

# Conference Proceedings Report: “Transforming the U.S. Electric System: Where State and Federal Initiatives Meet”\*

The George Washington University Law School’s Sustainable Energy Initiative’s conference, “Transforming the U.S. Electric System: Where State and Federal Initiatives Meet,” explored how local, state and federal organizations are approaching the challenges of meeting customer needs in the 21st century. The conference format was intended to facilitate information sharing and promote dialogue about best practices, supportive interactions, and areas in which jurisdictional conflicts or gaps remain. The conference was held on October 27, 2016.

The conference was structured to examine state and utility initiatives from different regions of the country, all from states served by vertically integrated utilities: Minnesota, California, the portion of the Southeastern United States served by Southern Company, and the City of New Orleans. Additional perspectives on the development of the future electric system were offered by representatives of SunRun, Oracle, and the Energy Storage Association. Representatives from the Federal Energy Regulatory Commission (“FERC”), the North American Electric Reliability Corporation (“NERC”) and the U.S. Department of Energy (“DOE”) discussed what their organizations are doing at the national level to transform the electric system to meet 21st-century needs. A leading consumer advocate discussed the concerns of lower

\* The conference proceedings were compiled and edited by Donna M. Attanasio, Senior Advisor for Energy Law Programs, George Washington University Law School (“GW Law”) with significant and valuable contributions from GW Law Students Karen Cleland, Meghan Mandel, and Lane Page. The conference was funded by the J.B. & Maurice C. Shapiro fund, and hosted by Dentons US LLP. Additional financial support for conference conceptualization and organization came from The Great Plains Institute and The Center for Energy and the Environment. Many thanks to Adrienne Thompson, former Research Associate and Energy Law Scholar at GW Law, Emma Hand of Dentons US LLP, Rolf Nordstrom of The Great Plains Institute, and Mike Bull of the Center for Energy and the Environment, for their support and assistance in developing or hosting the conference. The conference was not recorded, but to the extent the presenters utilized slides, those presentations are available online. See generally Transforming the U.S. Electric System: Where Federal and State Initiatives Meet, GEO. WASH. U.L. SCH. (Oct. 27, 2016), <https://www.law.gwu.edu/transforming-us-electric-system-where-federal-and-state-initiatives-meet>.

## Welcome Address

Emma Hand, Partner, Dentons US LLP  
LeRoy (“Lee”) Paddock, Associate Dean for Environmental Law Studies,  
GW Law School

## Minnesota’s e2I Project

Rolf Nordstrom, President and CEO, The Great Plains Institute  
Amy Fredregill, Resource Planning and Strategy Manager, Xcel Energy  
Will Kaul, VP, Transmission, Great River Energy  
Honorable Dan Lipschultz, Commissioner, Minnesota Public Utilities  
Commission

## California Utility Programs

Zori G. Ferkin, Of Counsel, Morrison & Foerster LLP  
Arlen Orchard, CEO and General Manager, SMUD  
Amy Pressler, Dir. of Public Affairs, Edison International  
John Sowers, VP, Electric Distribution, San Diego Gas & Electric Co.

## Southeastern U.S.

Noel Black, VP, Federal Regulatory Affairs, Southern Co.  
Emma Hand, Partner, Dentons US LLP, Legal Advisor to the City  
Council of the City of New Orleans for Utility Matters

## Newer Market Participants

Richard W. Caperton, Dir. of National Policy and Partnerships, Oracle  
Anne E. Hoskins, Chief Policy Officer, Sunrun Inc.  
Matt Roberts, Exec. Dir., Energy Storage Association

## Grid Architecture (Luncheon Keynote)

Jeffrey D. Taft, Chief Architect for Electric Grid Transformation, Pacific  
Northwest National Laboratory

## Federal Initiatives

George (“Chip”) Cannon, Jr., Partner, Akin Gump Strauss Hauer & Feld LLP  
Gerry W. Cauley, President & CEO, North American Electric Reliability  
Corp.  
J. Arnold Quinn, Dir., Office of Energy Policy & Innovation, Federal  
Energy Regulatory Commission  
Karen G. Wayland, Deputy Dir. For State And Local Cooperation,  
Office of Energy Policy and Systems Analysis, U.S. Department of  
Energy

## Consumer Perspective

John Howat, Sr. Energy Analyst, National Consumer Law Center

## Reactions, Insights and Conclusions: Panel-Led Audience Discussion

Donna M. Attanasio, Sr. Advisor for Energy Law Programs, GW Law  
School  
Gregory K. Lawrence, Shareholder, Greenberg Traurig, LLP  
Diane Munns, Senior Dir., External Affairs, Environmental Defense Fund  
Daniel J. Oginsky, EVP and Chief Administrative Officer, ITC Holdings  
Chris Villarreal, Dir. of Policy, Minnesota Public Utilities Commission

income residential consumers and a panel of experts led the audience discussion to synthesize the many issues addressed over the course of the day-long seminar. A complete listing of speakers is set forth in the side bar.

After a welcome from host, Emma Hand, a partner at Dentons LLP, and Lee Paddock, Associate Dean for Environmental Studies at GW Law, conference moderator Donna Attanasio, Senior Advisor for Energy Law Programs at GW Law introduced the program. Ms. Attanasio noted some of the commonly recognized change-drivers that are compelling grid transformation, including cyber-security concerns, hardening the grid against weather, and the need to integrate increased amounts of distributed energy resources (“DERs”) and demand response. Ms. Attanasio observed utilities, regulators and stakeholder who are seeking to prepare for this transition must also overcome a number of challenges, including tension between wholesale and retail jurisdictional authority, and maintaining reasonable costs to customers.

**Session I: Minnesota’s e21 Initiative<sup>1</sup>**

*Rolf Nordstrom, President and CEO of The Great Plains Institute*

The first panel was organized and moderated by Rolf Nordstrom, the chief facilitator of the e21 Initiative. Mr. Nordstrom, along with Mike Bull of the Center for Energy and the Environment, co-founded and co-led the Initiative. Mr. Nordstrom explained that the purpose of Minnesota’s stakeholder-led e21 Initiative is to develop a 21st-century electric system in Minnesota in response to a changing electric industry.

