



QER Public Stakeholder Meeting

Des Moines

Takeaway Summary

Panel 1

- Construction of new transmission facilities may be necessary in order to accommodate the changing resource mix and maintain reliability.
- In the context of bulk generation, 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.
- Competitive wholesale and retail markets remain the best way to efficiently allocate resources, meet customer needs, and spur innovative products. Government intervention is not needed.

Panel 2

- Innovation and technology are key for improving grid operations and providing customers with reliable, affordable electricity.
- Customers want information about their electricity usage, but utilities should improve customer engagement and education and provide targeted data to help them with decision-making.
- Incentives, rather than mandates, at the state level are the preferred tool for encouraging investment in energy efficiency (EE) and renewables.

Panel 3

- There is a shift in the generation mix - moving away from coal and to renewables. Transmission planning and expansion is important to the continued development of renewable generation.
- It is increasingly difficult to site transmission projects at a time when a diverse generation mix is requiring new additions to transmission.
- There is a tremendous opportunity for promoting to the general public the need for, and benefit of, a more robust transmission grid in the U.S. . It's typically and traditionally seen as a threat and it needs to be looked at as an opportunity.

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Opening Panel

Dr. Karen Wayland

- Overview of focus areas of first and second installments of the Quadrennial Energy Review (QER).
- U.S. electricity system is regional in nature, and we are looking at policies, market forces, etc.

Lieutenant Governor, Kim Reynolds

- Iowa energy plan is a comprehensive review and outlines state priorities and strategic guidance
 - Background: Since taking office, the Administration attracted over \$12 billion in new private investment; companies investing, include Facebook, Microsoft, and Google, seeking a skilled workforce, low energy costs, and increasing supply of renewable energy
 - Four pillars of the energy plan are: economic development and energy careers, Iowa's energy resources, transportation and infrastructure, and energy efficiency and conservation
 - Administration's approach: Will review public input and will identify new goals and approaches

Governor Terry Branstad

- Highlighted Iowa's leadership in renewable energy:
 - Largest economic development project in Iowa's history: MidAmerica Energy recently announced \$3.6 billion in wind energy development in Iowa—an additional 2,000 MW by year 2020—with no rate changes
 - Iowa produces 31% more wind power than any other state
 - Over 7,000 people employed in making component parts for wind energy industry
 - Significant growth in solar and geothermal energy; leading biofuels producing state, touting new biochemical tax credit; attracting business leaders with low-cost, reliable, renewable energy
 - Towns hosting wind generation see it as a way to attract businesses and generate jobs and opportunity in their communities
 - Back in 1983, Iowa was the first state to enact Renewable Portfolio Standards (RPS), and it was copied by 23 other states.
- Governor Branstad is the Co-Chair of the Coalition of Governors involved in wind and solar energy; he expresses appreciation for the collaboration with all levels of government as well as the private sector to ensure that Iowa has reliable, affordable, clean energy, and opportunities to create jobs in the state.

Mayor T.M. Franklin Cownie

- Referenced visit to Iowa by members of the Task Force [on Climate Preparedness and Resilience] to think about energy future.
- Served as a U.S. local government representative during the Paris meetings, signing a mayors' compact to reduce GHG emissions and make their cities more energy efficient.
- Efforts of the state and MidAmerican Energy—wind, solar, and geothermal.
- Des Moines city committed to reduce GHG emissions 25% by 2020, 50% by 2030, and hopeful to be net zero by 2050
 - Will only happen if we can have EE and renewables on the grid across the country.

USDA Rural Development Rural Business-Cooperative Service Administrator Sam Ridders

- USDA's Rural Development has an 80-year legacy of rural development, which began as the Rural Electrification Administration (REA).
 - Its mission is to expand member-owned electric coops which provide electricity to rural America
 - REA became the Rural Utility Service (RUS): It finances all aspects of the rural energy system and provides high-energy grants for very low-income communities that cannot afford loans.
 - There is a total of \$120 billion invested through REA, now RUS, in rural America's electric system
 - Current portfolio is \$46 billion in loans, 600 borrowers, and a tiny [0.04%] delinquency rate
- The Rural Energy for America Program (REAP) contributes to the vibrancy of small towns in America, investing in businesses to create environments for rural communities to grow.
 - Creates areas for businesses to invest in such as renewables, energy efficiency, and new bio-based product manufacturing facilities.

