-art for Iowa. This is state-of-the-art for United States and for the world. And we are going to be the operator of the solar arrays at that facility. We are also integrating solar on some of the sites around our power plants, ash sites. We have already repurposed with a local Community College, a traditional power plant. So just think about this.

The power plant that probably provided the technological innovations for these college students' grandparents, is now their rec center and their education center. That's progress. That's the persistence we talked about in Iowa and continuing with that. And that's just the beginning. We know the technology and innovation is going to continue to push us faster, harder, and we embrace that.

Now my third point. The smarter and stronger power grid. And I think this is probably the most important because this is really we see the heart of this. It's the platform and facilitator for innovation. It was mentioned earlier. We are going from one-way power flow or a linear process from fuel source mine all the way to light switch and now everything is inner connected and flows are going back and forth and information is going back and forth. We expect to invest 1.8 billion in this power grid over the next four years, again to continue that robustness to allow for more integration of intermittent resources and other technologies. The grid is the backbone of the system. We think it will be. It will not be the grid of my father, for my children it's not going be to be the grid I grew up with. For their children's children it won't be the grid they grow up with. It's great, but it's going to be there and I think it will be the platform for all these great ideas and frankly for a better way of life and for the financial and physical health and security of our customers.

In closing, as a regulatory affairs person, I do have to make a few policy statements. First off, I encourage DOE to not only take this collaboration in the gathering stage, but throughout the implementation of these ideas and work with the industry and the other providers to smartly implement this technology. I think we will get the most value if we work together to smartly integrate this technology. I think it will be of higher value and will happen sooner. So promote policies and regulatory models that both enable building the grid of the future, while also recognizing and addressing the impact of the transition and specifically, the impact on those customers that depend on us every day to flip the lights on when they get up, to turn them down when they go to sleep, make that coffee in the morning, to provide that light for a homework of the first grader, to power the laptops and smartphones and all the other fun things that make our lives better. Again encourage increased collaboration to help bring the cost of the technology down, as well as implementation. In closing, preserve state authority over retail electric service decisions because states are closest to the energy needs of the residents and the political and social culture of those customers. And with that, I look forward to the questions and further dialogue. Thank you.

CHRIS KELLEY: Thank you, Joel. Mark?

MARK SCHULING: Thank you, Chris. The question we were supposed to address is electricity distribution and end use, how do we manage challenges and opportunities? First I tell you, I don't have the answers to that. But I do have something to contribute and I do appreciate being at the table because I think that is important. And I think we are off to a good start on these type of issues. The Department of Energy has been looking at and releasing reports on the same issues we discussed today for the last couple of years. Lots of good information. The same issues still exist. There is no quick response and answer to these issues. But there is collaboration. And with collaboration, we'll make sure that whatever we end up putting out is going to be better than

it would have been put out otherwise. We are going to recognize all of the issues that exist and we'll have discussions on them before we put answers and before we implement. Issues currently being framed, data is being collected, answers at some point in time going to be generated not all at once, but over a period of time and I want to thank the Department of Energy for that effort.

Secondly, my perspective as a consumer advocate, a representative of the consumers. The consumers deserve access to safe, reliable, and affordable utility service. And from my standpoint, we want it to be equitable to all and it doesn't have to be equal it just needs to be equitable. We are going to have differences that occur over a period of time. We are going to have lots of different issues that are in play. A good example is energy efficiency that was discussed as part of this panel. Not everybody benefits with regards to energy efficiency equally. If you put in a furnace in a particular year, you are going to benefit more than other residential customers, but the other residential customers are benefiting from energy efficiency so the classes as a whole is benefiting. So there is going to be ebbs and flows, but what you have to do is you have to look what is the benefit overall? Is it equitable? And are we gaining something in the long run?

Third, I do have some issues that I think need to believe discussed and I think they all interrelate. And it's hard to deal with one without dealing with the other. And they are being discussed as part of this collaboration and they need to continue to be discuss in future collaborations and I think one of them is the grid of the future. This is an issue that the Department of Energy was looking at in prior years and it still is an issue today. I hear it discussed, but I don't hear specifics a lot. And I think it is important for that to be a collaborative effort. The grid of the future as Joel just mentioned, it is not going to be what his grandfather had and it's not going to be what his father had. I think it's more of what our kids will end up with. But we have to figure out where that is and when we start to look at the grid of the future, some of the information and issues that we have to take into account is storage. Storage is going to impact. And I think storage is on its way. Regional planning that we do now with regards to energy generation and transmission. Distributed generation, renewables, other types of distributed generation other than renewables. All of those are going to impact the grid, so we can't build the grid the same way we build it 30 years ago. We have to anticipate that all of this is coming and it will be a different grid than we have in the past and maybe we have micro grids as part of the grid as we go forward. But we will have to take a look at that.

Storage itself, that is a separate issue. I don't think it's just going to be batteries. All kinds of analysis going on out there. There was a *Wall Street Journal* article recently that I saw, it was a Danielle Fong. She graduated or started University in Nova Scotia at age 12 and graduated at age 19 with a bachelor in Science and Physics and Computer Science. And she is dealing with storage. What she is doing is looking at compressed air with being able to get a benefit from the byproduct of heat that comes from it. And so when we have got all of these amazingly intelligent people working on storage, it's going to come. I don't know when, but it is going to come and it will come sooner rather than later with even what we seen in the automobile markets. So, I think storage is there. It's important because of renewables. Important because of wind on the utility level. It is an important issue and as I said, it relates to the others. And then last issue I think we have to discuss and put in there is cost. Kind of talked about that before. It doesn't have to be

equal. It has to be equitable. How do we take into account utility costs? And the past all the costs were with the utilities. So it was easy, what we did was added up the cost and through a regulatory manner, we spread them out. We don't have costs just on the utility side anymore. We have cost on the utility side of the meter and on the customer side of the meter. And we have benefits on the utility side of the meter and on the customer side of the meter. So when we take into account costs and rates in the future, we have got to take into account costs and benefits that have to do with the entire generation distribution to end use process. Thank you.

CHRIS KELLEY: Thank you, Mark. So with that, we'll turn to the questions. So I have a few. I listened to what you have had to say, so let's go ahead and get started. So first, I want to quote a statistic that Brian mentioned during your presentation, that 90% of customers want more energy information. But this is a little bit in contrast to some of the previous panels that I heard from in the past and I know you're at a disadvantage because you weren't there. But, there seem to be two camps of customers is what we are hearing. Those that do want to use or get access to their usage data and really geek out on it and then those who just purely want reliable and affordable energy. So do you see these two camps as distinct and I guess for the rest of you, do you see these new intelligence platforms cropping up and that customers are really asking for a lot more information? Are they purely just cost driven? Start with you, Brian.

BRIAN BOWEN: I'll answer that by saying 90% of the customers may be interested in more information. That doesn't necessarily mean that 90% of them will act on that information. I think it's important to provide information to customers and have that be a two-way conversation. So maybe you reach out to a customer and find out that they don't want to hear anything anymore. There is absolutely nothing preventing them from being removed from an outreach list. I think the important thing is to open up options to those customers that are engaged and are looking for advice. And as I mentioned, we work with utilities all across the country. We also work with energy retailers. Traditionally, those are the main point of contact for customers who are looking for information about how to save energy, how to go through all of these various options that are available to them. So, it just makes sense for them to be able to ask their utility for some advice. And also just turn to Mark's point about, even if all customers aren't participating in programs, there are system benefits from participation and energy efficiency and distributed energy resources the grid. We need to keep that in mind as well even if we can't get that full 90%, there still will be system benefits to be captured.

CHRIS KELLEY: Thank you, Brian. Other comments?

BECKY BRADBURN: For us, the biggest piece was education. We can put the information out on our website but until they really understand how to use that information, there isn't as much engagement. Once some of our members started to understand how to interpret that information or how to use it, how to make it helpful and not in a cumbersome way. It can't be something they have to spend 4-5 hours a day on. It has to be something that they can spend maybe a couple of hours on a Saturday and have benefits. Then I think that information and that engagement happens.

CHRIS KELLEY: Thank you, Becky.

KENNETH GRANT: I agree with what Becky said. We spend a lot of time with education in helping customers to understand how they can utilize that information and for what we found is for our customers if you can tie it to the ability to save money on their bills, they will use the information. That is their primary driver for decision-making. And so they'll invest the time in understanding the information if they can tie it to savings. And I saw a statistic the other day and I'm not going to get this right because I didn't commit it to memory but something in the order of the majority or more than half of our customers will be millennials over its next 10 years and so I think they will continue -- I would say they have a very high interest, they are already geeking out on information and technology. And so I think that will take care of itself over time.

CHRIS KELLEY: Thank you. Joel did you have a comment?

JOEL SCHMIDT: Yes, first off thank you Brian for another point of data here. And I think that is the important point here is there is a lot of different data here and we need to think of customers plural. We thought of them through time in the classes of residential, commercial and industrial. And that is changing. We now have the ability to get more granular and frankly if I look at the load profile of a customer that generates residential and generates some of their own power, may even be experimenting with battery storage, probably has done energy efficiency, that profile if I don't put the scale on the X and Y axis, can often look like what I have got for my largest customers that have code generation facilities because the steam is valuable for their processes. And I think as utilities and the rest of us in this ecosystem, we need to get information from multiple sources. And data from the system, that Brian talked about, old-fashioned surveys can tell you something. The thing we never liked to get but we need to get and really need to look through, the nuggets of information and customer complaints. They tell us a lot. And that old-fashioned, not Facebook, it's not all the other Instagram and the other 50 apps that I don't know about. One-on-one face time. Be that at your church or schools. Or we have the privilege of meeting with our customers one-on-one on their facilities. Understanding what is important for them. I mean, a win for us is when that industrial facility can put in some energy saving measures so they become more competitive, they make more widgets in Iowa or Wisconsin at a lower price and frankly, the system benefit there is they absorb more of the cost because they are using more of the energy and system. So I think we really need to look at it from a lot of different places and one thing that we found really interesting is we ran focus groups the last year. For me, it was just amazing, like-minded people, the differences that would even be in there as well as how all customers were deeper in certain parts of our ecosystem than I ever thought they would be. And much shallower in the overall in things. And then the other stat I'll give I think I heard at a conference we were at Brian in the last month, it was one of them, that the average customer spends 6 minutes a year thinking about their electric bill. So we could look at that and say they don't care. I tend to look at that and say, I better use those 6 minutes pretty wisely. So I appreciate that and I think it is something we all have to pay attention to.

CHRIS KELLEY: Thank you. Nora.

MARK SCHULING: I agree with what everybody said. I think there are different ways to take advantage of the information. I think education is important. The consumer may be able to use

that education and reduce their electric bill. And data. I mentioned earlier, collection of data is always important for making a determination of where we go in the future. One issue that wasn't discussed, is the cost and we always have to remember that in the end, the consumers pay. Everything is passed down to the consumers. So there are expensive ways of gathering data and educating the customers and there are is less expensive ways and then an inexpensive way that probably won't work, but what we have to do is have to be accountable for the cost at the same time as we are going to be accountable for the information that is gathered.

CHRIS KELLEY: Thank you. Nora?

NORA NAUGHTON: Just real briefly, I think we also have to realize there is information overload sometimes and focusing -- we never really found anybody who didn't want to have more energy efficiency in their appliances and their factories or whatever. But, sometimes either getting an incentive or rebate or a focus, even by using an app that allows them to focus, can help a little bit and trying to determine which of the competing demands on their capital is going to win. And what is going to be more beneficial for them over the long haul? And just get them out of the inertia that sometimes comes with having so much information. I think that is just an important thing to remember too. That information is good but we do have to provide some focus, some incentive, some way for people to understand what is the path forward.