The e21 project was initiated in 2014 in response to a paper called “Disruptive Challenges”<sup>2</sup> which was widely discussed in the electric utility industry at the time. The paper warned that electric utilities could face a “death spiral” as consumers seeking new, alternative electricity sources, such as solar, left the grid, because their defection would cause utility revenue losses, which in turn would require utilities to raise rates, and thereby make it more economical for even more customers to defect from the grid.<sup>3</sup> While in retrospect, the “death spiral” scenario seems overwrought, the electric utility industry is facing flat or declining load, Mr. Nordstrom explained, at the same time that an aging grid, environmental concerns, and new customer expectations demand significant investment. In turn, this results in back-to-back rate cases, as utilities struggle to keep up with costs, overwhelming regulators, and frustrating consumers. Further, the current business model rewards utility investment in utility-owned generation and

transmission, which may conflict with environmentalists’ goals and limit customer choices. The e21 project sought to find a way off this “hamster wheel” by developing new utility business models that were better aligned with customer’s needs and the public interest, against a changing economic and technology landscape.

**Figure 1**

MN e21		NY REV
Stakeholders via Voluntary Collaboration	Driven by	Regulators via Commission Order
Fully Regulated	Regulatory Model	Deregulated
Average Rates	Rates relative to US Average	High Rates
“Winter is Coming” Preparation	Urgency of Action	Urgent Response to Sandy and deferred maintenance
Primarily Utilities	Means to Achieve Policy Outcomes	Primarily Markets

When comparing initiatives, Mr. Nordstrom noted some significant differences between Minnesota’s e21 Initiative and the well-known New York State Reforming the Energy Vision (“REV”) proceeding, which shares some similar goals.<sup>4</sup> First, e21 is a voluntary stakeholder collaborative, whereas REV is a proceeding before the New York State Public Service Commission and is driven by the commission’s orders. Second, Minnesota is a fully regulated, vertically integrated state; New York restructured its utilities and adopted competitive retail access back in the late 1990’s. Third, Minnesota has average electric rates, whereas New York’s are high. Fourth, New York’s project is driven in part by a heightened sensitivity to reliability issues following Superstorm Sandy and the fact that the state is facing upwards of \$30 billion in deferred maintenance or infrastructure replacement costs. Minnesota is not faced with a particularly urgent situation, but just as Minnesotans have it within their DNA to prepare for winter, e21 is preparing for the changes that can be seen coming. Fifth, the REV process is relying primarily on markets to achieve public policy outcomes, but Minnesota believes that utilities are a terrific implementer of public policy and will continue to rely on its utilities.

Phase I of the e21 Initiative, which launched in 2014, recommended a transition from cost-based to a value-based utility compensation system and a more customer-centric model.<sup>5</sup> As envisioned in Phase I, at least a portion of utility earnings would be tied to performance and customers would be given more options.<sup>6</sup> The e21 Initiative also advocates increased collaboration, rather than adversarial processes,

1. GW Law participated as a member of the core team in the e21 Initiative, and the conference was organized in part to facilitate dissemination of the e21 work to a national audience.  
 2. Peter Kind, *Disruptive Challenges: Financial Implications and Strategic Responses to a Changing Retail Electric Business* (Edison Electric Inst., Jan. 2013), <http://www.eei.org/ourissues/finance/documents/disruptivechallenges.pdf>.  
 3. See Rolf Nordstrom, *Transforming the U.S. Electric System: Where State & Federal Initiatives Meet 3* (Great Plains Inst., Oct. 2016) [hereinafter **E21 CONFERENCE PRESENTATIONS**], [https://www.law.gwu.edu/sites/www.law.gwu.edu/files/downloads/Minnesota\\_e21\\_all%20presentations.pdf](https://www.law.gwu.edu/sites/www.law.gwu.edu/files/downloads/Minnesota_e21_all%20presentations.pdf).

4. See *supra* Figure 1.  
 5. See Jennifer Christensen et al., *e21 Initiative Phase I Report: Charting a Path to a 21st Century Energy System in Minnesota 1* (Great Plains Inst., Dec. 2014), [http://www.betterenergy.org/sites/default/files/e21\\_Initiative\\_Phase\\_I\\_Report\\_2014.pdf](http://www.betterenergy.org/sites/default/files/e21_Initiative_Phase_I_Report_2014.pdf).  
 6. *Id.* at 5.

and inclusion of all stakeholders in the discussion of proposed changes.<sup>7</sup>

Although the Phase I report included fourteen separate recommendations, it can be summarized as recommending a shift away from a system that rewards utilities for selling more electricity and building capital-intensive projects, and that provides customers few options, and toward a system that enables utilities to earn revenue by achieving performance outcomes and begins to treat the customer as king, by giving them more information, options and services.<sup>8</sup> Mr. Nordstrom noted that the e21 Phase I report was filed with the Minnesota Public Utilities Commission and he believes that eight or nine of those fourteen recommendations are currently being implemented or making their way through the regulatory process.

Phase 2 of the e21 Initiative focused on three particularized areas: (1) integrated system planning; (2) performance-based utility compensation; and (3) grid modernization. The e21 participants developed three white papers on these topics.<sup>9</sup> While the e21 Phase I Report reflects a group consensus, there were differing views with respect to the areas into which the e21 Phase 2 Report delved, which the Phase 2 reports sought to reflect.

The e21 project's work on integrated system planning builds off of Minnesota's existing integrated resource planning process. It proposes a planning process that includes increased stakeholder collaboration in advance of formal filings, with the goal of reducing transaction costs for all parties; transition to an "end to end" planning approach that considers how all types of resources may contribute to meeting system needs; better information about customer-driven resources; better modeling of rate impacts for the different resource options/scenarios being considered; and a better balance between reliance on resource modeling and policy/strategic considerations in charting the path forward.<sup>10</sup>

The paper on performance-based compensation identified a continuum for reform that moved from the status quo to a utility compensation model that makes utilities increasingly agnostic financially as to how customer needs are met (e.g., from central station generation, distributed energy generation, or non-wire alternatives) and by whom (utility or third party); captures declines in real costs over time as utilities are incentivized to optimize between generation and demand-side resources; and explicitly begins to tie utility financial incentives to utility performance on specified public policy outcomes.<sup>11</sup> Mr. Nordstrom noted that there is a significant challenge in developing appropriate metrics for performance.