Secretary of Energy Ernest Moniz

- The Secretary commended Iowa's leadership in moving toward renewable energy. The Secretary outlined plans to visit Ames National Laboratory, a lead place to address critical materials that are essential to our clean energy technologies.
- QER 1.1 focused on the entire energy infrastructure system, pioneering its process of engaging across whole of government. QER 1.1 produced 63 recommendations, 14 of which are already reflected in federal law.
- One QER 1.1 recommendation put into law was the modernization of the Strategic Petroleum Reserve, which highlights the importance of energy security. Energy security is not only a national issue, but an international issue of collective security.
 - We remain committed to reducing our oil dependence, even as we produce more oil than before. We emphasize three areas of work to achieve this goal:
 1. Continuing to increase the efficiency of our vehicles.
 2. Continuing a movement toward electrification of vehicles.
 3. Continuing the development of alternative liquid fuels, like biofuels/advanced biofuels.
- QER 1.2 focuses on the electricity system, from generation to delivery of electricity.
 - We are looking at different parts of the country because the conditions, requirements, needs, and observations will be different. Those are sources of strength, but can also pose challenges in how we develop the national level of policy.
- The focus of today's meeting is on the Midwest and plains states. Additionally, the meeting should emphasize the close integration of U.S. and Canadian electricity. The Secretary also applauded the Governor of Iowa who is coupling the move to clean energy and questions of economic development.
- He highlighted the Mission Innovation initiative, in which the United States, along with 19 other countries, is working to double energy R&D over the next five years.

Panel 1: Bulk Power Generation and Transmission:

How Can We Plan, Build, and Operate the Appropriate Amount for Future Needs?

Panelists

- Jeffrey Gust, Vice President, Compliance and Planning and Chief Compliance Officer, MidAmerican Energy Company
- Dean Ellis, Vice President – Regulatory Affairs, Dynegy
- Joshua Mandelbaum, Staff Attorney, Environmental Law & Policy Center
- Tom Heller, Chief Executive Officer, Missouri River Energy Services
- Angela Weber, Commissioner, Indiana Utility Regulatory Commission, and Vice President, Organization of MISO States

On the Changing Generation Mix

- MidAmerican is experiencing a dramatic change in our generation resource mix. By the end of 2016, MidAmerican will have more than 4,000 megawatts of wind generation installed. Our recently announced Wind 11 Project will bring online an additional 2,000 megawatts of wind generation by the end of 2019, bringing total energy to 85% of our customer needs. (Jeffrey Gust)
- The next iteration of QER can provide state regulators with additional thought leadership on how the wholesale markets should and need to adapt to changing resource mix. (Dean Ellis)
- Iowa Leading Transition to Clean Energy - 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.
 - As a compliment to this, Iowa has some of the longest and strongest running utility energy efficiency programs in the country. Wind energy in Iowa has started to rival energy efficiency on a cost basis.
 - Clean energy is 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.

Technology Advances

- Technology Advances: There remains tremendous untapped resource potential for technologies such as wind and solar. Wind turbines are becoming more efficient. Technology advances will continue to drive energy efficiency and cost reductions. (Joshua Mandelbaum)

Transmission

- Reliability and Transmission Projects: Retirement of a number of older coal-fired power plants in response to environmental regulations has resulted in significant transmission projects to maintain reliability. Transmission lines are being constructed to connect new wind resources with load centers. MidAmerican is participating in constructing a number of multi-value projects (MVPs). The MVPs in Iowa include over 350 miles of new 345KV lines with MidAmerican building approximately 220 miles of those lines. 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. (Jeffrey Gust)

- State Transmission Siting Processes Adequate: There is no need at this stage for federal siting processes. The generator interconnection approval process should be reviewed and streamlined. (Jeffrey Gust)
- Transmission Projects: CapEx 2020 included 11 utilities, building five major projects to build more than 800 miles of new transmission facilities in the upper Midwest. 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. (Tom Heller)
- Transmission Projects and Reliability: 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. (Angela Weber)