CHRIS KELLEY: Thank you. So Nora, you had mentioned a comment in your earlier remarks about a push or a need for a push, additional push for EE incentive policies for utilities. Do you see this coming from state regulators, Federal regulators? Or elsewhere?

NORA NAUGHTON: I think that this is probably more legal than anything, but I think from the Federal regulators it would have to come in terms of the carrot rather than the stick. And the regulation is really at a state level right now. What -- there is a number of -- I'd say there is say growing concern that mandated energy efficiency standards do not allow for flexibility, so therefore the voluntary efforts should be the only thing that remain. And the concern that I think gives us is that, just as I just spoke, the information over load, the fact that there is a lot of demands on people's capital, the fact that energy efficiency, while it pays itself back for every $1 spent, more than two dollars is saved. It does require an upfront purchase and it pays back over time and can go way beyond the cost as well because of the life cycle. But, but trying to get people to take that step without any kind of mandate or incentives can sometimes -- there is just too many demands on them and I have to say sometimes energy efficiency is just not as sexy as putting in a solar facility or a wind farm even though it cost you much, much more to do that. It just -- there is an appeal to people to have completely clean energy instead of just saving energy using the sources we have by being more efficient. So, I think that answers your question.

CHRIS KELLEY: Thank you. Yes, it does. Let me broad that same question a little bit so others can answer. So just a broad question about the regulatory environment in in general. So, Nora, you just mentioned sometimes mandates help. Do you all agree with that? Do you feel that there is more need for regulatory mandate? Does it need to happen more at the state level, local level? Federal level? Any comments on that? Becky?

BECKY BRANDBURN: I'll take a stab at it. One of the things in Iowa, as a statewide group of cooperatives, we are requesting from our state legislature more on the incentive side not the mandate side. We feel we have done a good job and it goes down to our members as well. Our generation in transmission co-op has helped us to offer rebates for energy efficiency. And so, we share in that cost and ultimately our members are more proactive in energy efficiency. So, the incentive side for us worked well. Another thing we are doing in Iowa is we have a carve out as part of our tax that we can up to 10% of the tax credit can be used for utility solar and that is one of the things that we are looking at from a cooperative perspective is that we think we can have a bigger impact in helping the environment if we can do it on a larger scale. So, we would, I guess from a co-op perspective would prefer incentive versus mandate –

CHRIS KELLEY: Thank you, other comments?

JOEL SCHMIDT: I think the best use of Federal resources is really more at the broader products and so forth. We see significant benefit in what was called the white goods industry and appliances. And leave it to the states and the communities to work the incentives. I believe incentives are needed. I look at incentives beyond just dollars. It's encouragement, it's supportive environment. I come from a perspective of two states that you would say have very different ways of managing this. But both obtain results for their customers. And that is what is important. And I think it is important as we have been talking about, embracing change and technology in this arena as well. What we what were good incentives five years ago may not be the best incentives now and we may want different incentives in five years for the behavior and the objectives for society. I think we have to continually change and evaluate and have continuous learning not only from our microenvironments but we have an exchange of data nationally and internationally instantaneously, that I think can also provide us a lot of value.

CHRIS KELLEY: Thank you.

KENNETH GRANT: I think it is certainly a state-level issue, not a Federal-level issue and should be handled at a state level in partnership with the utilities. Energy efficiency programs are something we continue to invest in. We have goals in Oklahoma and Arkansas and we met or exceeded those goals and we continue to grow those programs. We started significantly investing around 10 years ago. And we will continue to grow those programs. I think the problem you run into with mandates, we wouldn't be in favor of mandates, there are additional mandates, we would like to see more incentives but if more mandates are put in place, something has to be done about how utilities recover their fixed costs in reducing the variable piece of our charges and that is where we recover a significant amount of our fixed costs. You're always at odds with yourself and it also makes it difficult.

CHRIS KELLEY: Thank you.

MARK SCHULING: Our office spends a significant amount of time on energy efficiency. It is working with the utilities. Not against. It's working with them. We are very successful at this point in time in Iowa with regards to our programs. I think it's appropriate to leave it with the states. Depending on who you are and where you're at any particular time and what is occurring,

circumstances can change but there is no reason whatever state is doing and it's being successful, to mandate that they change the type of program they are offering. So I think we are doing well in Iowa at this particular time.

CHRIS KELLEY: Thank you.

BRIAN BOWEN: If I could respond briefly on Federal action and then turning to the conversations that is helping at the Federal level and state level. At the Federal level, I think we see energy efficiency coming into play obviously with the Clean Power Plan as a compliance mechanism and I think one of the roles at the Federal level that is productive, is just understanding what the standards are for measurement and verification of energy savings. Especially as trading is being proposed in different regions. We need to all ensure we know what reduction credit is in one jurisdiction verses another. And the availability of smart meter data and interval meter data generally is helping that. So we are active in those conversations and think it is appropriate for the Federal Government to look into them as well. The issue that is both Federal and state is around really Mark's point about how to make some of these data processing and data analysis issues more cost effective for consumers. And so, First Fuel is a company, software company that has built our product in the cloud. So to speak. And all that means is that we are using servers provided by Google, Amazon, Microsoft, they know how to build servicers better, faster and cheaper that we do and they certainly know how to protect them and secure them better than we do and it sounds like they also supplied them with clean energy so that is great too. But there is a conversation happening at the Federal level through the energy bills in the House and Senate and also now in the State of Illinois, there has been a notice of inquiry opened up about the accounting treatment of cloud and software as a service utility investment versus on premise IT investments. And at the risk of getting very wonky and making all the accountants in here flip their lid, the conversation is around how on premise IT is the treated as a capital expense. If a utility builds their own data center it can be capitalized and earn a rate of return. However, using a cloud-based system is treated as an operating expense. It does not earn a rate of return. Even though that may be the better, faster and cheaper and more secure option. I think just given the Federal Government's embrace of the cloud, the DOD, the NSA, of course, many other organizations are now turning to the cloud due to those benefits. I think it's productive those conversations are happening so we can ensure that data at is used in a cost effective manner and provides customer benefits.

CHRIS KELLEY: Thank you. So I guess sticking with these new technologies and new services that are available, historically utilities have been very open about sharing information with each other and with agencies like the DOE but as we are see more and more ancillary services, these third parties are now coming in with a proprietary systems and data, do you continue to see a role for DOE, because my presumption is they'll be limited sharing with these new types of organizations online. So, the question I guess is back to you Brian. To what extent to you see value from DOE participation and the space that you work?

BRIAN BOWEN: So we have benefited from DOE's participation in our space already. One of our longest serving customers is the general services administration, Department of Defense, and we have also done some Research and Development through DOE Grant with the DOD of our

original product, which was the ability to audit a building remotely. We certainly see the need for that Research and Development continuing. I think in our particular sector, we are really researched the deployment stage but I know that there are many other sectors where that R&D is essential and certainly should be supported.

CHRIS KELLEY: Is it accurate to the just follow-up, to assume that there will be less information sharing back to the government as a result of participation in these types of programs? So in other words, because it's a competitive space, will there be proprietary information you wouldn't be able to share back?

BRIAN BOWEN: Well, that's an interesting question. I mean, we do have proprietary IT, of course. But we are active in working groups and basically every state that we are operating in. I mentioned EMB is a real key conversation. So how is our algorithm enabling enhanced M&D? We are active in those conversations and in trying to make as much open source as we can, while still protecting what our engineers built over time. So we are all about sharing best practices.

CHRIS KELLEY: Excellent. Thank you. So now let's turn to this subject of distributed energy resources. So we heard earlier today about renewables, but more from a context of utility scale renewable. I have a question, I think Becky you brought up community solar, residential solar and your service territory. Are you seeing consumers doing more of this? And is it resulting in any operational challenges? Or other challenges for you?

BECKY BRADBURN: There is always challenges. We are seeing in the area of solar especially, we have got several members at each of my co-ops that are looking at putting in a solar array of some magnitude to help offset some of their costs. Like I mentioned earlier, the prime-time of generation 8 a.m.-5 p.m. doesn't work well for our residential customers. I don't feel like they are getting the return they were expecting. However, we are finding a niche for CNI load. We are very Ag related. We have a lot of hog, chicken, poultry, barns and in that space, we are actually we have got a few members that have put those on to help shave some of the demand for them, which, who for them because their load curve matches up better with solar. So we are having some success there. On a community solar base, both of my co-ops are exploring the option for it. We are very small. Prairie Energy has about 4000 members and Franklin has 1800. So, we are a lot smaller. There are bigger co-op that is have already done community solar, so the great thing about the co-op business model is we are willing to share with each other and so, right now, we have already gone to a neighboring cooperative and their solar farm and then the information and what they offer online to their members to see what kind of technology and information they can get back in the office. So, we are kind of on the leading edge, but yet we are small enough we can't be the early adopters so we are working through that. I expect this fall that we'll make some decision what size, location, that is the big key for us. The resources have to match the location to help our grid out and that is a challenge with the smaller one-off systems. So I expect something this fall we'll be able and ready to move forward.

CHRIS KELLEY: Thank you. Other comments on DER? Ken?

KENNETH GRANT: We are starting to see some development of solar but in a low cost part of

the country. And with current natural gas prices, it is not really economic in our part of the country to a large extent. And so, now is the time for us to study and prepare and so we do think that the technology that we deployed across our distribution grid will help us to manage distributed energy resources better especially with the voltage data we have across the distribution grid. One of the things we have done is we have moved forward with building some solar of our own on our distribution network. So we can study the effects of solar on the distribution grid, distributed solar. And we are seeing the intermittency and the variability of that production and so, we are going to look at using some storage in conjunction with that solar to see how we can manage that with storage. Again, it's got to become more economic. But we are preparing for that future and now is the time for us to do that. And we will continue to expand our solar. We have a community solar tariff that just got approved by our commission and so, we can start expanding our solar on the distribution grid and we are looking at doing that in a distributed form on the distribution system and offering that to customers through our community solar tariff.

CHRIS KELLEY: Thank you. Other comments? Joel?

JOEL SCHMIDT: Given that Alliant Energy has about 1400 roughly customers in Iowa with rough top, we do have experience here. Right now I think the discussions are primarily around and Mark hit on a few of these; cost and benefit allocation, equitable treatment. And I don't think this is probably the forum to go there. There is a lot of active discussion and probably no right answers and no completely wrong answers. We have got to work our way through that and we are doing that. But, we do know on the grid as the penetration increases, and it becomes very much on a circuited level; you can look at an average and you do really don't have information. That being said, we are finding roughly that if you get up to about the 10% penetration, the system is pretty good. Beyond that, stuff starts to operate more. Some of the that could be good, some could be bad. Again back to data. We have to find that. I saw recently, I don't know who released the study - I think it was in Scott Mann's State of the Industry now that I think about it, that Hawaii actually has experienced a grid having more capability than they thought. It doesn't have unlimited, but it has more. Which again tells me the creativity of the engineers and operators and with some data and experience, we can do more. I think we are in a great place especially in Iowa. We have multiple sources for renewability energy. We have already talked about the low cost of large-scale wind. We have got decades of experience in the small scale wind. Be that private or utility-owned or utility backed with PPA's. We are starting to experiment. Josh mentioned the larger scale solar projects. A lot of those that are being investigated in the state around the area. And that is going to continue to grow so that's a third option. And then we have talked about the customer-owned solar. As well we have seen a lot in some of the agricultural settings, be that hog confinements, other farms where there is a load profile and land and so forth. It's made sense with the other incentives to install this.

CHRIS KELLEY: Thank you. Other comments?