On grid modernization, e21's white paper lists five objectives for modernizing Minnesota's grid:

1. Maintain/enhance reliability, safety, security and resilience.
2. Enable greater customer engagement and empowerment.
3. Enhance ability to integrate DERs and new products.
4. Improve environmental performance.
5. Promote optimized utilization of grid assets.<sup>12</sup>

The whitepaper then details fourteen recommendations to further these objectives, and support the process the Minnesota Public Utilities Commission has established under the leadership of Commissioner Nancy Lange.

Looking back over the three years of the project, Mr. Nordstrom identified five themes that emerged from e21's work, applicable in Minnesota and other states:

1. Utilities will continue to be central to providing electric service, because it is an essential service to the public, as will excellent and adequately funded regulators.
2. We'll need new, integrated approaches to utility planning.
3. The electric distribution system is a place of dynamic change and a new source of value.
4. There is significant value in multi-interest discussions and negotiations in advance of formal proceedings.
5. We need a measured approach to reform, to prepare the electric system and regulatory framework for potentially rapid change.

With respect to the last point, Mr. Nordstrom noted that e21 sought to look across the entire system, which is rather like "trying to eat the elephant all at once," but solutions will be built more slowly. Moving forward into Phase 3 of the e21 Initiative, Mr. Nordstrom expects e21 to increase its engagement with regulators and to bring in more national experts. He also sees continued use of the multi-interest stakeholder forum as a means for engagement, with increased participation from consumer advocates.

Mr. Nordstrom closed his remarks by again noting that the strength of the e21 Initiative was collaboration. This view is embodied in an African proverb, adopted as the unofficial e21 motto: "If you want to go fast, go alone; if you want to go far, go together."

**Amy Fredregill, Resource Planning and Strategy Manager, Xcel Energy**

Xcel Energy is a vertically integrated utility covering eight states, the number one wind-provider in the U.S., and a leader among utilities in emission reductions. In recognition of a changing electric industry, Xcel Energy is considering new value streams and transforming its resources plans. For example, its 2030 goal is to have 63% carbon-free electric-

7. *Id.* at 10.

8. *Id.* at 8.

9. See Jennifer Christensen et al., *e21 Initiative Phase II Report: Charting a Path to a 21st Century Energy System in Minnesota* 10, 11, 13, 15 (Great Plains Inst., Dec. 2016), [http://www.betterenergy.org/sites/default/files/e21\\_PhaseII\\_Report\\_2016.pdf](http://www.betterenergy.org/sites/default/files/e21_PhaseII_Report_2016.pdf).

10. *Id.* at 13–15, 46–68.

11. *Id.* at 11–13, 29–46.

12. *Id.* at 16–17, 78.

ity. During her presentation, Amy Fredregill pointed to four industry trends that are driving change.

Changing economics, including the falling cost of renewable energy, particularly wind, is an important contributor to the changing resource mix. With wind as an economic alternative, Xcel Energy is closing down coal plants and adding more gas-fired generation, which is a better integrator for renewables. Its customer-facing rate design for solar has evolved to place emphasis on the value of solar to the system.

Customer expectations, including a desire for more options, are also forcing change. Xcel Energy has created a pilot for electrical vehicle charging, and is creating new products, including its “Renewable Connect” program, launched in Wisconsin and proposed for Minnesota,<sup>13</sup> which will allow customers to select a renewable product with multi-year contractual commitments rather than the more varied electric mix.

Customer desire for price certainty and evolving regulatory trends are important factors in Xcel Energy’s effort to maintain competitive pricing and meet community needs. Multi-year rate plans are one of the approaches that Xcel Energy sees as a means to meet this objective, and it is also launching a time-of-use pilot in Colorado. Ms. Fredregill pointed out that since every state has different policy goals, Xcel Energy has variations in its programs across its eight-state territory to meet both federal and state policy compliance measures, including Clean Power Plan targets, and with respect to regulatory reform efforts.

Emerging technologies are a fourth driver of change. In addition to the falling cost of wind, noted above, Xcel Energy is looking at other cost-effective means for emissions reductions, grid modernization, customer service, including a NEST project in Colorado, and better means for integrating renewables that stem from technological innovations.

In order to move forward with these reforms, and in keeping with the e21 approach, Xcel Energy has been, and intends to continue, increasing stakeholder collaboration by holding workshops to discuss technology issues and other concerns. Its greatest challenge and concern is assuring that it maintains reliability. It must also address modernizing its grid to manage the changing distribution network, despite its relatively low penetration of advanced metering infrastructure, and upgrade its nuclear capacity in order to stay on track for carbon reduction.

### *Will Kaul, Vice President, Transmission, Great River Energy*

Great River Energy (“GRE”) is a generation and transmission cooperative, with twenty-eight distribution cooperative utilities as members, and the second largest utility in the state. Due to the geographic diversity of its customer base, it is a wires-intensive company. As a cooperative whose rates are not regulated by the Public Utilities Commission, it brought a unique perspective to the e21 Initiative and

it saw its participation as an opportunity for learning and strategic benchmarking.

Right now, GRE is seeing many new pressures and is asking the National Rural Electric Cooperative Association to help develop new business models to cope with these changes. In particular, even without retail choice as a formal option, the retail customers of GRE’s member distribution cooperatives are choosing by making changes in their consumption or adding solar. At the same time, Minnesota’s aging systems need to be replaced with new technologies. Even in areas in which cooperatives have long excelled, such as demand response, significant investments must be made to make “dumb” systems “smart.”

Will Kaul sees us as mid-way through a forty-year cycle of transformation. According to Mr. Kaul, we’ve seen the wholesale grid reshaped over the past twenty years, and the next twenty years are likely to bring as dramatic a change at the grid-edge. In reaction, he sees GRE moving from a commodities-based business to a service-based business.

Mr. Kaul emphasized that the advantage of being a customer-owned cooperative is that customer needs are easily conveyed to management. But as great an advantage as GRE receives through its close relationship with its customers, Mr. Kaul found that the greatest challenge posed to GRE is aligning its distribution-utility members around a shared vision. He noted that to support the transformation, it will be important for all its members to agree on common measures, such as installing advanced metering infrastructure, smart demand response and other new technologies, such as those that enable better communications to substations. With such rapid industry changes, the challenge for GRE is keeping up and “getting out of our own way” to unlock the potential for greater customer benefits.