Demand-side Resources

- Demand Side Resources: In the context of bulk generation, 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. It will continue to drive the development of battery and energy storage technologies. These innovations should be incorporated into our thinking about planning for bulk power. (Joshua Mandelbaum)
- Voltage control and frequency support may also be needed in order to maintain reliability, which can be accomplished through the use of non-transmission alternatives like energy storage. 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. (Angela Weber)

Markets

- Capacity Markets: A well-organized market should facilitate capacity market transactions to ensure an appropriate amount of resources are available to meet future load requirements. Organized markets should continue to work together to eliminate seams issues. More focus is needed on interstate seams issue such as those that may arise from the Clean Power Plan. Organized markets should not administer emission-trading programs unless stakeholders agree they are uniquely positioned for that task. Organized markets must not be too prescriptive but should anticipate future products and needs. (Jeffrey Gust)
- Allow Competitive Markets to Work: Competitive wholesale and retail markets remain the best way to efficiently allocate resources, meet customer needs and spur innovative products. Government intervention is not needed. Don't forget that the sector moved away from a vertically integrated, monopolistic structure for various reasons including cost overruns, high price and poor service. Hybrid

approaches which mix vertically integrated utilities with competitive generators and competitive suppliers don't work. (Dean Ellis)

- Price Formation: The FERC price formation efforts have been helpful and engagement of DOE leadership would be very welcome. DOE has the expertise and the data to help shape that outcome. (Dean Ellis)
- Markets in SPP and MISO: Energy and ancillary service markets 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, MRES is able to self-supply through a fixed resource adequacy plan. It is essential that the self-supply option continue. We do not want 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. (Tom Heller)
- Resource Adequacy in Vertically-integrated States: The vast majority of the states in Organization of MISO States (OMS) are vertically integrated or employ a traditional regulatory structure. OMS members are concerned with the provision of safe and reliable service at just and reasonable rates. 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. (Angela Weber)

Permitting Reform for Hydropower

- New Hydropower Licensing: More permitting reform is needed to reduce processing time for hydropower project approvals. 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. The Missouri River Energy Services (MRES) Red Rock Hydro project, a 36 megawatt, 55 megawatt peak hydro plant on the existing Red Rock Dam is an example of public-private partnership that needs to be pursued for developing renewable energy. It will have taken 13 years to get this project done when it is completed in 2018. Recent energy legislation passed by U.S. Senate 212, contains some language that begins permitting reform, however more is needed. (Tom Heller)

Q&A

Question on Seams Issues –

- Since OR1000 has been passed, there has not been any major project between the markets such as SPP and MISO or MISO and PJM. Methods to address constraints between the two markets are needed. This would help to reduce prices for customers. SPP and MISO should be able to work together to resolve 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.
- When flows go across the MISO- from PJM to MISO over to Chicago, it affects Northern Indiana Public Service Company (NIPSCO) because it has to power down its energy and then go to the open market to replace it and alleviate congestion concerns. 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. FERC recently

eliminated that joint process which lowered the cost of those projects. Hopefully this will alleviate the lack of new project construction and address some congestion issues.

Question on Renewables and Reliability

- Looking at flexible resources and determine how to value flexible attributes, such as natural gas fired plants to balance the intermittency of renewables. Need greater insight in the ability to dispatch and predict intermittent resources. A number of ISOs have implemented wind forecasting and central dispatch systems for renewable systems such as wind which improve predictability. Other resources have to be brought on multiple times a day to switch on and off to balance the renewable energy. Going forward one of the most critical aspects will be how to incent value, and how to get the price formation right for the resources that have these flexibility attributes?
- Energy storage will be critical in future markets. This will increase reliability and use of renewables and other intermittent resources.
- Transmission is critical for reliability of the future. A joint ownership model, such as that used in Minnesota, should be pursued.

Question on Markets: What is working in the SPP and MISO regions? Do you feel the market mechanisms are working or are there challenges present?