MARK SCHULING: Our Iowa utilities board had a proceeding and information gathering proceeding with regards to distributed generation, and it went for a significant number of months. Hundreds of people responded. Determined that we need to gather more information and we

need to do some additional projects and both of the investor-owned – Alliant Energy with Joel Schmidt here and MidAmerican Energy are proposing some pilot projects, both proposed solar farms as Joel mentioned. There are other solar farms in the state. It seems to be a good alternative for people that can't put it on their house, for economies of scale. It's just another alternative that is available there and we are starting to see that occur in Iowa and as we mentioned, we have lots of wind, but not a lot of solar and so, it is good to see alternative renewables coming into the state.

CHRIS KELLEY: Thank you. Anyone else? Okay. So with that, why don't we turn to our closing remarks. So just like with the last panel, what I'd like to do is open it up and maybe we'll start at the end with Mark this time. But you'll have a minute. An opportunity to provide any closing statement that you have. You have got the QER Task Force here before you so any policy recommendations or any other comments you like to make.

MARK SCHULING: I'm guessing this isn't a yes or no question?

CHRIS KELLEY: If you like it to be.

MARK SCHULING: As I mentioned before, I'm a consumer advocate. We need to continue what we are doing. We are here today in a collaborative effort and we need to continue to collaborative effort. I also mentioned that customers end up paying. That's the way it works. We need to be at the table and part of the process so that all issues are looked at that we can take into account all issues that are rising and when we implement something we will implement something that will work. It's not going to be easy. No quick answers for this. We need to meet. We need to gather data. We need to discuss and then we need to come up with answers. And what the Department of Energy is doing here as an excellent way of moving it on the Federal level but also keeping us going on the state level too. As I mentioned, there is several issues that need to be looked and they need to be looked at together. I have no answers with regards to them. But I think it is exciting. I think storage is exciting. It will have a major impact. I think the new grid is going to be different and we'll figure out how to distribute generation better. And then as we go forward, we understand that costs need to be taken into account. We understand that rates will have to be looked at. We think that when we got that point, we will have the information that is there. And be able to make a proper determination. Everybody will pay their equitable share. We will be able to figure out how on to do that in a collaborative effort.

CHRIS KELLEY: Thank you, Mark. Joel?

JOEL SCHMIDT: Thank you and I would echo the comments on collaboration. What struck me is the more we think about the blurring lines in all parts of our business. Not only who is working it from customers, industry, third party providers, regulators, technology providers. The technology - there is blurring lines there. Is storage really a supply or demand solution? Yes. Are a lot of the other solutions supplier one demand? Yes. So, should our policies and our operations be divided by supply and demand? I'm not so sure. Data. There are lots of different lines on that and I talked about the different ways to think about customers. But a new one that struck me in the last few days is really communications. Communications now can be

machine-to-machine. They can be customer to machine. They can be machine to the company. They can be the company to the regulator. The customer to the regulator. You really do have this web of communication and it's all flowing instantaneously. And it's rich, but it's also has risk and perils in it and it's our job to manage that. We talked about collaboration. I think it's great. It's the human potential that is going to solve these problems and our collected potential is much more than our individual. In closing, I think it's a very exciting time to be in the industry. In my three decades, I know this is the most exciting time to be in the industry. We can't forget this is about the customers. And about the customers today and tomorrow and well into the future. Thank you.

CHRIS KELLEY: Thank you. Becky?

BECKY BRANDBURN: I guess I would echo both of my predecessors. It is definitely about cooperation. I would recommend you take a hard look at the electric cooperative business model. We have done cooperation for years. I would also reiterate my opening remarks. While you're setting goals, please keep the how those are accomplished at a local level. I think we have done a great job in Iowa. You have seen our examples of our wind development, the different technologies. I just really, really would emphasize keeping the accomplishment of the goals at a local level. How we do it. Give us the opportunity to make you proud.

CHRIS KELLEY: Thank you, Becky. Nora?

NORA NAUGHTON: I guess I would emphasize not to forget EE in the mist of all of the development of other energy resources. Energy efficiency has been a valuable investment in our community and our local businesses and our homes. It's been a proven investment. It returns two dollars for every one dollar spent. And it is more than just saving kilowatt hours because energy efficiency is also helped our citizens save money. Our businesses reduce energy cost and become more competitive. The electric grid reduced peak load and other and overall load. And utilities to avoid costly infrastructure development. So, it's an important part of the conversation and I just would emphasize that if there are going to be Federal incentives, energy efficiency has a long way to go. There are still plenty of areas that need to have or become more efficient on the existing grid that we have today. While we are all looking to the future and the future of the grid, we still have to make decisions now that can have that kind of immediate impact and that is what energy efficiency really is.

CHRIS KELLEY: Brian?

BRIAN BOWEN: So I think it was Joel who called the grid a platform. And they think is really a great way to think about this whole discussion. It's a platform we can still get a whole lot of value out of it and continue to get value out of going forward. So, just in my closing remarks I'll reiterate a few of the points I think did the OE can be particularly helpful on and -- DOE -- the first is evaluation measurement and verification of energy efficiency so that as Nora is saying, it be can valued as the resource it is going forward. That is essential and something we will be participating in. And the second is the issue of Cloud Computing and how as utilities are increasingly making investments not just in poles and wires but in sort of bits and bytes, how to

ensure that the in certainly I was aligned so customers are getting the best quality of service at the lowest possible cost. So that is something I think will happen at the Federal level in terms of guidance and also at the state level in terms of implementation. And then the final point as imaged, First Fuel has been working with DOE for years. We have benefit Friday investments in early stage technology. We are now at the point of deployment. There are many other exciting technologies at the grid edge that we'll continual to benefit from and I'm sure we are making the most of this platform we built. So thank you.

CHRIS KELLEY: Thank you, Nora. Brian.

BRIAN BOWEN: So I think it was Joel who called the grid a platform and I think that is a really great way to sort of think about this whole discussion. It's a platform that we can still get a whole lot of value out of and continue to get value out of going forward. So just in my close remarks, I will reiterate a few of the points that I think DOE can be particularly helpful on. The first is, again, evaluation, measurement and verification of energy efficiency, so that as Nora is saying, it can truly be valued as the resource that it is going forward. That is essential and something that we will be participating in. The second is this issue of cloud computing and how as utilities are increasingly making investments not just in poles and wires, but in bits and bytes, how can we ensure that the incentives are aligned in those investments so that customers are getting the best quality of service at the lower possible cost. So that is something I think will happen at the federal level in terms of guidance, but also at the state level in terms of implementation. And the final point, as I mentioned, First Fuel has been working closely with DOE for years, we have benefited from its investments and early stage technology, that we are now at the point of deployment. There are many other exciting technologies at the grid edge that will continue to benefit from that. And be sure that we are really making the most of this platform that we built. So thank you.

CHRIS KELLEY: Thank you, Brian. Finally, Ken.

KENNETH GRANT: So, as Mark said, I believe you said stay the course. And I think that is right. We have a saying in our company, we like to say much progress made, more progress needed. And I think that sums it up. Four quick things. We need to continue to advance technology and innovation. There are a lot of things we need to solve with the grid of the future and the movement towards demand side resources as opposed to just supply side. But we need to make sure that second point that we keep customers in mind. These advancements in technology need to benefit customers. We need to find ways to take cost out of our business so customer's bills don't continue to grow. That is important. We need to trust the markets third thing. The markets are working. And our customers have saved significant money as a result of the SPP market. Fourth thing, partnerships. I think that is where the DOE has been helpful in helping advance technology. Partnerships with the DOE, the public and private sector, EPRI and other industry groups like that. We have to make sure that we are managing cost. We have to make sure we are providing reliability especially in the short-term as we wait for things like storage to become economic and efficient.

CHRIS KELLEY: Thank you. So with that, please join me in thanking our panel.

[Applause]

So we'll now turn to a break for lunch. For those in the audience here, we do have a list of restaurants, nearby restaurants that is posted outside at the entrance table. I want to remind you again if you like to provide public comments, sign up at the front as well and also want to remind you that immediately after lunch we'll get started at 1:00 p.m. with comments from Assistant Secretary Patricia Hoffman who will be kicking things off and then go into our third and final panel. Thank you.

(Break)

Remarks by Assistant Secretary for Electricity Delivery and Energy Reliability Patricia Hoffman

CHRIS KELLEY: We don't want to waste any more of your valuable time. Let's get started. So next up on the agenda, we have a guest speaker and I'm go going to turn it right to Karen Wayland and let her do the introduction and we'll go from there.

KAREN WAYLAND: Thank you very much. It's my pleasure to introduce our Assistant Secretary and I'm going to just say a little bit about DOE first and I will be brief. For those who are not sure how DOE is organized. We are an energy and a nuclear weapons stewardship department and a large part of our budget is on that nuclear stewardship and legacy side. But our energy programs are organized in part around Office of Science and Energy and so under that we have a number of program office that is do research technical assistance and other things. We have around the kind of energy space, we have an Office of Energy Efficiency and Renewable Energy. Office of Nuclear Energy. We have Office of Fossil Energy and then Pat is the Assistant Secretary for the Office of Electricity Deliverability and Energy Reliability. She has been in that capacity for a number of years and before that the very Washington term of Principal Deputy Assistant Secretary. We are very pleased that she has been a critical part of a cross programmatic work we are doing on grid modernization initiative. So with that, I will turn it over to Assistant Secretary Pat Hoffman.

[Applause]

PATRICIA HOFFMAN: So, thank you, Karen. I know we have a lot on the agenda today but I'm just going to build off of the conversation that was already started this morning. Kind of continue to push the conversation along. Probably put a little bit of challenging thoughts out there. Not that it may be addressed in this QER session but it may be addressed in future QER sessions. But one of the things I like to do is build upon conversations so that we are not all just saying the same thing, but we are building off of what we heard. So first thing, with a last panel, fundamentally, I look at the system, the grid, as a platform. It was mentioned in the prior panel. I think about it as a platform similar to the Internet where you look at network theory where you

have more devices and things connected to it, the more valuable the network is. And so as we are moving forward, we recognize that the grid is going to be that platform, that network that is hopefully going to be allowed to have numerous things connected to it. But a platform for innovation and opportunity.

The second major point that I'd like to bring up is the grid is in a transition. As we are looking at policy and looking at innovation and looking at what is market of competitive now, we have to recognize that the grid is going through a transition. We have to think about what is that future state? What that future outcome and make sure we have the capacity and services to address what is needed in the future. Because we are in a transition. The generation mix is going to change. Consumer engagement is going to continue to evolve. And so we have to think about that as what is the implications 10 years from now? Five years from now? And think about that as we start looking at policy. So I want us to be forward-thinking and make sure that as we are looking through this transition, we recognize it as a transition.

So some of the things we talked about on the transmission side. We recognized that the generation mix is changing, the first panel talked about the attributes of how the generation mix is transitioning. But the one thing that they started to bring up was the importance of transmission. Why is this important? Why the focus on investing in the transmission system? And I was at the IEEE PES Power and Engineering Society meeting yesterday. And we started talking about this as well. The transmission system is important because right now the system, the grid at large, is being considered as the backup to deal with any sort of imperfections that occur. And so, some people call it a battery. Some people call it a backup. But that is why the transmission investment is coming across to be an important. Why are we driving more investment in transmission? Because over the years we basically used up a lot of the fat or extra capacity in the transmission system. So we are getting to the point where we are utilized that surplus and so we need to think about how we are going to invest in the transmission system moving forward.

So, one of the things that we start looking at, is transmission as a system asset. Some of the debates and conversations we are having, which I think the second panel brought up, is energy storage. Energy storage in some people, are looking at energy storage as a transmission alternative. Does that mean we should think about energy storage more in the lines of a grid asset as we look at investment in transmission assets? I leave that up to you decide or think about. It is one of the things that the evolution of the conversation as we move forward, we have to think about where we are placing resources, what is the optimal placement? What is the cost effective placement of these resources as we move forward? DOE in the past had done interconnection planning scenarios to get people to think about if we have a low carbon future, if we have a high nuclear future -- we didn't do a gas future. But if you look at some of the different futures, what are some of the system requirements in enabling that future to occur? And I think as we are looking at the grid as a platform, we have to think about that from our point of view.