### *Honorable Dan Lipschultz, Commissioner, Minnesota Public Utilities Commission (“MPUC”)*

Commissioner Dan Lipschultz observed that Minnesota’s system has increasingly diverse generation and satisfied customers. Minnesota enjoys reasonable rates (9.52¢/kWh) compared to the national average (10.44¢/kWh) and low interruptions (0.88 interruptions/customer; compared to 1.1 interruptions/customer national average).<sup>14</sup> In 2015, Minnesota had 21% of its electricity from renewables and had reduced its coal usage (44% in 2015 compared to 62% in 2005 and 66% in 2000).<sup>15</sup> It is also strong in energy efficiency, rated tenth in the nation by the American Council for an Energy-Efficient Economy (“ACEEE”) for 2016.<sup>16</sup> The need for change, therefore, is not apparent on the surface. However, Commissioner Lipschultz pointed out, on closer inspection, Minnesota is also experiencing flat sales as well as system inefficiencies and aging infrastructure, resulting in more frequent rate cases to maintain pace with expenditures.

14. See e21 CONFERENCE PRESENTATIONS, *supra* note 3, at 28.

15. See *id.*

16. See *id.*; *State Scorecard Rank*, AM. COUNCIL FOR ENERGY-EFFICIENT ECON., <http://database.aceee.org/state-scorecard-rank> (last visited Feb. 2, 2017).

13. See *Customer Renewable Energy Solutions*, XCELENERGY, [https://www.xcelenergy.com/company/corporate\\_responsibility\\_report/library\\_of\\_report\\_briefs/customer\\_renewable\\_energy\\_solutions](https://www.xcelenergy.com/company/corporate_responsibility_report/library_of_report_briefs/customer_renewable_energy_solutions) (last visited Feb. 2, 2017).

As a result, and with e21 as a prompt, MPUC has awakened to these realities and is taking charge to ensure it is managing the change and doing so with minimal rate impact.

Areas of focus include: grid modernization; rate design reform; and interconnection standard updates. Grid modernization, led by Commissioner Nancy Lange, may also address distribution planning. A staff report was issued last spring,<sup>17</sup> and further Commission action is expected in the first quarter of 2017. Rate design reform, under Commissioner Lipschultz's direction, and interconnection standard update workshops have also begun. Future workshops may include distribution system planning and alternative rate-making, including consideration of performance incentives. Through continual efforts made by Minnesota to anticipate changes in the industry, it is the intent of the MPUC and its Commissioners to keep Minnesota's system up-to-date.

In sum, the panelists saw Minnesota taking positive, proactive steps, but facing challenges in assuring that reliability targets are met and customer satisfaction remains high as it moves forward.

## Session II: California Utility Programs

*John Sowers, Vice President, Electric Distribution, San Diego Gas & Electric*

For San Diego Gas & Electric ("SDG&E"), customer satisfaction is a priority. That means both maintaining reliability and providing customers with more options, while addressing declining load factors (system inefficiencies) and integrating renewables. We can expect more change in how electricity is produced and delivered in the next ten years than in the past hundred, predicted John Sowers, which will affect how we approach grid modernization and distribution planning. Also, new technology will give customers options and the choice of whether to invest in a certain type of resource, for example placing solar on their rooftops.

To meet customers' new requirements, smart meters, or advanced metering infrastructure ("AMI"), must be deployed to all customers with the goal of bringing customer information into the distribution management system to better understand customer needs and energy uses. The relationship with the customer must become more of a two-way flow, rather than the more typical relationship of today of just sending a bill to the customer.

SDG&E hopes to increase customer engagement through innovative programs

and services, which include an online energy marketplace. However, SDG&E will have to figure out how to adapt to varied customer preferences and how to deal with different types of resources.

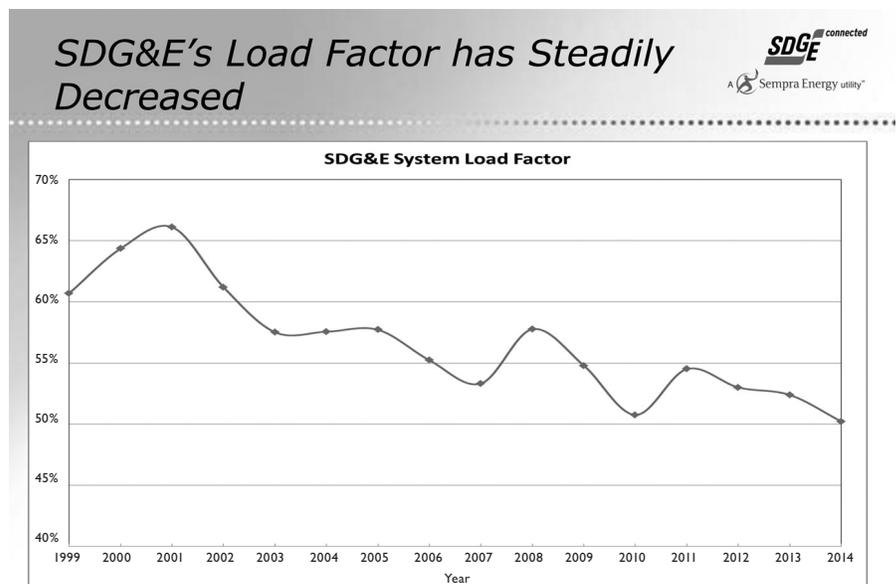
Mr. Sowers also observed that the questions that utility companies need to ask themselves are changing with the changing energy environment. In regards to distribution planning, utilities must figure out how much flow they can take through particular substations and back to the grid (hosting capacity), and how likely customers are to purchase different types of resources.

Utilities also have to figure out what new functionalities they are enabling with new investments, and what the benefits to the system and the customer will be from these new functionalities. It is important to keep in mind that new functionalities will affect the customers and distribution system at a micro level, as well as the overall energy mix at a macro level. It is also important for utilities to make sure that new resource investments have operating characteristics that will enable them to integrate renewables.

An increasingly prevalent new technology in California is the use of electric vehicles. Accelerating the growth of electric transportation through technology, such as electric vehicle charging and storage, can help with grid utilization issues<sup>18</sup> while also helping with air quality. SDG&E has a Vehicle Grid Integration plan designed to send appropriate price signals to customers, which will reflect grid conditions as well as individual circuit conditions, thereby helping to avoid unnecessary investments in the grid.