- Complexities of capacity markets and in particular regional issues create extra cost and difficulty. Mandatory capacity markets, such as what exists in PJM, should not be put in place. They are expensive and disadvantage those who own resources and want to self-supply their capacity (like small municipals). They end up paying for capacity twice -- their own resource plus the market.
- It is not clear if MISO is intended to function as a voluntary residual balancing mechanism for the utilities, which is fine, or if it is meant to be the primary revenue source and capacity for power producers? There is extreme difference between Illinois, one of 15 states in MISO, and the 14 other traditionally regulated FERC states, which creates tension.

Question on Research and Development of New Energy Technologies: Is R&D investment a critical role for the federal government?

- Yes. Federal investment in R&D remains critical. It will help to advance energy storage, along with existing private investment in R&D. It also will allow utilities to work cooperatively and test out some of these technologies.
- Joint research between EPRI and the National Labs has been helpful.
- NERC is actively working to understand the changing resource mix, impact on essential and reliable services, and potential projects to address those issues (e.g. energy storage, flywheels). DOE should work with NERC in this area.

Question on Cybersecurity

- The utility industry must comply with mandatory Critical Infrastructure Project (CIP) standards. These are baseline standards. If you want utilities to do more, you have to meet with them and communicate with

them. Many utilities are identifying critical stations and doing more to protect them. Industry efforts in cybersecurity are not being communicated publicly for the most part.

Question on Distributed Generation

- It represents an opportunity. To maintain reliability with more distributed generation coming on line, more coordination is needed as well as new infrastructure such as switch out transformers or other new technology to handle that change in flow.

Panel 2: Electricity Distribution and End-Use: How Do We Manage Challenges and Opportunities?

Panelists

- Kenneth Grant, Vice President of Sales and Marketing, Oklahoma Gas & Electric (OG&E)
- Brian Bowen, Regulatory Affairs Manager, FirstFuel
- Nora Naughton, Director of Policy, Midwest Energy Efficiency Alliance (MEEA)
- Becky Bradburn, General Manager, Franklin Rural Electric Cooperative, and Executive Vice President, Prairie Energy Cooperative
- Joel Schmidt, Vice President – Regulatory Affairs, Alliant Energy
- Mark Schuling, Consumer Advocate of the State of Iowa, Iowa Department of Justice

Harnessing Innovation and Smart Grid Technology

- OG&E has applied technology to the distribution grid, helping to provide innovative programs and improve grid operations. OG&E, with partial funding through DOE's smart grid investment grant, deployed automated metering infrastructure across 30,000 miles of service territory. With the AMI infrastructure, OG&E has deployed in about half the time originally planned and provided a way for customers to have better price and usage transparency. (Kenneth Grant)
- OG&E's Smart Hours program is a technology-enabled demand response program to incentivize customers to shift on-peak usage to non-peak hours using a variable peak-pricing rate. The company has seen a peak demand reduction of 147 megawatts and participating customers saved 15% annually on average. (Kenneth Grant)
- Prairie Energy and Franklin REC's Board of Directors are mainly farmers, and many farmers are embracing technology and have invested in smart grid technology to help them in their decision-making. (Becky Bradburn)
- Regarding innovation, Alliant Energy is working to harness technology and data to provide customers with reliable, affordable energy.
 - In partnership with EPRI, Alliant Energy inaugurated their own learning lab in Madison, Wisconsin. They have 10 types of solar panels to study their performances and the data that comes from them. They have batteries, solar parking cover, and electric vehicle charging stations.
 - Alliant Energy repurposed, together with a local Community College, a traditional power plant to provide an education center for the students.
 - They are integrating solar around some of their power plant sites. (Joel Schmidt)

Importance of Customer Engagement and End Use

- Discussed how utilities are using data analytics and increasing customer engagement to serve customers. (Brian Bowen)
- Research from Navigant and Pike and other sources indicate that 90 percent of electricity consumers want more energy information. (Brian Bowen)