The second area: distribution. I think about where we are heading with the distribution system. What is the future of the utility and the distribution system? And some of the questions we were debating is, I like the comment that we have to be equitable but not equal. And I think we have to keep that in mind with the distribution system. Are we going to look at the true cost of

delivered electricity and what does that mean to varying prices for consumers? What does it mean for varying levels of reliability for consumers? And are we heading down that direction where one size doesn't fit all but it must be equitable not equal. And so that is something to think about. And I thought the conversation brought that out. We probably should continue to push that conversation. So what is the role of the distribution utility? I thought about it in several different ways and some fundamental principles that I think we should all keep in mind is that a distribution utility is going to be reliability entity. It's going to be an entity that is going to look at critical functions and look at level of reliability, especially for critical functions in a region. Say your fire, police, how are we going to look at making sure those services are up and running? Second thing is a distribution utility is going to be the entity that is going to have visibility. It will need to have visibility from a distributed energy resource point of view. It is going to need to have visibility from a response point of view, from a recovery point of view, from an emergency point of view. The third thing is, I think that distribution utility is going to ultimately be the advocate for the consumer. I know from an IOU perspective, that's a different way of thinking, but you heard it from the second panel, the trend is that distribution utility is going to have the information, do some of the analysis and going to be able to look at system reliability implications but really be the entity that can help determine the cost effective approaches as we are investing in the regions. And because the regions are different, we are going to need a point where we can gather and aggregate this information, validate energy services solutions and options. But also look at improved reliability. The last option is the distribution utility could be a financing element. Allow for the competition, allow for market competition but help finance some of that. So as I looked at the distribution area, I thought I would bring up those points from the conversation and continue to push it.

Just a couple of things that DOE is doing. We have been supporting grid modernization in our way, grid modernization is equivalent to what EPRI is looking at, is the integrative grid of the future. The internet of things. Being able to pull together many types of technologies and capabilities. We had a 220-million-dollar solicitation that we did to the national labs to help develop and partner with the labs and industry. But we also recognize that we need to work on a regional basis so that theme continues to come out within the department. And our research projects as well. I think I'm talking fast. In the Midwest, we are looking as part of our grid modernization activities, a Midwest seam study to look at the opportunity for HVDC links to look at how do we develop and expand the transmission system, recognizing where the generation resources are being developed. We are looking at modeling in computational capabilities. We are looking at opportunities with the universities. We have an effort with Iowa State University to develop advanced modeling capabilities; looking at transmission, looking at reliability, looking at the benefits of energy storage. We are also looking at sensors and synchro phasors, PMUs. Really the value of one of the things we think is a core principle moving forward is getting granularity, getting data granularity so what we can look at is really how do we optimize the system better, whether you're talking transmission system or whether you're talking distribution system. That data granularity is really important so the PMU program is part of our efforts to really help look at transmission and granularity on the transmission system. We do have a funding opportunity announcement that is out looking at the potential applications for phasor measurement units or synchro phasors on transmission system from an RTO point of view, from a ISO RTO point of view, but looking at reliability applications as well as asset

management.

We also developed some tools to help with transmission, some easy mapper tools. We also developed some regulatory support papers with the states. Really thinking about how do we advance the conversations with the pros and the cons. And I think as we continue to advance conversations, we are going to have to think about just what is the benefits and what are some of the constraints around looking at this? So some of the papers we have done is looked on regulation, planning and operation of the distribution system, high performance based regulation of high DER penetrations, some other papers that we are looking for and all up on the LBL website is -- and these are going to come out this summer: is electricity pricing, recovery of fixed costs and resource planning. So those are some of the papers and investigatory efforts we are looking at.

So two other things I would like to talk about and have you think about. One is the conversation around markets. Earlier in the conversation, on the first panel, there was some discussion on markets. I like us not to use the term "markets" generically. I really would like us to think about the energy markets, the reliability markets, which include ancillary services, some people call that the ancillary service markets. And then the capacity markets. So when we are saying that the markets are working well or not working well, we can better define what aspects of the market we are talking about so we can drill down further. The capacity markets are still a challenge because we have a lot of policy that is driving capacity. And I think that the energy storage conversation coming up is going to continue to push this to a forefront of how are we going to deal with energy storage from a capacity point of view and from a markets point of view. So I think that will continue to develop and grow.

The last point that I would like to make is in the area of resilience. We don't talk a lot about resilience and it's not a main point of the conversation here but I'd like to bring it up because I think it is relevant to how we move forward. Resilience is a function of your ability to store, your ability to rebuild and your ability to provide or transport other services to the area that is damaged. So we think about that. Storage is going to be a key point when we look at resilience. If you have a lot of capacity, you don't have a lot of volatility. So it's going to end up with volatility and prices but it's really going to affect consumers, customer appreciation, customer response to any sort of structure that we set up. We look at the tolerances that customers want to have with respect to power outages and that has to be part of our thinking as we move forward from a resilience point of view. What is there expectations in moving forward and what are we looking forward to invest in so we can ensure resilience as part of that conversation?

So with that, I think I have covered quickly, all of the major points that I wanted to make. I wanted to make sure I didn't get buzzed off the podium. With that, I will end there and do you want me to take a couple of questions.

CHRIS KELLEY: We have time for a couple of questions. Yes, sir, in the back?

AUDIENCE MEMBER: Tim Tessier at ITC Midwest. We had some great conversations today on a lot of things that can improve on the system or even with customer data. However, the one

question seems like it's been avoided and hate to put this on you is how do we handle cost recovery. All the things we are talking about - data granularity whether with customers or on the transmission grid costs a lot of money. Who will pay for that? Are there going to be incentives? Are there going to be tax credits? What can we do to move this forward because I see it as being the biggest hurdle of why we are not there now.

PATRICIA HOFFMAN: I think you add a great point that we should add that to the conversation. It goes down to, how are we going to pay for this and what is the business model to allow for cost recovery? At the end of the day, I think it will be a combination of all the above. I don't know necessarily there is a single solution and as the second panel said, the concern that came out from one of the speakers at the end was what can consumers bear, with respect to ultimately the price and the impacts going to affect the consumers. And so, how do we look at a portfolio of solutions which may be some incentives? It may be looking at taking a hard look at capacity markets. It may be looking at different things and looking and developing a structure in which we can finance these things with different mechanisms but ultimately a portfolio. I don't think some consumers, especially when you talk to the customers in the rural communities, it's going to be very hard to place all those burdens on the customers. The one advantage we have is the low price of gas. And so, how do we make sure that as we are investing and capitalizing on the low price of gas, that we are investing in our future and in our infrastructure wisely?

CHRIS KELLEY: Any other questions? Okay. Please join me in thanking Pat Hoffman.

[Applause]

PATRICIA HOFFMAN: Thank you.

Panel 3

Transmission Development with an Evolving Generation Mix

CHRIS KELLEY: So now I'll ask our third and final panel to join me up on stage. And as we get situated I want to remind you if you want to participate in the public comments at the end, please sign up at the front of the room. And again just if you like to submit comments online, you can do that at www.energy.gov/QER.

So our next panel is our third and final panel. It is focused on something unique. So every one of our QER meetings we had the first two panels have been similar to this one, but every meeting has a little bit of a unique twist in the third panel. Sour our twist is transmission development within evolving generation mix. So this panel will likely touch on some of the earlier comments that we heard from those first two panels but will be diving deeper into issues surrounding challenges and potential opportunities present given the changing source of generation. So allow me to introduce our panel here.

Joining me here on stage are Jennifer Curran, the Vice President for System Planning and Seams Coordination for MISO. We have Lanny Nickell, the Vice President for Engineering at the Southwest Power Pool. We have Carl Huslig, Senior Vice President Business Development for Grid Alliance GPLLC. Jim Hunter, Director of Utility Department International Brotherhood of Electrical Workers and finally Elizabeth Jacobs, a member of the Iowa utilities board and member of SPP's regional state committee. So, panelists, just like we did with the last few, we are going to give you each 5-7 minutes to speak and then it will come right down the line and then back to me. There are a series of colored lights over here with a very loud buzzer. So you won't miss it. That will go off at the five-minute mark. So you'll still have two minutes to go at that point. So, why don't we get started. We'll start with you Jennifer.

JENNIFER CURRAN: Thank you. And on behalf of MISO, thank you for the invitation to participate in this discussion. We think it is an important discussion and important to collaborate on the challenges we face. MISO an independent not for profit organization that is responsible for maintaining the reliable transmission of power in 15 states and the Canadian Province of Manitoba. Every day, MISO works to create value for our stakeholders through reliable operation of the electric grid, administration of one of the world's largest energy markets and execution of regional scale transmission planning. Historically, the MISO region has received about 80% of its energy from coal burning plants. Over the past decade or so, we have seen the generation mix in the MISO footprint start to shift due to a combination of economic, regulatory and environmental and policy drivers at both the state and Federal levels. These changes affect capacity resource margins, grid reliability, transmission infrastructure needs, and the overall electric system dispatch and operations.

I want to note that the impacts we are already beginning to see; the reduction in coal generation and increase in natural gas, and renewable generation in the introduction of new technologies, are expected to continue regardless of whether the EPA's carbon emission rules survive the legal challenges they face. One of the techniques that MISO applies in regional transmission planning process is the development of future scenarios like we just talked about. Against which we can design and develop and test transmission plans. These scenarios provide potential resource mix outcomes that could occur given a set of assumptions. I think for the first time in the decade that we have been creating these scenarios, we don't have one called business as usual. So change is the expectation. Having said that, from a transmission planning perspective, this isn't a new phenomenon either. In the MISO footprint, after a number of years of transmission planning, primarily for reliability and market efficiency, it became clear that although Federal energy policy was uncertain, certain state policies and in particular, the wide scale adoption of renewable portfolio standards in the Midwest were driving us to a new generation portfolio, specifically an increase in wind. In 2007 we started working with our stakeholders to enhance our processes to account for this new generation. In 2011, as one of the panelists noted this morning, we approved about a 6-billion-dollar portfolio of transmission projects called multivalue projects. These projects when fully in place will reliably integrate renewable resources both those that are remote from load centers and those that are close to load centers and provide access to lower cost resources across the MISO region under a range of future resource scenarios. A couple of lessons we learned from that process are instructive as we consider future build out. First you got to the

have the business case. In this case, the energy cost savings far exceeded the cost of the transmission investment. In the future it may not be as much about energy but about capacity. Second, you have to have a method of sharing the cost of the transmission projects where you matchup beneficiaries and those who pay the cost. And finally, we had some general policy consensus and in the absence of that it will be more challenging to come up with the plans. To be clear, we are not an advocate for specific resource policies, but we are planning to ensure that they can be enabled reliability and efficiently. Starting in 2017, we will repeat the process we used to develop multivalue projects. It will be a multi-year process with the goal of identifying the next phase of major transmission infrastructure build out that is needed. We can't stand pat and wait for more clarity. The transmission development process takes a long time, longer than the resource development process and we will integrate new processes – the competitive development processes. It is going to take another multi-year effort.

I see my light is blinking so I'm going to conclude with one additional thought. I spent my time focused on regional planning but there is a lot of opportunity to implement these types of approaches more broadly.