Some of the key opportunities for SDG&E include: using technology and improved business processes to reduce costs

Figure 2



**A falling load factor implies that SDG&E must purchase more capacity for every kWh that it sells, increasing the cost of power**

17. See MINN. PUB. UTIL. COMM'N, STAFF REPORT ON GRID MODERNIZATION (2016), [http://morethansmart.org/wp-content/uploads/2015/06/MNPUC\\_Staff\\_Report\\_on\\_Grid\\_Modernization\\_March2016.pdf](http://morethansmart.org/wp-content/uploads/2015/06/MNPUC_Staff_Report_on_Grid_Modernization_March2016.pdf).

18. See *infra* Figure 2 (illustrating the declining efficiency of use of SD&E's system).

and continue in its role as the trusted energy advisor, advocating for a more streamlined regulatory process to provide greater flexibility and transparency, using programs and technology to optimize the utilization of the grid, and increasing customer engagement through innovative programs and services.

**Arlen Orchard, CEO and General Manager, SMUD**

The two main focuses of SMUD (formerly known as the Sacramento Municipal Utility District) are improving relationships with customers and transitioning away from providing one single product, to providing multiple value streams and increased customer choice.

Similar to the other utilities represented, SMUD is experiencing flat load growth, and sees a world that is changing, driven by customer expectations, new technology, large and small third-party market entrants, new data analytics, and a low carbon future. This transformation is going to require a new utility business model. This model will include a competitive retail environment, a focus on net revenue, a focus on customers, an array of competitive and tailored products and services, and customer segmentation with integrated and targeted products and marketing.

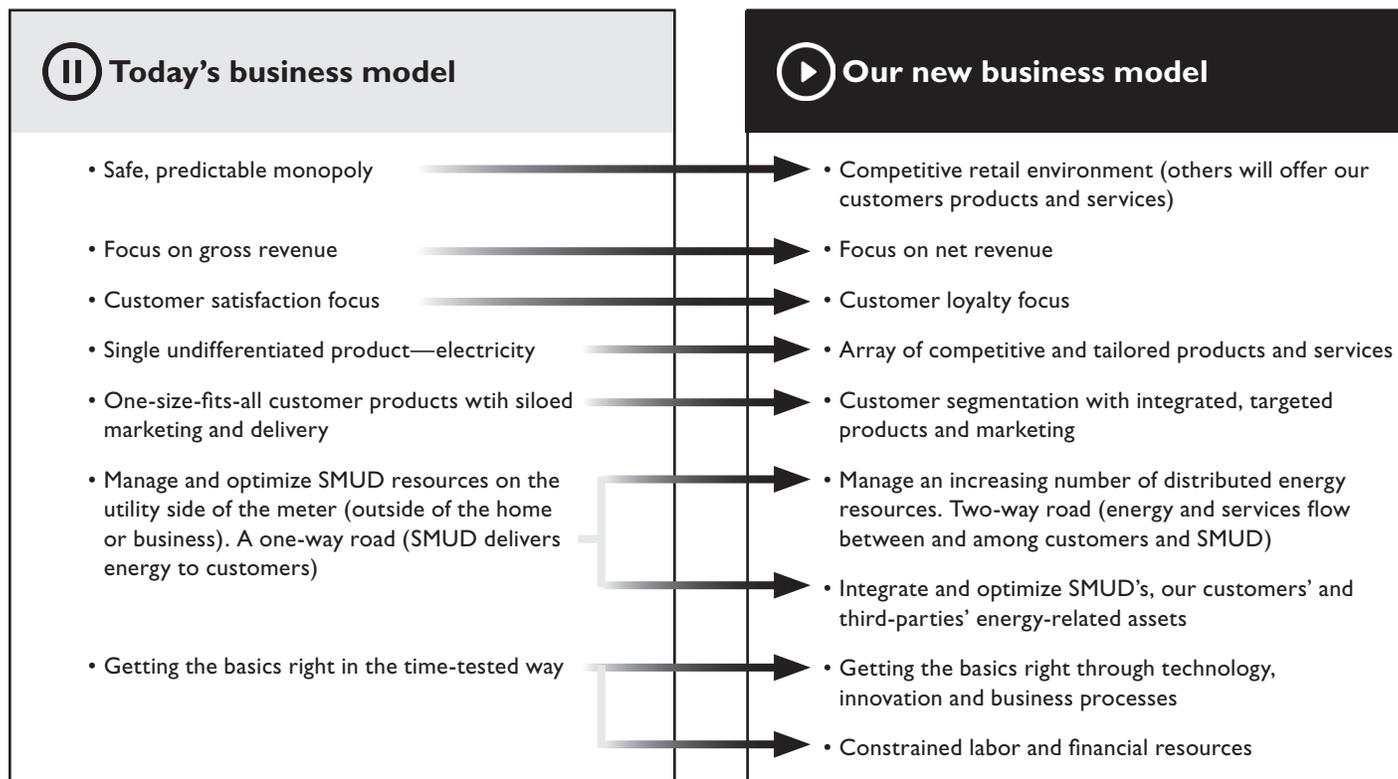
One of the most important factors for creating success with this new model is to focus on the customer and rethink the customer-utility relationship.<sup>19</sup> It is important for utilities to know their customers better because they are diverse

and the utility must be prepared to meet all of their needs. Utilities must be able to reach their customers with the right information, which involves switching from mass marketing to market differentiation, and having data available to help understand individual customers' wants. This data can include demographics, historical customer information, market research, and psychographics.

The customer's experience with the utility should be easy, responsive, personal, and collaborative. The overall goal is that customers will have options and will feel in control of their energy usage. Most customers want to conduct transactions digitally so it is important to have new online and phone options. This will increase customer satisfaction as well as bring costs down for the utility. When thinking about the customer, utilities need to focus on promoting personalization and connectedness, while becoming more interactive throughout the process.

SMUD's goal is to provide multiple products, many of which will come from new technology like solar storage and electric vehicles. In deciding what to offer, SMUD needs to figure out which products will actually increase revenue. The plans for now are to start offering community solar, but to wait and observe products like storage and demand response to see if they grow. The list of services that SMUD hopes to offer includes energy transmission, distribution planning and operations, traditional utility incentive programs, low-income rates and programs (all of which it offers now), as

**Figure 3**



19. See *infra* Figure 3.

well as distribution and grid operations, distributed energy resource integration, and full service bundling.