- FirstFuel provides an intelligence platform for commercial customers in the energy industry by harvesting insights from metered data. It has an algorithm to disaggregate load and understand how energy is being consumed and how it can be saved. FirstFuel has a few principles for analyzing metered data: 1) It should be clear and engaging; 2) it should provide personalized recommendations; and 3) providing easy ways for a customer to take action to save energy by connecting them with a person to get them the service they need. (Brian Bowen)
- FirstFuel is contributing to efforts to define metrics of success for digital engagement. There is no one-size fits all, but rather there is a need to enable options and experimentation to allow customers to understand what they need. (Brian Bowen)
- Each co-op is unique. Franklin REC and Prairie Energy are committed to providing local solutions to their customers. (Becky Bradburn)

Access to Clean Energy

- On cost-effective clean energy, Alliant Energy has added highly-efficient, cost-effective natural gas facilities and has close to a gigawatt of wind capacity that they own or purchase on long-term contracts. (Joel Schmidt)
- Iowa's electric co-ops received media attention from Politico.com and the *Des Moines Register* as champions of solar and renewable generation. Co-ops are looking at the installation of community solar. (Becky Bradburn)

Grid Operations

- OG&E's AMI network enabled operational benefits such as automated meter reading, remote connections and disconnections, and has helped OG&E identify and respond to outages more quickly. (Kenneth Grant)
- Mr. Schmidt emphasized the importance of a smarter and stronger power grid. Alliant Energy will be investing \$1.8 billion in this power grid over the next four years. Alliant Energy is going from a one-way power flow to an interconnected system where flows are going back and forth.
- Building the grid of the future will require a collaborative effort to determine where we start. Considerations include distributed generation, renewables, storage, and regional planning for generation and transmission. (Mark Schuling)

On Affordability and Equity

- 50% of Alliant Energy's customer base have net incomes of less than \$50,000/year annually, and 25% have \$25,000 or less. Affordability is at the forefront, and technology is driving change. (Joel Schmidt)
- Consumers deserve access to safe, reliable, and affordable utility service in a way that is equitable, even if it cannot be equal. (Mark Schuling)

On Energy Efficiency

- EE is the least cost, most practical method of meeting policy goals. The future of EE includes: analyzing systems for energy reductions and becoming a supply side resource in RTOs; giving performance

incentives; and stimulating EE through the CPP's Clean Energy Incentive Program for lower-income. (Nora Naughton)

- EE goes beyond utility programs. Building codes and building data have done a lot to increase energy efficiency, and those savings are derived over many, many years. (Nora Naughton)
- In the last 30 years, Iowa's electric cooperatives have invested \$220 million in EE. Prairie Energy and Franklin REC expect to invest \$16 million in EE between 2015 and 2019. (Becky Bradburn)

On Regulations and Jurisdictions

- States with the most energy efficiency standards have the most savings. Some states in the Midwest are moving away from standards to a more voluntary approach and integrating them in their planning. This approach can work, but with less savings. (Nora Naughton)
- DOE should support policies and regulatory models to build the grid of the future while still addressing the impact on the customers. (Joel Schmidt)
- Mr. Schmidt called for the preservation of state authority over retail electric service decisions because they are closest to the needs of their customers. (Joel Schmidt)
- Co-ops need the flexibility and time to adapt to new regulations. (Becky Bradburn)

Question on whether customers want more information:

- 90% of customers may be interested in more information, but that does not necessarily mean that they will act on it. The important thing is to open up options for customers. Mr. Bowen agreed with Mr. Schuling that there are system benefits from EE and DER. (Brian Bowen)
- The panelists generally agreed on the importance of educating consumers on how to utilize data and save money on their bills. Ms. Naughton added that providing incentives or targeted information can help customers overcome information overload.
- Utilities and others need to get information from customers in a variety of ways, including surveys, one-on-one engagement, and focus groups. (Joel Schmidt)

Question: Is there more need for regulatory mandates? If so, at what level?