Given the scope of the MISO footprint, we share borders with a number of entities, we call these our seams neighbors. We coordinate with these neighbors on planning and operations and there is a greater focus on planning given FERC's order 1000 rules. Effective coordination between the entities and the ability to reach agreements around both operations and planning approaches to maximize use of existing resources and make the best investments going forward for new resources are going to be the best mechanism to ensure we continue to deliver value to consumers. Perfect timing. That wraps up my remarks.

CHRIS KELLEY: Thank you.

LANNY NICKELL: Good afternoon, I'm Lanny Nickell, Vice President of Engineering for Southwest Power Pool and happy to participate on this panel today. I want to thank the DOE for giving SPP and particular me, this opportunity. SPP is also an RTO. We independently operate energy markets and provide open access transmission service across all parts of 14 states located on the western edge of the eastern interconnection. We are celebrating our 75th anniversary this year and have much to celebrate. We are formed in 1941 when 11 power companies pooled their generating resources in support of critical national defense needs at the time. Since then, we have continuously evolved adding functions and services over time that have enabled us to better accomplish our mission of keeping the lights on and providing value to our members. Our integrated marketplace that we implemented in 2014 is a great example of a service that we added to help us accomplish our mission while generating 422 million dollars of regional energy savings just last year alone. We are also very proud of our regional transmission planning successes since we became an RTO, our regional transmission planning and cost allocation has facilitated the construction of nearly 6 billion dollars of transmission infrastructure with another 4 billion dollars that remains in our plans for the next decade. We believe that this investment has provided and will provide significant value to our customers. As an example of that value, earlier this year, we completed a study that projected significant savings as a result of the transmission upgrades placed into service between 2012 and 2014. The net present value of the benefits for

those projects alone is expected to exceed 16.6 billion dollars over the next 40 years with a benefit to cost ratio of 3.5 to 1. In other words, for every dollar we have invested during that timeframe, we expect to see 3.5 dollars of benefits. That's a pretty good value. Additionally, in April of this year, our board approved a reduction in our reserve margin requirements that wouldn't have been possible without our nearly decade-long investment in transmission upgrades and that action alone will generate nearly 1.4 billion dollars of capacity cost savings over 40 years.

Now let me talk about our evolving generation mix and it is changing. In 2015, our energy mix consisted primarily of coal at about 55% of our mix. Gas at 22% and wind at 14%. A decade ago, wind generation on SPP system was virtually non-existents. And coal generation was nearly 10% each points higher than what we saw in 2015. So a lot of change. We currently have about 13 gigawatts of wind generation connected to our system representing about 15% of our capacity mix. Earlier this year, we set penetration, wind penetration records with nearly 50% of our load being served by wind at certain points in time. We have been able to reliably accommodate this kind of growth and change thus far, one because of our ability to anticipate it in prior transmission planning efforts. And two, simply because of the expansion of our transmission system that has been able or allowed us to deliver clean, affordable energy from the parts of the system with high wind potential to the population centers that need it. We expect continued growth in new generation particularly renewables on our system. The region we serve is home to some of the highest on shore wind and solar potential in the eastern interconnection. Currently, we have nearly 9.5 gigawatts of new generation on schedule to be added by the end of 2018 with wind accounting for almost 8 gigawatts of that new generation. We have another 26 gigawatts of new generation in our GI queue under various stages of study with about 21 of that being prospective new wind generation. We are also starting to see interest in solar. We have about 2000 megawatts of prospector solar farms being studied in our queue. Public interests and policies like the Clean Power Plan and production tax credits combined with our renewable rich fuel availability will further accelerate this growth.

Finally, we are expecting retirements of about 4000 or we observed retirements of 4000 gigawatts of fossil fuel generation over the last decade and expect to see another 2 .2 gigawatts by 2020. Although we have successfully planned for the renewable integration, much of our success is due to the resource mix evolving to meet our regional needs. But as these renewable resources are added to our system, we will eventually reach a point at which we will no longer be able to reliably utilize this generation for our own needs and at this point, renewables will have to be delivered to other regions. We and other regions haven't been successful so far with regard to large-scale interregional transmission development. That is going to be important as we continue to develop these resource mixes as is expected. It's going to be important that we work with other regions to develop interregional solutions. It takes a lot longer to build transmission than it does generation. And as our competitive transmission development process progresses and growing opposition in some parts of our region, the transmission constructions, we expect that some upgrades will take longer to complete in the future than what we have seen in the past. With increasing uncertainty about future generation resource plans, that our stakeholders develop, it will make increasingly challenging to anticipate in an adequate and timely fashion where and what transmission infrastructure will need to be added. We have noted a growing opposition by

land owners and rate payers and other public interests to transmission development and expansion, so to maximize efficiency, and minimize threats to the approvals, we must find creative ways to utilize existing right-of-way as much as possible and to plan future expansion in a way to accommodate growth without requiring additional land usage.

Additionally, a public promotional campaign regarding the value of transmission could provide significant use in helping the general public understand and appreciate the tremendous value that transmission expansion when done right, can provide. So, we have seen that transmission expansion done right can provide a lot of value. But we are going to need time to anticipate future needs. We are going to need better certainty regarding future policies and we are going to need consumer acceptance behind the value that transmission infrastructure can provide. With that, we think that we can grow and develop the grid in a way that will provide reliability at the lowest possible cost and generate myriad of other benefits for the country. Appreciate the opportunity to be here and look forward to continued dialogue.

CHRIS KELLEY: Thank you, Lanny. Carl?

CARL HUSLIG: Good afternoon, I'm Carl Huslig, Senior Vice President of Business Development at Grid Alliance. Thank you for the opportunity to be here today to discuss some of the challenges impacting future transmission development in MISO and SPP. I'm speaking today from the perspective of unique role Grid Alliance is designed to play in the market. Specifically, Grid Alliance is the nation's first competitive transmission company singularly focused on answering the unmet transmission needs of U.S. municipal and cooperative and joint municipal action agencies better known as public power. We are formed in 2014 and backed by the Blackstone Group. We developed, construct, acquire and co-own and operate transmission systems that will help public power deliver low cost and more reliable transmission service to their customers while simultaneously increasing their access to previously inaccessible clean generation. As my written statement lays out, substantial obstacles continue to exist to ensuring the benefits of a regional and interregional transmission investment in transmission competition generally. So that the end users are not seeing the benefits of robust transmission grid in MISO and SPP and neighboring regions. In short, existing RTO policies do not adequately support the development of the modern transmission grid needed to support a more diverse energy landscape. Despite early progress, the Federal Energy Regulatory Commission's policy of promoting competitive transmission development has not been implemented in a way that consistently captures the value for their RTO rate payers.

Finally, recent progress at FERC notwithstanding beneficial interregional projects, continue to be unreasonably denied, delayed or denied by misaligned regional planning criteria in modeling practices, denying the customers the benefits of such projects. Unless reforms are made, the benefits to the U.S. overall from the Clean Power Plan and similar policy initiatives will be minimized because the breath of opportunities provided will be limited for public power and investor-owned utilities. To that end, we have identified three areas where the DOE policy support would be beneficial. First, promoting policies that expand public power transmission investment and RTO integration. At the outset, while there are a number of large highly sophisticated public power utilities in the MISO and SPP footprint, primarily large generation

and transmission cooperatives, which have been successful in addressing the needs of their customers and providing them with access to diverse generation resources, they are the exception. As a general matter, we have found a critical need exists in these regions for additional investments in public power transmission systems and broader public power engagement in regional transmission planning and development. There are numerous reasons why this is the case and why these needs continue to go unmet as I explained in my written testimony. Fundamentally it boils down to the absence of realistic opportunities for public power to invest in transmission facilities and immense resource and staffing commitments that inhibit small public power systems from joining RTOs and meaningfully participating in the RTO transmission planning process. Public power generally has little ability to improve upon their transmission arrangements when they operate within an RTO. Further their connections typically within IOU supplier are often a single, low voltage radio line. Thus, all too often, the starting point for a transmission dependent municipality are transmission systems that leave loads without access to diverse generation options and captive to the incumbent utility. As a practical matter, public power often must look to a third party for transmission planning and development. Unfortunately, notwithstanding FERC's efforts to introduce competition into the transmission industry, existing right of first refusal construction restrictions continue to frustrate efforts by public power to attract the third party capital necessary to bolster their systems. Not surprising, there are real adverse consequences for public power utilities lacking opportunities to develop new transmissions or even join in RTO. For the purposes of today's meeting, because such public power entities by necessity must take generation source available through low voltage radial connections, their ability to access new and clean generation resources for customers is limited. Some of the obstacles that restrict public power and transmission investment and integration into RTOs such as accessing sufficient capital to invest in new transmission and attaining resources required to materially participate in the planning process can be resolved through innovative partnership and joint ownership models like Grid Alliance offers public power utilities. FERC has indeed historically encouraged joint ownership arrangements and recognized the critical public policy benefits attended to such projects. DOE should echo their support and encourage FERC to continue advancing supportive rate making policies, namely rate incentives and expanded RTO zones necessary to advance public power's integration into the RTOs and provide public power transmission investment opportunities commiserate with IOU's. In doing so, DOE would advance its own goal expanding customer access to a mix of diverse next-generation energy resources. Second, encouraging FERC's adoption of more rigorous rules governing how qualified energy are selected to build competitive transmission projects. FERC's policy of promoting competitive transmission development is sound and has the potential to provide consumers with tremendous benefits. The good news is that in California ISO, PJM and SPP, solicitation thus far, winning projects were selected for far less than the assumed planning cost; showing that competition is driving innovation and saving customers money. The process is off to a slow start with RTO's to date having identified only very a small number of projects for competitive bid. The breath of projects identified for competitive element simply have to increase or the important goals of FERC's competitive reforms in order 1000, namely cost savings from the competition will not materialize. That being said we have enough results to show rules that govern the selection of qualified entities to build competitive transmission products needs modification. Specifically, competitive building to date gives us important lessons in clear ways we need to improve the process. The existing rules allow the RTOs or

agents too much arbitrary discretion to disregard qualified bid and select higher cost options without justifying the increased costs are to the rate payers. For example, in the recent SPP competitive solicitation, the selected bid was not the lowest proposed submittal. There were two other proposals that capped construction costs that would result in over 30% savings below the winning bid estimate. Moreover, these processes bare [unintelligible] the selected winner merely submitted a cost estimate or did not commit to a cap on capital expenditures. This leaves rate payers at a risk of cost overruns and thus could eliminate the savings estimated for the competitive projects.

CHRIS KELLEY: Carl, can you turn to your closing comments.

CARL HUSLIG: The last is supporting efforts to promote interregional transmission planning. We echo the wire's comments in the March 4 QER comments that the DOE analyzed, whether the order 1000 regional planning processes complement each other in advance interregional project development. Having DOE issue policy guidance promoting interregional planning best practices would advance the public interest in having more efficient and cost effective projects move forward. In closing, while the MISO and SPP agents have their share of regional transmission challenges, we see a lot of opportunities as well. I look forward to the discussion and again want to thank Secretary Moniz and DOE for welcoming me here to share my comments.

CHRIS KELLEY: Thank you, Carl. Jim?

If you're open to having Elizabeth go first, we can do it that way and give them a chance to bring it up.

ELIZABETH JACOBS: I do have one slide I'm using. I don't know if that is loaded.

CHRIS KELLEY: Technical difficulties. Talk among yourself.

[pause]

Are we close? We could do something unorthodox. I could start asking questions right now and while they are loading them up.

JIM HUNTER: I only have a few slides. I can talk.

CHRIS KELLEY: If you don't mind, that would be great.