SMUD is planning on increasing its solar offerings, but believes it cannot compete with third-party providers for rooftop solar, so it is focusing on community solar. This new focus should help to increase revenue and to meet environmental goals. The plan is to offer differentiated solar products and multiple pricing options. SMUD has already started providing solar to bigger commercial customers, and in 2017 it will begin targeted marketing to residential and smaller commercial customers.

The other new product that SMUD is focusing on is electric vehicles. While electric vehicle use is not as widespread in Sacramento as it is in San Diego, it is still an increasingly growing market throughout California. SMUD is using multiple tactics to support electric transportation, which include providing incentives like free charging for a year to new owners, discounting tariffs for charging at night, and working on promoting and investing in electric applications like electric school buses and downtown streetcars.

*Amy Pressler, Director of Public Affairs, Edison International*

Amy Pressler from Edison International focused her presentation on the evolution of the new energy environment that we have today and where grid modernization is headed. This new environment is a result of a march towards clean energy and de-carbonization, a desire for more grid resiliency, and regulatory changes. It has followed from legislative efforts and is based off the direction that customers want utilities to go.

The energy goals for California, beginning with the renewable portfolio standard established in 2002, are continuing to grow. Senate Bill 350: Clean Energy and Pollution Reduction Act of 2015 calls for 50% of customer needs to be met with clean energy by 2030.<sup>20</sup> Assembly Bill 327 has also been a key driver in these changes, including by promoting distributed energy resources. It has directed reforms to California Net Energy Metering tariffs and a new grid planning process calling for utilities to develop distribution resource plans, which will better integrate customer-sited distributed energy resources.

California's grid modernization effort envisions a modern, customer-centric utility distribution grid that integrates a wide variety of resources. The first step is to develop tools necessary to deploy a plug-and-play grid, which refers to a system where customers can easily connect many types of energy technologies, including electric vehicles, solar panels, and energy storage devices.<sup>21</sup> These tools will include integration capacity analysis, a locational net benefit methodology, a

distributed energy resources deferral framework, data access, and demonstration projects.

\*\*\* At the end of the California presentations, the panel moderator, Zori Ferkin, Of Counsel at Morrison & Foerster, asked the presenters what the California Independent System Operator ("CAISO") can and should do to facilitate the goals of the utilities and the new energy market. Overall the responses indicated that CAISO will and should have some role in developing the new market, but right now it is unclear what the role will look like or how it will be implemented, with respect to resources on the distribution grid. It was noted however, that the CAISO will have a key role in integrating renewables.

**Session III: A View From the Southeast U.S.**

*Noel Black, Vice President, Federal Regulatory Affairs, Southern Co.*

Southern Company's fundamental principles are keeping customers at the center of what it does and delivering affordable, clean, safe, and reliable energy, and it does so under a regulatory system that will help the utility design and innovate. Five priorities that drive its business are: (1) excelling at fundamentals; (2) achieving success with major projects; (3) supporting the creation of a national energy policy; (4) promoting energy innovation; and (5) focusing on its people.<sup>22</sup> Other priorities include preparing for both natural events and technological problems, like cyber threats, and aligning the company's objectives with those of its constituents, which will result in aligning themselves with regulators.

Southern Company is working to develop a full portfolio of energy resources, including nuclear, natural gas, clean coal, and energy efficiency. It also wants to promote energy innovation for resources like clean coal and nuclear, as well as research and develop new technologies to capture and sequester carbon. Additionally, it believes the national policy should focus on restoring America's financial integrity by bringing back industrial development and reducing reliance on foreign energy.

Southern Company is currently investing in clean coal and advanced nuclear power. It is building two new units at its Vogtle nuclear power plant in Georgia. Additionally, its Kemper facility, an integrated-gasification combined-cycle plant, which is also under construction, had recently (at the time of the conference) produced syngas, which was a major milestone in its development. Because Southern is "vertically integrated and rationally regulated," as described by Noel Black, it is well-positioned financially to undertake these major investments. In addition, it is interested in other new technologies, regardless of whether located on the customer or utility side of the meter, and is working on projects with Bloom Energy, Tesla (battery storage), and NEST. The wind profile for its service territory is not great, but it

20. See S. 350, 2015–16 Leg., Reg. Sess. (Cal. 2015), [https://leginfo.ca.gov/faces/billNavClient.xhtml?bill\\_id=201520160SB350](https://leginfo.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB350). This is also referred to as the "Golden State Standards" for clean energy. See, e.g., *SB 350: Golden State Standards*, CAL. CLIMATE LEADERSHIP, <http://focus.senate.ca.gov/sites/focus.senate.ca.gov/files/climate/505050.html> (last visited Mar. 8, 2017).

21. "Plug-and-play" is a term that has recently become widely used and discussed in the electric industry.

22. S. Co., REAL SOLUTIONS: SOUTHERN COMPANY 2015 ANNUAL REPORT 1–2 (2015), <http://www.southerncompanyannualmeeting.com/uploads/southern-company-2015-annual-report.pdf>.

is also installing solar capacity, which is better suited to its geographic location.

Another important aspect of public and private cooperation is working with federal and state governments. For example, Southern Company has been working with DOE, FERC, and the Department of Homeland Security on resiliency.

In sum, Southern Company sees its path forward in remaining customer-centric, under a regulatory structure that enables it to invest and innovate.

### *Emma Hand, Partner, Dentons US LLP*

Emma Hand, who is outside counsel to the City of New Orleans for Utility Matters, explained that the people of New Orleans are conscious of environmental and energy problems, especially in regards to natural disasters and vulnerability, and that they desire clean energy, but there are multiple challenges in achieving their goals that are particular to New Orleans. These challenges include a high poverty rate,<sup>23</sup> which makes low electric rates a priority, and New Orleans' location on the wrong side of a transmission constraint, which makes it difficult to get power into the city.

Despite these challenges, New Orleans is still attempting to achieve clean energy and has had success in multiple areas. It relies heavily on nuclear and natural gas-fired plants, which makes both its electric rates and emissions rates from electric power relatively low compared to the national average.

The low electric rates, however, make it difficult for renewable resources to compete. Nevertheless, the city has a successful energy smart program and has had a lot of success with rooftop solar. New Orleans ranked tenth at one point for U.S. cities using solar,<sup>24</sup> although its success in rooftop solar was largely due to a generous state solar tax credit. The credit covered up to 50% of the first \$25,000 spent on installing rooftop solar. This credit has since been limited due to the cost to the state budget after the surprising popularity of the credit, which will likely result in a much slower pace of solar installations.