- The majority of panelists indicated that incentives at the state level are effective and preferred over mandates at the state or Federal level. Ms. Bradburn noted that a statewide group of cooperatives are requesting that the state legislature do more on the incentive side rather than the mandate side. Mr. Schmidt stated that the best use of Federal resources is on broader product [development] while states and communities can work on incentives. What were good incentives five years ago may not be the best incentives now.
- Ms. Naughton highlighted the usefulness of mandates. Given the information overload and the many demands on people's capital, it is hard to get people to take steps toward EE without mandated energy efficiency standards. Energy efficiency may not be as attractive as investments in a solar facility or wind farm, but EE can pay itself back and go way beyond the cost.
- The Clean Power Plan is a compliance mechanism at the Federal level. It will be very helpful for understanding the standards for measuring and verifying energy savings, particularly as trading is being proposed in different regions. (Brian Bowen)

Question: Historically utilities have been very open about sharing information with each other and with DOE, but with the rise of more ancillary services, third parties are now coming in with proprietary systems and data. Do you continue to see a role for DOE? How much information would you share back with the government given the competitive space [in technology development]?

- We have benefited from a DOE R&D grant already, and we see the need for that R&D to continue. We have proprietary IT, but we are active in working groups and basically ever state that we are operating in. We are active in those conversations and trying to make as much open source as we can while still protecting what our engineers built over time. (Brian Bowen)

Question on distributed energy resources, specifically utility scale solar. Are customers doing more of this, and is it resulting in any operational challenges?

- Several co-op members are interested in solar to offset some costs, but the prime-time generation for solar does not match the load curve for all customer types. It matches well for some agricultural customers but does not match well for residential customers. (Becky Bradburn)
- Under current natural gas prices, it is not economic to develop solar [in the Midwest]. We believe the [AMI infrastructure] will help us manage DER better. (Kenneth Grant)
- Integration of up to 10% of renewable energy penetration has been positive for the system. It is uncertain if more integration will be positive or create problems. Increased analysis, experiential data, and technology development should allow us to solve problems that arise. (Joel Schmidt)
- Some investor-owned utilities--Alliant Energy and MidAmerican Energy--proposed solar farms, which seems to be a good for economies of scale. It is good to see alternative renewables in Iowa. (Mark Schuling)

Closing Remarks

- Three speakers emphasized cooperation. This is important as the lines continue to blur in all parts of the electricity business. Information is flowing instantaneously, and it is the human potential that is going to solve the problems we encounter. Set goals and focus on how to achieve them at a local level.
- Ms. Naughton reiterated the importance of EE to help citizens save money and help businesses reduce cost and become more competitive. If there are going to be Federal incentives, more should be done on EE.
- Mr. Bowen stated that the grid is a platform that we can get a lot of value from. DOE can be helpful in the evaluation measurement and verification of EE.
- Mr. Grant emphasized the importance of advancing technology and innovation to benefit customers.

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

- The grid is a platform similar to the Internet where you look at network theory and where the more devices and things connected to it, the more valuable it is. It is a platform for innovation and opportunity.
- The grid is in transition, and we have to be forward-thinking as the generation mix changes and consumer engagement evolves.
- We should look at transmission as an asset. It can be considered a backup to deal with any sort of imperfections that can occur. We are driving toward more investment in transmission because we have used up a lot of the extra capacity in the transmission system.
- Regarding the distribution system, are we going to look at the true cost of delivered electricity? One size does not fit all, but it must be equitable. Also, what is the role of the distribution utility? The distribution utility is going to be a reliability entity. It also requires visibility from a resource point of view and from response, recovery, and emergency points of view. The distribution utility will be the advocate for the consumer. It also could be the financing element while still allowing for market competition.
- Assistant Secretary Hoffman highlighted some of the things DOE is doing.
 - DOE is supporting grid modernization to pull together many types of technologies and capabilities.
 - We are conducting a Midwest seams study to look at how to develop and expand the transmission system, recognizing where the generation resources are being developed.
 - We are looking at modeling and computational capabilities and considering opportunities with the universities. We have a program with Iowa State University to develop advanced modeling capabilities, looking at reliability and the benefits of storage.
 - We have a funding opportunity for potential applications for phasor measurement units on transmission systems from an RTO point of view, looking at reliability and asset management.
 - We developed easy mapper tools to help with transmission.
 - We developed some regulatory support papers with states, and some that we have done include: regulation, planning, operation of the distribution system, high performance based regulation of high DER penetrations, etc.
- On markets, I like not to use the term "markets" generically. Rather, I like to think about energy markets, reliability markets, including ancillary services, and capacity markets. When people say the markets are working well or not working well, we can better define what aspects of the market we are talking about to drill down further.
- Finally, on resilience, it is a function of your ability to store, your ability to rebuild, and your ability to provide and transport services to the area that is damaged. Storage is key. Where you have lots of capacity, you don't have a lot of volatility. We also look at tolerances customers want to have with respect to power outages, which has to be part of our thinking in moving forward.