JIM HUNTER: Hello, my name is Jim Hunter, I'm the Director of the IBW Utility Department in Washington, D.C. The IBW has over 725,000 members in the U.S. and Canada, 220,000 of those directly in the utility industry. The IBW believes we need to accept the fact that renewable resources are intermittent by nature. Base load power plants have provided the stability to the grid that we all come to expect. We are now seeing both coal and nuclear now, plants closing due to either environmental reasons or market prices making them uneconomical to operate. The

closings are not because of a national strategy to provide reliable power and are not done with the foresight of keeping costs to consumers low. They are purely an economical decision from an asset owner's perspective. I've testified several times in front of the Senate Energy Committee on Reliability and stressed the need about our base load power plants. We need to remember that with deregulation, the obligation to serve the customer was given up and replaced with the market. The IBW builds wind and solar projects and we understand their importance. Large wind farms in areas where the wind is constant, will provide a good mix for existing grid. But they require transmission to be built. The current situation involved the closure of large number of plants, means we will rely more on a robust transmission system, which Pat talked about, over the next 20 years. The issue with transmission is citing and planning. We see the internal processes within the RTOs for planning working adequately for the most part. The problem comes when a merchant transmission company wants to build across RTOs. Cost allocation between the RTOs is an issue that needs to be resolved. The IBW would suggest a joint DOE FERC committee to look at these issues and make some recommendations. We really believe that renewables need to be built where the asset is most abundant. Coupling multiple sources of wind over large areas provides stability. That means we need to build transmission lines to get the power from the source and load centers. Our systems were designed by power companies to transport their generation to their customers. Now I worked in the electric system now for 43 years; I worked as a substation tech at PEPCO in DC. And clearly, transmission was built for one reason and that was to get from your generators to your customers. We now want to use that system as if it were a national highway and it's not. Generation and transmission are integral to each other and they must be coordinated at a national level. IBW is long held at a legislative fix is needed.

I want to talk a little bit about a success story that we have been involved in, the Clean Line Project. First and most importantly, is being building with highly-trained professionals from the IBW and that is the most important part. In many states, the PUC rules allow merchant transmission companies to be considered utilities. Some do not. Where the merchant is not a utility it doesn't have imminent domain status. DOE using its authority under 1222 of the Energy Policy Act of 2005, is helping to move one of the Clean Line projects forward. DOE will actually own the projects facilities in Arkansas. Clean Line will own electric's capacity. What is more important here is not that the project will be built with DOE exerting the condemnation authority, but that that backstop from DOE will enhance the ability to negotiate with land owners. This is the first time this section has been used and we applaud DOE for using it. Let's be clear, there are several safeguards in a participation agreement that Clean Line agreed to. I have attached a summary of those in my comments. There are several hurdles that they must accomplish before they can get DOE involvement in real estate acquisition. Our electric system has been the most reliable in the world. We have benefited from our diverse mix of fuel types in large power plants and as we move away from central generations, a national energy policy we think will be essential. I just mentioned that today we heard that Dynergy announced some coal plant closings. That puts us right at 10,000 megawatts of closings of coal since 2010. We are seeing nuclear plants close, Kiwanee, Vermont Yankee, now Fitzpatrick and today also Exelon announced if they don't get when they are asking for in Illinois, they will close two more plants there. We can't meet any of our CO2 goals as long as we start closing nuclear plants that are biggest provider of low CO2 generation. And base load at the same time. Thank you.

CHRIS KELLEY: Thank you. Elizabeth?

ELIZABETH JACOBS: And I don't need my slide. I can paint the visual picture for you. Nothing like being the last speaker on the last panel on a Friday afternoon when it's 80 plus degrees and not a cloud in the sky. So to my nice friends in the audience who are staying here, thank you. On behalf of all of us who are based here in Des Moines, thank you to the Department of Energy for scheduling this public hearing here on our great city. As a former Board Member of the Des Moines Convention and Visitors Bureau, I'm thrilled you're here. Hopefully you arrived early yesterday and spent a lot last night and left some help for our economic development in this community. So, appreciate all of that very much.

While I'm listed as the representative for the Southwest Power Pool Regional State Committee on this panel, most of my comments are going to be made based on informal conversations with members of that regional state committee; we don't individual an official stance on some of the topics that are here today. Thus, I don't have written comments that we're submitting. It feels awkward to speak on behalf of an entity that the group didn't approve. We don't have approval process really for the comments. So, it's going to be colored with some of that. And like many states, and what my slide was going to be, was a picture of the United States with all of the RTO boundaries set up for you and like so many of the states that are out there, more and more of us as regulators are dealing with multiple RTOs within our state – and that really adds a new complexity to the issue of dealing with transmission, generation, public policy and how we are going to try to deal with things moving forward. And with the addition of the upper Midwest into SPP within the last year, that added more states that are now usually thought of as one RTO-only state dealing with the policies and procedures of two RTOs. We are thrilled with that, but there are opportunities, but also challenges with that as well. And some of those challenges I think get to the heart of the matter. It was Lanny who mentioned that it is getting more and more difficult for transmission projects particularly to get approval for citing, its drug on a much longer process than maybe in past days. You're seeing a lot of different folks coming to the table, a lot of different interveners and stakeholders who are wanting to make sure that their viewpoints are heard and I think that what we are finding as state regulators across the footprint is that it is harder and harder to cite that transmission at a time when a diverse generation mix is really requiring new additions to transmission, there is congestion potentially, and all sorts of things and as Jim talked about, trying to get renewable resources, particularly in Iowa, the wind, from the northwest over to other entities. The transmission projects are that much more important.

I will say that from the SPP standpoint as well as the MISO standpoint, both of the RTOs have been extremely successful in dealing with the intermittency of the renewables we have. I don't think I have heard any complaints from anyone about making sure that the wind can flow appropriately on those lines and we greatly appreciate that. As you heard from our Governor this morning, wind energy is huge in this state both as a good renewable policy, but also as an economic development driver and so being able to work with an RTO, both RTO's, that has been extremely helpful for us as well. I think there is also some conversation we heard a conversation about distribution and transmission. Really blurring the lines between generation and transmission goes back to the whole issue of energy storage. But if energy storage is being used

to temporarily relieve congestion, is it transmission? Distribution? Generation? And how do we as state regulators deal with that? What do we have purview over and what do we not? What is the Federal Government have purview over and what does it not? I think we heard numerous times today already about the complexities of interregional planning and I think that is one of the biggest challenges facing all of us. It can be from a seam standpoint, once again visualize a map with all the different RTOs and all the different states and how we have multiple boundaries. So you have the state jurisdiction and RTO regional aspects and then you have the Federal Government and all of the policies and procedures with that.
How do we deal with those seams issues? And how do we deal with cost allocation? And as a state energy regulator, we are the group that is statutorily required to balance the interests of the industry so the financial viability of the projects, with the impact on the consumer and making sure that the lights stay on, the reliability. There is no one else that is statutorily charged to do that. Bits and pieces elsewhere, but that falls on us. And as we look to the future, that is something we have to try to weigh that intersection of all of those aspects, as we try to figure out where we are and where we are going in terms of generation and transmission. That is critical for all of us as well. So that is why we really feel strongly that the state regulators are very interested in helping with the seams issues. What can we do with those of us who are in multiple RTOs, how can we help try to spur on conversation and what is it that we can do to try to get some public policy potentially in place that will help with that overall?

We talked about markets. One thing that I think I can say on behalf of all the regulators is, as we looked at the Clean Power Plan, we saw that as a market changer not only from the energy markets perspective but all of a sudden, was environmental dispatch going to have to be considered more in the market setting than just the economic dispatch. So we think that is important going forward. Whether or not, as Jennifer indicated, whether or not the Clean Power Plan goes forward, there is still going to be a lot of issues focused on carbon reduction and how is that going to play out and how is that going to impact the markets from an energy standpoint and economic standpoint? And I think just lastly, one of the things I do want to offer up is that the state regulators are here to help. It hasn't come unnoticed to me that the state government folks have always been in this seat at the end of the panel. So we appreciate hearing from everybody. I don't know if the buck stops here or what that means but I think I can speak on behalf of all the regulators in the Southwest Power Pool and in the MISO footprint, that we are here to do what we can. We want to help be conveners and facilitators of conversation along with the Department of Energy and we appreciate the opportunity this afternoon.

CHRIS KELLEY: Thank you, Elizabeth. So, I'd like to turn to something you mentioned and then a few of the other speakers brought up and that is permitting and citing for transmission. So, you brought up and a few folks brought up the lengthy process associated with that. And then with these evolving generation types that come online, coming on much faster and they require more transmission. I guess I'd like to explore more. Do you see challenges associated with transmission, permitting and citing processes or can you talk more about that? And do you have any recommendations for the QER Task Force here? Do you want to take that? Elizabeth?

ELIZABETH JACOBS: With the typical state regulator caveat, we have open dockets on transmission projects, so I will speak in very general terms and not related to any one docket in

particular. It will be my viewpoint, not the viewpoint necessarily of the Iowa Utilities Board or SPP at this point. It is becoming more and more of a challenge and actually our legislature just adjourned a week ago and there was a bill in there making its way and part of it did end up being passed regarding merchant transmission in the State of Iowa. There is just a real concern by some individuals, and a lot of different entities, about the impact of whether it is transmission or pipelines or generating facilities. What can be done. So I think the more opportunity we can have for stakeholders to talk and talk about the need around the table before they are in the middle of the project trying to get it approved and cited, I think that would be extremely helpful. That may be a great opportunity for DOE to play in trying to help facilitate conversation on how the transmission projects get moved forward more quickly. If you can use existing right-of-way, that is great. But I think that that kind of facilitation would be most helpful to everybody and the other interesting thing in our state, is we are the entity that gets the ability to grant the power of eminent domain. Not every regulatory body in other states has that. So you also have a patchwork of legislative policies that we all have to live by. So I think that is something that has to be factored into these transmission projects as well.

CHRIS KELLEY: Thank you. Other comments? Carl?

CARL HUSLIG: My experience is primarily here in the Midwest. So the state of Kansas has 180-day process. The state of Oklahoma has no process. Iowa has their process where you pretty much have got to have the 75% of land owners. So every state has their own process. As we look, the big deficit we are facing right now is interregional projects or projects across state boundaries. So we build a project at my previous companies between Kansas and Nebraska and it became a chicken and egg. If we did the Kansas process first and we told Kansas where we had to end up, yet Nebraska stakeholders wanted to have a full open vetting process on where they thought we should cross the state border. State compacts and citing could be beneficial in this area.

CHRIS KELLEY: Thank you.

LANNY NICKELL: I think, and I made this statement in my written remarks. I think there is a tremendous opportunity for promoting what transmission can provide and what it can do for our country. It's typically and traditionally seen as a threat and it needs to be looked at as an opportunity. We have done studies and we have proven that if you could do it right, you can provide tremendous value to rate payers and consumers all across the country. So I think that is certainly one way that we can battle this, is to help the general public. Utilities pretty much understand the value of it. I think even for the most past, the regulatory bodies that end up having to approve these new lines, they get it. But it's the general public. It's the opposition that we face a lot of times that could better understand the value of transmission.

CHRIS KELLEY: Thank you. Other comments?

JIM HUNTER: We have seen citing as being such a huge project. We had a project for Edison in California that took well over eight years. By the end of the project, it was three times the cost of initial. They had to actually go underground with a 230KV feeder which was extremely

expensive to get around one town. And at the end of the day, clearly, if they had a decision to make over again, knowing what they were going to go through, they wouldn't have built the line. And it provided tremendous amount of value, reliability and everything with it, but I agree. It's how we get the public. Working with Clean Line, we have actually had folks working full-time going to some of these meetings. You get to a meeting and you're talking about citing a transmission line and somebody stands up and has tears in their eyes and starts talking about that tower is going to put a shadow over my grandfather's grave and he won't be able to sleep in that grave with that shadow. You sit there and say, my God, how do we argue this? We are seeing all over the country, every place we go, trying to get transmission cited is just virtually impossible. And FERC has backstop authority for gas transmission, but not electric. We worked with Congress and tried to get some backstop authority for FERC and any time they even talked about using it, you had a bill in Congress to take the authority away from them. Even from Senators that were very friendly to not only labor but doing something about renewables and most of this was building renewable lines across the state, Pennsylvania being one of them, where the power wasn't going to Pennsylvania but the transmission lines were. And that Senator was getting a lot of pressure from his constituents. Don't let them build that line across my property. So what we do and how we do it, there has to be national policy on strategy on how we can build transmission especially at a time where we are closing all these plants.