New Orleans is attempting to achieve clean and renewable energy in other areas as well. It has just started a one-MW pilot program pairing solar and battery storage to see how the two work together. It has sent out a request for proposals for 20 MW of renewable energy to come into the city. As of the time of the conference, there was an integrated resource plan, a plan to make sure that net metering rules are working correctly, and de-coupling proposals in front of the city council, Ms. Hand noted. Additionally, the mayor has a sustainability initiative that includes developing a plan for micro grids.

### **Session IV: New Market Participants**

The three speakers in Session IV, who spoke before and after the luncheon speaker, represented market participants whose presence in the industry was nearly non-existent twenty years, or even ten years, ago. Yet, the issue of data analytics and customer segmentation, solar, and storage were touched upon in nearly all of the presentations by utility representatives, indicating the prevalent role of these companies in the future.

### *Anne E. Hoskins, Chief Policy Officer, Sunrun Inc.*

Anne Hoskins, a former Commissioner on the Maryland Public Service Commission and now with Sunrun, urged utilities and regulators to view solar as a solution to the challenges facing the industry, including grid modernization, rather than a problem. From Sunrun's perspective, solar power is much more than a product, and it is integral to the grid of the future.

Currently, Sunrun is primarily a provider of residential solar, but it expects to do a lot more in the future. For example, it just reached an agreement with a battery provider and it sees solar as a product that can be integrated into a comprehensive home energy management system. It has launched the Sunrun BrightBox,<sup>25</sup> which pairs solar with a Tesla battery to give customers a cost-effective mechanism to store electricity for later use, without having to sell it back. The BrightBox is already cost-competitive in Hawaii, which has a retail rate of about 20¢/kWh, and it expects to release it next in California, in Pacific Gas and Electric Company's service area, where it also expects to be cost competitive.

The availability, development, and efficiency of solar power around the country depend on regulatory mechanisms, and solar providers consider which regulators are best to work with. For successful regulatory mechanisms to be created, solar needs to be seen not as a problem but as a solution that can help address climate change and modernize the grid. Strategies such as performance-based regulations and time-of-use rates can be helpful, whereas fixed charges or demand charges harm customers and are more likely to encourage defections. Rather than seeing solar as a threat, that will induce customers to defect from the grid, regulators should be working with solar providers to assure that solar power becomes part of the integrated grid.

### *Richard Caperton, Director of National Policy and Partnerships, Oracle*

Oracle is an enterprise software provider that works with utilities around the world. It recently acquired OPower, Richard Caperton's prior employer. Mr. Caperton focused his presentation on how to achieve higher customer satisfac-

23. See *Quick Facts*, U.S. CENSUS BUREAU, <https://www.census.gov/quickfacts/table/IPE120215/2255000> (last visited Mar. 21, 2017) (identifying a 27% poverty rate); *New Orleans, Louisiana (LA) Poverty Rate Data*, CITY-DATA.COM, <http://www.city-data.com/poverty/poverty-New-Orleans-Louisiana.html> (last visited Feb. 24, 2017) (identifying a 29% poverty rate).

24. See, e.g., Jennifer Larino, *New Orleans Ranks in Top 10 U.S. Cities for Solar, Report Says*, NOLA (Mar. 26, 2015, 3:29 PM), [http://www.nola.com/business/index.ssf/2015/03/new\\_orleans\\_ranks\\_10th\\_solar.html](http://www.nola.com/business/index.ssf/2015/03/new_orleans_ranks_10th_solar.html).

25. *Sunrun Launches Sunrun BrightBox™ Solar Plus Energy Storage Systems in California*, SUNRUN (Dec. 14, 2016), <https://www.sunrun.com/why-sunrun/about/news/press-releases/sunrun-launches-sunrun-brightbox%E2%84%A2-solar-plus-energy-storage>.

tion based on what customers want, what software is available, and how the software is applied in the utility industry. He sees an opportunity for utilities to make major improvements in customer engagement and the customer experience by better utilizing market data and the “moments that matter,” when customers are most receptive to receiving and acting on utility-provided information, as other industries have done.

Other industries are outperforming the utility industry in customer satisfaction, largely because other industries have moved more rapidly than utilities towards new structures to improve interactions with customers. The biggest area where utilities are behind is in customer engagement capabilities. Other industries are utilizing new structures that focus on accessibility and convenience, and “set it and forget it” concepts, which are appealing to customers.

Smart homes that incorporate “set it and forget it” technologies are the future. Customers want to manage their energy use, but they do not want to deal with utilities frequently. Customers are most receptive to utility programs as soon as they move in, therefore utilities should reach out to customers at the time they are most receptive and provide them with personalized services based on that customer’s needs, rather than waiting until a problem occurs and the customer is forced to reach out to the utility.

Utilities should be getting more data on customers to allow them to better meet customer needs. They should be moving away from a generic mass market, because customers want services tailored to their individual preferences. Utilities should also be providing proactive alerts and notifications that give customers information about their bills. Customer service representatives should be empowered to recommend “next best-actions” and be better equipped to answer customer inquiries. These types of services will raise customer satisfaction, while also reducing call center volume, which can greatly reduce costs to utilities.

In regards to software, cloud-based, SaaS software<sup>26</sup> is often the best approach to getting new software, but utilities are biased toward acquiring software in a manner that allows it to be treated as a capital investment, rather than as an operating expense. This can result in less than optimal acquisitions. Utilities should be addressing this problem with their regulators, so that the two can work together to assure utilities are financially motivated to select the software that is best suited to a changing environment, as well as for data privacy concerns.

### *Matt Roberts, Executive Director, Energy Storage Association*

Although energy storage penetration in the U.S. today is relatively low, the industry is growing rapidly, explained Matt Roberts. More systems went on-line in the last quarter of 2015 than in all of 2013 and 2014 combined.<sup>27</sup> This may be comparable to where the solar industry was about ten years ago, at the cusp of exponential growth. Penetration rates vary by state, however, because adoption is highly dependent on regulation.