Question from Tim Tessier at ITC Midwest about cost recovery and who is going to pay:

- I think it is a combination of all of the above. I do not believe there is a single solution. How do we look at a portfolio of solutions, which may include incentives? It is going to be very hard to place all those burdens on the customers. One advantage is the low price of gas. How can we make sure we are investing and capitalizing on the low price of gas and ensure we are investing in our future and infrastructure wisely?

Panel 3: Transmission Development with an Evolving Generation Mix

Panelists

- Jennifer Curran, Vice President, System Planning and Seams Coordination, Midcontinent Independent System Operator, Inc. (MISO)
- Lanny Nickell, Vice President for Engineering, Southwest Power Pool (SPP)
- Sharon Segner, Vice President, Transmission, LS Power Development, LLC
- Carl Huslig, Senior Vice President, Business Development, GridLiance GP, LLC
- Jim Hunter, Director, Utility Department, International Brotherhood of Electrical Workers (IBEW)
- Elizabeth Jacobs, Member, Iowa Utilities Board, and Member, SPP Regional State Committee

Changing Resource Mix

- A shift from coal to renewables is happening. (Jennifer Curran)
- Base load power plants have provided the stability to the grid. Coal and nuclear plants are now 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. (Jim Hunter)
- It is difficult to site transmission at a time when a diverse generation mix is requiring new additions to transmission. (Elizabeth Jacobs)

Policies and Regulations

- Transmission was built to get a utilities' generation to their customers. The expectation now is that system is a national highway and it's not. Generation and transmission are integral to each other and they must be coordinated at a national level. (Jim Hunter)

Planning for Transmission

- The MISO applies regional transmission planning techniques to test transmission plans. These plans provide potential resource mix outcomes that could occur given a set of assumptions. (Jennifer Curran)
- Effective coordination between regional 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 continued value to consumers. (Jennifer Curran)
- Investment in transmission as a result of transmission planning has resulted in favorable cost to benefit ratios. (Lanny Nickell)

Considering a future renewables buildout

- When considering future renewable buildout there must be three items:
 - A business case
 - A method of sharing the cost of the transmission projects where beneficiaries are matched with those who pay the cost.
 - Policy consensus. (Jennifer Curran)
- Many regions haven't been successful so far with regard to large-scale interregional transmission development. As renewable resources are added to the system, regional systems will reach a saturation point and will no longer be able to reliably utilize this generation for their own needs. When this happens, electricity generated using renewables will have to be delivered to other regions. (Lanny Nickell)

On the value of transmission

- The industry needs better certainty regarding future policies and consumer acceptance behind the value that transmission infrastructure can provide. (Lanny Nickell)
- DOE should support joint transmission ownership models and encourage FERC to continue advancing supportive rate making policies, namely rate incentives. DOE should also support FERC in expanding RTO zones necessary to advance public power's integration into the RTOs and provide public power transmission investment opportunities commiserate with IOU's. (Carl Huslig)

Barriers to building transmission

- Opportunities for public power investment in transmission and participation in RTOs are limited in part due to lack of access to capital and resources. This further limits transmission planning and the offering of a diverse generation mix to their customers. (Carl Huslig)
- The breadth of RTO projects identified for competitive development need to increase or the important goals of FERC's competitive reforms in order 1000, namely cost savings from the competition, will not materialize. (Carl Huslig)
- 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. (Carl Huslig)

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?