CHRIS KELLEY: Thank you. So, my next question is about this increase in renewable penetration on a system. So it sounds like MISO and SPP have been able to handle this new renewable to date. Do you envision a future where renewable penetration is so high that operations are affected? That reliability is affected? Or is the bigger issue around export of that excess capacity? Jennifer.

JENNIFER CURRAN: So, my answer isn't yes or no because I think it's maybe neither. So, certainly what we have seen is that the renewable penetration levels we have today are nowhere near the maximum from a reliability perspective. And in part, that is because they are dispatched and operate within a market of such a broad scale, with sufficient transmission capacity that you can address the diversity of those resources and do the balancing. We used to say -- so we are at about 14,000 megawatts right now installed. We used to say the maximum we got was 20 to 25. The reality is we never actually studied beyond that at this point. But we are starting to because we are going there. But at the end of the day, some of it will be about export. Certainly there could be a point where you're out of balance but we are not there yet. It will really be about making sure we continue to have the right operational and market products to make sure that we can incorporate that wind into the system. That is the approach we have taken so far and that's how we continue will work well into the future.

CHRIS KELLEY: Any comments, Lanny?

LANNY NICKELL: And I do think there will be become a point at which SPP can no longer accommodate more renewables without something changing. We will have to have either new technology, certainly storage could be part of that answer. We are just not seeing it yet. We haven't seen it developed yet. But I mentioned earlier that we have 13 gig of wind that is currently connected to our system. And we expect, based on generator interconnection

agreements and those that are being developed that are being developed on schedule, we expect around 21 gig of wind on our system. We have a current minimum load of 22 gig. So and that is about 2018, we expect to see 21 gig. So we are getting close. And it won't be long before we exceed our capability of being able to absorb it at least for our own internal needs in a reliable fashion and it's going to have to be delivered somewhere else and so, that is what we need help with. New technology to help us deal with that and infrastructure between regions to help us deliver it to where it is needed.

CHRIS KELLEY: Thank you. Anyone else have comments? Carl?

CARL HUSLIG: I have three unique perspectives. I ran the system operation center for the utility in Kansas and had the first wind farm in the Midwest. At that time, we drained [word?] power and all sorts of stuff went on. But now that there has been more and more from an operating standpoint, you don't hear that at all. I think there is getting to be enough wind and people are familiar with it from an operations standpoint and it is doable. Secondly, we just went through and Southwest Power Pool in Kansas and Oklahoma building a bunch of high end priority projects and I was the president of the utility that built the majority of those. And they are already full. 2017 - they went into service 2015, they are already full. And then I think the third unique perspective is, we are having a lot -- I still live in Kansas and I have in-laws that live in southwest Kansas and there is a ton of wind farms being built, but the load is not going to utilities. It's going to 3M power. It's going to insurance companies and I don't know that as we continue to plan, we need to figure out how do we bring those perspectives into the planning because all we have ever done is plan to your point, generation to utility load and now we have this new market player, i.e.: people who want renewables like the 3Ms of the world. That will continue as people build a wind farm just for those loads, it will over exceed the capacity we have on the transmission grid and Southwest Powers Pool.

JIM HUNTER: One of things we have seen -- I'm on a board for EFH in Texas. With [word] being a closed system within the state, they have 13,000 megawatts of wind. But in the middle of August when they are hitting peak records, out of that 13,000, they hit a 69,000 megawatt peak and they have 1,000 of that 13,000 wind. It's not dependable. You can't -- so I don't think it is so much a matter -- they hit over 30% penetration at certain times. The problem is it's not being there when it is really needed. I think it's more of the issue.

CHRIS KELLEY: Other comments? So earlier on a panel we heard comments about MISO's multivalue transmission plan. Jennifer I'll ask if you could speak to the opportunities or challenges surrounding the plan?

JENNIFER CURRAN: So, I think from an opportunity perspective, of course the number one opportunity was to let the utilities in the region meet their required performance with respect to the integration of renewables. But it was done in such a way to maximize value. So, whether you have a renewable portfolio standard or not, in the Midwest with multivalue projects in place, you will benefit by lower energy cost with a benefit that ranges from maybe 2-1 to 4-1 depending on what set of resource mix assumptions you have. One of the, I would say, challenges that became an opportunity was related to some things that we talked about earlier and that Lanny

noted as we think about how we work together to develop those plans. So one of the real keys to success was coming to -- bringing the states together both the regulatory utility regulatory boards as well as the state Governors to think about where do we want these future resources to be located?
That's a piece that also helps with your prior question which is how do you bring this all in? And what we ended up with was a mix that really leveraged our "good wind zones" where the best wind capacity is in the western part of our footprint, but also allowed for wind development in every state in the MISO. As we go forward, I think we see certainly the planning process that took a long time and now we are taking a while through the approval process. So as we go through the need cases and the citing, there are 17 projects. Some are in service and some are just beginning their regulatory process. So I think probably one of the biggest challenges when you think about something of that magnitude is it does just take time. They approved them in 2011 and the last will go into service sometime post-2020, 2021 or 2022, something like that.

CHRIS KELLEY: That was a directed question to Jennifer. Anyone else want to comment on it? No? Okay. Let me turn to the role of DOE and the Federal Government at large. So, maybe if you can give thought to and talk a little bit about your view in terms of what is the role of DOE and USDA and other Federal Government agencies in the future given your evolving generation next and how it affects transmission. Any thoughts on that?

ELIZABETH JACOBS: I think I see it as a really important role to help with facilitation, leadership, collaboration, on some of the hard topics that have to be out there. And not only collaborations among the folks that are in this room, but also with other Federal agencies such as FERC and EPA. I think there are so many stakeholders involved and so many opportunities for topics of discussion, that it will be hard to whittle it down and trying to pick a handful of priorities, you could really serve in a leadership role potentially getting the conversations and the dialogue going, but then possibly offering some sort -- we heard from all the panels or the other two today as well, incentives, incenting the behavior and the stick and the carrot I think everybody would prefer the carrot here, of what it is that needs to be done. That could be an important role. There has been some great research. Pat talked about the easy zones. I have been involved with all the mapping and those kinds of jobs or projects out there. They are important as we try to do our job. So I think being a valuable resource, being a convener and trying to figure out what are good workable incentives for us to all do the right thing would be very helpful.

CHRIS KELLEY: Thank you. Other comments?

JIM HUNTER: I think DOE is in a good place. EPRI was mentioned earlier and some of the programs where EPRI is trying to do the research that I think DOE should be involved in. What is this grid of the future going to look like? I mean I was involved in Washington, they did a pilot project on smart meters and they brought in a professional group to do some surveying and that. And everybody in the group that had the meter that they could see their usage, that they could control something in the home, everybody was like, this is the future. This is the greatest thing ever. At the same time, we are doing a whole project on smart meters. None of those meters had that capability. So, we are seeing in Texas, especially, they have gotten so

sophisticated, they have got apps for the phone. You go in and it estimates what your final bill for the month will be. All those things. You can actually see and touch and do something with your electric usage. That is -- and through that, the companies also then give you an opportunity to change your thermostat two degrees rather than the old way of cutting the compressor off and maybe it will come back on and maybe it won't. To be able to adjust that thermostat that few degrees. Those are the types of things that I think people understand and will accept and how we can get DOE to try to coordinate that and I agree with Elizabeth with all of the other -- even other departments within the government that have land usage areas to deal with.

CHRIS KELLEY: Thank you. Carl, did you have a comment?

CARL HUSLIG: Not on this one, thank you.

CHRIS KELLEY: Okay. So with that, why don't we turn to the last set of comments from you. So I think we have time for about two minutes a person. Your opportunity to provide your closing remarks if you want to summarize what you said earlier, if you have a new point you want to bring up. Again just a reminder that the QER Task Force is here and they want to hear policy recommendations and what you think is important for them to hear. So why don't we start here with you Jennifer.

JENNIFER CURRAN: First, thank you again for including MISO in this the dialogue. I think this industry has a long history of working collaboratively together to solve tough problems and I'm convinced we will be able to keep doing that going forward. Maybe two observations more than recommendations. The first is as it relates to the question of interregional cost allocation and planning which we talked a lot about. I think maybe everybody mentioned that in their remarks. Myself included. And it certainly is one of the challenges we face. At the risk of stating the obvious, one of the challenges and perhaps the biggest challenge is that we think about benefits differently in different regions. Which is important when you're trying to decide who is going to pay. And that is a factor of our regulatory structures, the resource mixes we have in our region, how our markets operate, what type of rules are in place as well as plain old customer preference as you try to think about having to deal with that. It's more complicated these days. At least in the region of the country where I am, because of low gas prices. So the one place many of us have been able to agree on benefits is reduced cost of energy. And that just has less differential now that gas prices are lower. So I think there are a couple of opportunities for us to focus on to try to close some of those gaps. The first and probably more obvious is to continue to think about what future drivers of value do we see out there? So in the past it's been about energy value. In the future it probably will be more related to capacity or the value of diversity. And some of those other things. So there is some opportunity there. The other one that is probably less obvious is thinking about improving consistency and alignment in some of the ways we think about operations and transmission usage because at the end of the day, how those systems are operated or how the benefits manifest themselves to customers. The other thing that I would just note is that, like I think everyone, MISO is at the very beginning of this question of what does storage mean? Is it an alternative to transmission? Is it something that helps transmission? Is it a market product? Is it a transmission product? So we look forward to continuing the dialogue in the industry to improve our thinking about it overall and how to incorporate into our transmission

planning. Thank you.

LANNY NICKELL: I think that we have seen and we have proven that investment in transmission infrastructure, particularly when it's done right, can be a value added enabler that not only increases reliability going forward, but it reduces dramatically cost impacts to our customers and our rate payers across the country. In order to develop the best transmission system that is needed to accommodate the evolving resource mix that we already seen and expect to continue to see. We need time to get it right. We need certainty and we need acceptance. And having sufficient time to anticipate these future needs, having better certainty regarding policies that shape our future power grid and certainty about cost recovery. And then customer acceptance of the value that transmission investment can provide will enable not only SVP's ability but also other regions ability across the country to develop a transmission grid that maintains proper reliability at the lowest possible cost and again can generate many, many different kinds of benefits for our country. So, I think again facilitation is important. Facilitation, helping to understand this, helping to understand the future. And coordination, collaboration across the regions is really critical. We are going to have to work together to meet the country's needs and the best possible way.

CHRIS KELLEY: Thank you. Carl?