- Stakeholders need to take the opportunity to talk before they are in the middle of the project trying to get it approved and cited. 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. (Elizabeth Jacobs)

- Interregional projects and projects that cross state boundaries are a challenge. Each state has its own approval process. State compacts and citing coordination could be beneficial. (Carl Husig)
- 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. (Lanny Nickell)

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?

- The penetration levels today are not near the max from a reliability perspective. It will really be about enabling the right operational and market products to ensure the incorporation of wind into the system. (Jennifer Curran)
- It won't be long before renewables will exceed a utility's ability to absorb the extra generation for their own internal needs in a reliable fashion. This power will need to be delivered somewhere else. Utilities will need help with this from new technologies. (Lanny Nickell)

Opportunities or challenges surrounding the MISO multi-value plan:

- There is tremendous benefit to bringing stakeholders together to think through transmission planning before a project is underway. (Jennifer Curran)

The role of Federal agencies in the future given the evolving generation and how it affects transmission?

- Help with facilitation and leadership collaboration of leadership on hard topics. (Elizabeth Jacobs)
- Introduce behavior incentives (Elizabeth Jacobs)
- Continued R&D (Jim Hunter)
- Coordination of stakeholders (Jim Hunter)

Closing Remarks

- A continued challenge in regional transmission planning is that different regions think about benefits differently. In the past the industry as a whole has been focused on energy value. In the future it probably will be more related to capacity or the value of diversity. (Jennifer Curran)
- It will be important to improve consistency and alignment in interregional operations and transmission. (Jennifer Curran)
- Transmission can be a value added enabler but it has to be done right. This takes certainty of policies that shape our future power grid and certainty about cost recovery. (Lanny Nickell)
- Facilitation and coordination is important. (Lanny Nickell)
- DOE should do the following:
 - Promote public policies that expand public power transmission and investment and RTO integration.

- Continue to encourage FERC's adoption of more rigorous rules governing how qualified entities are selected to build competitive transmission projects.
 - Continue to support efforts to promote interregional RTO transmission planning reforms. (Carl Huslig)
- To mitigate the challenge of renewable intermittency, large scale wind projects need to be tied together. (Jim Hunter)
- It is important to continue to develop a diverse generation mix that meets the needs of the entire country. (Elizabeth Jacobs)
- Regional jurisdiction is important to maintain during resource adequacy planning. This ensures the values of the customers are met. (Elizabeth Jacobs)

Public Comments

Tom Wind, Consulting Engineer, Midwest Wind Energy Center and Iowa Wind Energy Association

- DOE had a big role in promoting wind power for about 20 years.
 - They had an initiative to start a collaboration and invite stakeholders—utilities and policymakers—to talk about the issue. Then perhaps a year or two later, a new wind project would be announced in that state. That program is not needed anymore.
 - However, today, DOE is funding studies like the Wind Vision Study. The value is that it provides something for policymakers, legislators, and people to see what is possible, and that sets the vision for what can happen. Industry can't do that. It has to come from a central function like DOE or somebody like that that can get a lot of collaborators. The value is tremendous.
 - The SunShot Initiative is another one. I encourage DOE to continue funding renewable energy programs like this that set the vision and help with research to some extent too.

John McClure, Nebraska Public Power District

- During today's meeting, the recurring themes have been diversity, climate change, energy security, reliability, and the importance of capacity.
- The nuclear issue, particularly existing nuclear plants, are very important. There are cases of plants closing today. How much of that can we afford as we try to meet these objectives.
- Just last month, we hit 49% wind penetration, but last week, one day it was less than 4%. We have to understand how to make that work.

Chris Villarreal, Director of Policy, Minnesota Public Utilities Commission

- We are having a different discussion than what was heard from most of the day. We are looking at a distribution system planning exercise. We have been thankful for the assistance that DOE has given to the state on how to modernize the distribution grid.
- As we think about how the distribution grid will modernize, how can we use those resources to avoid building transmission? How do we use non-transmission alternatives to support reliability? How does the distribution grid itself become the resource to avoid building expensive transmission lines?
- Transmission lines will be needed for the utility scale resources, but in Minnesota, we are looking at how distribution is going to work with transmission planning.