CARL HUSLIG: I'd like to thank the DOE for the opportunity to speak today and allowing us to make our comments. I'll go back to the three main things the DOE can help from our written comments and it is then a couple after. That promoting public policies that expand public power transmission and investment and RTO integration. Public power represents 27% of the load but 75% of the footprint. So when you're talking about flyover transmission, there is a lot of territory that co-ops and municipals, all they got to do is see the lines go over territory with no opportunity to invest. The second is continuing to encourage FERC's adoption of more rigorous rules. Governing how qualified entities are selected to build competitive transmission projects. The emphasis behind Order 1000 was to lower cost to consumers. I think we always have to realize I'm not a regulator like Elizabeth, but I think we always have to remember that we have got to deliver power cost effectively and if we continue to add cost to generation and distribution and transmission, at some point the rate payer is going to figure out something else and the utility model of today is going to be a lot different in the future. Lastly, from a DOE/FERC perspective, continue to support efforts to promote interregional RTO transmission planning reforms and I think Jennifer and Lanny have talked a lot about that, but I have heard this and I was very young when this happened, but the first time a national energy policy was discussed was in 1972 with Richard Nixon and we are 44 years later and 10 Presidents and we still don't have a national energy policy. So I think as we continue to promote stuff, when it comes to cost allocation and interregional planning and stuff like that, that would really benefit folks, I think we would have those discussions. Finally, I think as we move forward, the Clean Power Plan or whatever it is, as we replace coal and go with more clean energy, we need to be thinking about what are transmission projects that are no regrets. Are there facilities that we can build that will be no regret facilities. Can we all collaborate and coordinate around those and figure out where to build those? Because as I mentioned in one of the questions when we built the projects in Kansas, all of a sudden they had 5000 megawatts of wind development in southwest Kansas because once we

build it, they did come as people say. So, but at the end of the day, are there facilities? Transmission, even merchant that we can build throughout the country that has no regrets? Thank you for the comment time.

CHRIS KELLEY: Thank you, Carl. Jim.

JIM HUNTER: Everybody is thanking DOE. I will not thank DOE. I'm sitting in this Auditorium versus being out enjoying this beautiful weather. I want to say I think one of the things that we feel is important is if we are going to depend more on renewables we have to understand their value and we have to understand that if the wind is not blowing in certain areas when it is blowing in others. We need to start tying more and more of our large-scale wind projects together so that when the wind is not blowing in northern western Texas, it is blowing somewhere in Oklahoma. And we can transfer or get those and shift that power. I think right now we are talking about the difference in transmission system. We are also seeing it on the generation side with all of these closings.

And they are not being planned well. It's not -- they were going in saying we can close that 700 megawatt facility because we have excess generation. And those are – it's only a matter of time before that comes back and bites us. Thank you all for being here.

ELIZABETH JACOBS: Last two minutes. We'll make this quick. The members of the Regional State Committee of the SPP are a diverse lot. They represent a very broad section of the states and the mid-section of the southern sections of the country. Thus they are very much want to make sure that a diversity of generation mix is allowed to go forward in this country, that it isn't just focused on one or two things that meets their individual states needs and meets the footprint of the RTO and meets the energy needs of the United States. So that would be the first take away is to make sure that that diversity of generation mix is allowed going forward. We don't set policies and procedures in place today that in 10 years or 15 years from now may not be workable. Secondly, of course the state regulator has to talk about state jurisdiction one more time. There are 50 different jurisdictions plus the District of Columbia. State jurisdiction is important. We heard it on several of the other panels. It's important from a resource adequacy standpoint and it's important from a reliability standpoint. We are the ones who know best what works in the local area. We will work with our partners in other jurisdictions very closely but we also know what we have to do within our own states that is important. And the most important piece of that is what we can do for the consumers. We cannot forget that. With all of the build out that needs to come, the cost allocation issues. You heard from Joel Schmidt from Alliant who talked the 25% of their customers have a medium income of $25,000 a year. We can't forget that. That's the role we all need to play as well. So that is important as we plan in the future. Thank you for being in Des Moines.

CHRIS KELLEY: Thank you and please join me in thanking our panelists.

[Applause]

Public Comment Period

We are now excused to go outside if you like. But I will say for those of you in the room, we are going to turn to public comments now so I ask the QER Task Force to join me on stage and we'll get started.

I'll turn it over to Karen Wayland in a moment here but I wanted to introduce the folks we have up here on stage. You have already heard from Assistant Secretary Pat Hoffman, who is up here to listen to comments. We have Dr. Karen Wayland and we have Matt McGovern and John Richards, also up on the stage here. So Karen did you want to make comments first?

KAREN WAYLAND: This part is always really fun because we never know what is going to come at us and we really enjoy them. We have two people signed up. If there are other who are interested, please do when the two people that we'll call-up as they sign in the order they signed up. Feel free to make comments afterwards. This Public Policy -- we treat the comments the same way we treat these dialogues on the panels. They are all transcribed and get tagged with keywords that is a searchable database that will become available to the public once the QER is done. They get treated the same way as public comments that are submitted through the website. These are really critical to making sure the work we are doing, the analytical work that we are doing, and the recommendations that come out, actually do meet your needs of the people who are dealing with these things every day out in the 50 states.

So, just a reminder that the public comment period will go through July 1st, so if you have additional comments that you like to submit, you can upload those onto our website at energy.gov/Quadrennial Energy Review through July 1st. And the final report should be due in November. This time around we have an expiration date because the number of us will not be in the department anymore. So, you'll see it within the year, you'll see the final report. So with that I want to thank my staff and everybody here. This is a long day. Beautiful day. And many of you traveled to come here and sat through this. We really, this is very important for us and it does result in real policy change. So we really appreciate the time that you have taken to participate in this process. So I'll turn it back to Chris.

CHRIS KELLEY: Thanks, Karen. So the way the process will work here for the public comments is, I'm going to call your name based on the order in which you signed up on the sheet. We do have a microphone it looks like set up here. That's the only one. So ask you to make your way to the microphone. Just introduce yourself and your affiliation and you will have five minutes to talk. There will be a timer just like the panelists that you'll see in front here that indicates when your five minutes is up. So our first commenter is Tom Wind. Tom?

AUDIENCE MEMBER: Yes, I'm Tom Wind, I'm a consulting engineer working in wind power with the Midwest Wind Energy Center and Iowa Wind Energy Association. And I just like to make just a brief comment. The declining cost of wind power is really what has enabled Iowa utilities to embrace wind power. And how did this happen? Why did the cost of wind power come down? Well, supply and demand. More need for wind power, manufacturers scale up,

they improve their product, a lot of innovation going on through the manufacturers. But how did this get started? I think that the Department of Energy had a big role in this. I have been involved with wind power for about 20 years. When I was first involved, there was less than two megawatts of wind power in Iowa and now there is 6200. But I traveled in about 15 or 20 states working and talking about wind power and I have been amazed at it's a DOE program. The most memorable one is the Wind Powering America program. And when a state didn't have any wind power or they just had maybe one or two wind turbines, DOE had an initiative where they would start a collaboration or have a meeting. A stakeholder meeting and invite utilities and other people to come and policymakers and they get everybody together in one room and talk about things. And it's just remarkable. Amazing what would happen after that occurred. It might be a year or two, but low and behold, there would be an announcement or a new wind project will occur in that state. And the DOE went through a program through the NRL and they just picked state-by-state and said we need to do something. It was a collaboration like Libby Jacobs talked about. That was a wonderful program. It's no longer, we don't need that anymore. But our recent program that DOE funded is the Wind Vision Study. What is the value of doing a study and saying, this is what can happen in the future? And you think, well, it's just a study. But what it does is it provides something for policymakers, legislators, people to see what is possible. And then that sets the seed. That sets the vision for what can happen in the future. Industry can't do that. That has to come from a central function like a DOE or somebody like that that can get a lot of collaborators. At least 50 people or 100 people were involved in that Wind Vision Study. Experts from all over the United States. Only somebody like DOE can get that done. And the value is, I think is tremendous. The Sun Shot Initiative is another one. So I would encourage the DOE to continue funding renewable energy programs like this that set the vision and help with research to some extent too. Thank you.

KAREN WAYLAND: With that wonderful endorsement, you can keep the five dollars you owe me.

CHRIS KELLEY: You know this is public record. For the record, no money was exchanged.

KAREN WAYLAND: No money was changed for that.

CHRIS KELLEY: Our next speaker is John McClure. Are you in the room? The microphone is yours.

AUDIENCE MEMBER: Thank you. Good afternoon. My name is John McClure. I'm with Nebraska Public Power District and I really appreciate the opportunity to be here today. It's been an outstanding day of information sharing. And you may have caught one of my issues that I'm interested in when I asked the Secretary a question this morning on the first panel. My utility is a utility with about a 3000 megawatt peak. We primarily are a wholesaler in Nebraska, we are the largest transmission owner and operator in the state. We serve about 25 public power districts and co-ops who are rural power distributors in the state. Ultimately, our power supply goes to 400 communities generally on the smaller scale throughout the state. We serve mostly in the rural areas where agriculture is important. We have a diverse energy mix. In 2015, for all sales that we made both to our native load and to the market, we were 46% carbon-free. We have

nuclear. We have wind. We have hydro. We have coal. We have natural gas combined cycle units and we have peaking units. As I was listening to some key themes today that kept reoccurring, comments about diversity, climate change, energy security, reliability, and the importance going forward of capacity. I'm going come back to the nuclear issue and in particular, existing nuclear plants. I would hope as you're studying these issues, you look at how important is the existing nuclear fleet to meeting these objectives? We have seen cases of plants closing around the country. That was mentioned by a speaker today. And how much of that can we afford to lose as we try to meet these objectives? I hope you look very carefully at those issues. I did want to share one thing anecdotally and I plan to follow-up with written comments, but there is a notion sometimes that the wind is blowing somewhere. But there has to be a wind facility there and as large as the SPP footprint is, it goes from northern Texas all the way up to the Canadian border. And one of the most wind rich areas in the country. I will periodically look on the computer to see what is happening in the footprint because that information is very accessible from SPP's website. And as Lanny Nicholls mentioned earlier, just last month, we hit 49% wind penetration and footprint. That was obviously a time high winds and low loads that resulted in 49%. But in the last week I looked, one day and it was less than 4%. So, we are really chasing winds at times in the footprint. We have to understand how to make that work. The reality is we are going to see more renewables going forward and as he indicated, a significant chunk is coming in. And we need to understand how that works. My utility right now is building a 225 or in the permitting process of a 225-mile 345 line. And some of the challenges that have been mentioned about public sentiment are very much in play right now. So, there is a bunch of issues, again I appreciate the opportunity and this has been a very valuable for me today to hear all the perspectives from excellent panels and thank you for the opportunity.

CHRIS KELLEY: Thank you.

AUDIENCE MEMBER: And all travel home safely.

CHRIS KELLEY: So, with that, those are the two speakers that we have signed up. Anyone else in the audience care to make comments? Yes, sir?

AUDIENCE MEMBER: At the risk of incurring the wrath of all the people who would like to go outside and enjoy this fine day, I'm Chris Villarreal, Director of Policy at the Minnesota Public Utilities Commission. Listening to the conversation today it occurred to me it might be useful to update y'all about what is going on in this – "y'all" is a term used often in Minnesota. So, one of the things that is important to discuss here is in Minnesota, we are having a different discussion that what was heard from most of the day. What we are looking at and starting in the fall is a distribution system planning exercise. And we have been really thankful for the assistance the Department has given the state, both the PUC as well as the Department of Commerce to facilitate that discussion how to modernize the distribution grid. So the comment I have is, as we think about how the distribution grid will be become modernize, and how distributed resources are going to start to proliferate on the grid, how can we use those resources to avoid building transmission? How do we use non-transmission alternatives to support reliability? How does distribution grid itself become the resource to avoid building expensive transmission lines? Now transmission lines will need to be built for the utility scale resources, but what we are looking at

in Minnesota is the distribution resources to support new and what is going to happen going on for our utility. So, it was a great discussion today about transmission, transmission, transmission. One of the things that we want to know is how is distribution going to work with transmission planning? How do those information flows start to work together as opposed to just assuming transmission flows down to the region when we are thinking about how does distribution flow up? Thank you.

CHRIS KELLEY: Thank you. Anyone else care to comment? Okay. With that, I think we will go outside and enjoy the day. Thank you all for your time.

[Applause]