The cost of energy storage is declining rapidly. Mr. Roberts offered the costs of a grid-scale Li-ion battery as an example, showing the total projected cost (battery and balance-of-system) declining from \$665/kWh in 2015 to an estimated \$412/kWh in 2020, as well as rapid declines in the commercial and industrial sector.<sup>28</sup> Given these changes, a rapid increase in installations is expected across all sectors, signaling this as an intense area for capital investment throughout this decade.

Even with the decline in cost, energy storage is often perceived as uneconomic (particularly for residential, grid-tied solar systems). But the cost of storage cannot be measured relative to solar or other technologies; it must be evaluated relative to its benefits. As an “enabling technology,” storage is an important complement to intermittent sources of electricity such as solar and wind, but it should not be seen as a “bolt-on”<sup>29</sup> technology that merely enhances the performance of other technologies. Storage has its own value proposition, and creates a new market. Unlike renewable energy resources, though, it can be more difficult to quantify the value that storage offers because its worth is scenario-dependent. Its potential values include: grid benefits, such as energy arbitrage, frequency regulation, spin/non-spin reserves, voltage support and black start; utility benefits, such as resource adequacy, distribution deferral, transmission congestion relief, and transmission deferral; and customer services, such as time-of-use bill management, increased photovoltaic (“PV”) self-consumption, demand charge reduction, and back-up power.<sup>30</sup>

Moreover, storage may be undervalued in circumstances where its benefits are not recognized by the market. Policies that treat storage as a substitute for generation or focus on a single attribute such as ramping capability fail to reflect the full value, and therefore will provide inadequate compensation to unlock the full potential of storage. PJM’s frequency response market, which rewards storage for being able to respond faster and more efficiently than gas, is the type of policy initiative that can open new opportunities for stor-

26. Software as a Service (“SaaS”) is a software distribution model in which a third-party provider hosts applications and makes them available to customers over the internet. SaaS is one of three main categories of cloud computing, alongside Infrastructure as a Service (“IaaS”) and Platform as a Service (“PaaS”).

27. See Energy Storage Ass’n, *Transforming the US Electric System: The Role of Energy Storage* 3 (Oct. 27, 2016), <https://www.law.gwu.edu/sites/www.law.gwu.edu/files/downloads/Energy-Storage-Presentation.pdf>.

28. See *id.* at 6.

29. *Id.* at 13.

30. *Id.* at 8 (citing Rocky Mountain Institute). See, e.g., Garrett Fitzgerald, James Mandel & Jesse Morris, *The Economics of Battery Energy Storage* 5 (Rocky Mountain Inst., Oct. 2015), [www.rmi.org/Content/Files/RMI-TheEconomicsOfBatteryEnergyStorage-FullReport-FINAL.pdf](http://www.rmi.org/Content/Files/RMI-TheEconomicsOfBatteryEnergyStorage-FullReport-FINAL.pdf).

age. State procurement targets for storage can contribute to growth of the industry, but may also unintentionally cap the amount of storage a state is willing to adopt. Markets and procurement policies need to be re-evaluated around performance and performance-limitations and focus on the value delivered.

Today, no other commodity has as little storage as the electricity industry. Although storage has been elusive in the past, as the array of energy storage technology continues to advance, it will have an increasingly larger role in the U.S. electric system. Energy storage is not a substitute for existing technologies, but rather a technology that offers new capabilities and enables transformation.

## Luncheon Keynote Speaker

### *Jeffrey Taft, Chief Architect for Electric Grid Transformation, Pacific Northwest National Laboratory*

Dr. Jeffrey Taft presented on the technical and design challenges involved in adapting the North American electric grid to 21st-century needs, especially as grid operators incorporate new technologies such as DERs, advanced metering infrastructure, and storage.

Grid architecture is a set of rules that create a structure, necessarily imposing boundaries on a system. Historically, the structure of the electric grid was much simpler; generation was primarily centralized, automation was low, and, primarily, power moved from generators to consumers.<sup>31</sup> Presented as a blueprint, the structure of the grid then could be visualized as a sort of one-way street—with generation at one end and distribution at the other end. Today, in contrast, a modern electric grid is more like a network. The complexity of the grid is akin to a tapestry, where pulling a thread at one point can send ripple effects throughout the structure.<sup>32</sup> It is essential to be cognizant of the entire grid, even if the goal is to optimize only a subsystem. As the types and mix of components on the grid are changing, former design principles may no longer make sense. A grid architect's goal, therefore, is to design a structure that meets the needs of a modern electric system. Grid architects can look to the architecture of other complex systems, such as computer networks, for design inspiration.

In addition to creating rules that enable an operationally efficient structure, a grid architect must also design with policy goals in mind. In the 20th-century, the objective was simply to “keep the lights on.”<sup>33</sup> In the 21st century, reliability is still important, but grid operators now must juggle other goals such as flexibility, sustainability, and security.<sup>34</sup> As the number of goals has multiplied, the complexity of the structure of the electric grid must necessarily increase as well. Unfortunately, grid architects do not have the luxury of

starting from scratch but instead must build within and on top of a “legacy” structure.<sup>35</sup>

Specific to the electricity industry, the major challenge for grid operators today is coordinating traditional wholesale markets along with newer markets.<sup>36</sup> More specifically, distributed energy resources, demand response and storage offer new capabilities, but how to manage them effectively to extract their full value is still an unsolved problem. Among the difficulties in designing a structure where these two markets can co-exist efficiently is not knowing how much DER adoption there will (or will not) be in the future. According to Dr. Taft, we are at a fork in the road with three possible futures: Modernization (high-DER penetration and high-automation), Localization (emphasis on local choice and multi-user micro grids), or Business-As-Usual (low-DER penetration and low-automation).<sup>37</sup>

Given this uncertainty, there is no one-size-fits-all structure that will result in the most efficient system. Some of the management issues can be resolved by connecting distribution-level assets through a distribution system operator, rather than permitting the distribution operator to be by-passed.<sup>38</sup> But this is only one piece of the solution. Grid architecture helps to illuminate the interfaces, for example, identifying the need for interoperability standards and areas where cross-visibility is needed.<sup>39</sup> The grid architect's role is to present multiple possible structures and to explain the advantages and disadvantages inherent to each depending on the possible variables on the system.<sup>40</sup>

Whatever the ultimate mix of resources may be, Dr. Taft emphasized that the convergence of systems, e.g., power grids, information and communication networks, financial networks, and social networks, can create new value streams. Recognizing locational value also matters. Furthermore, modernizing the structure of the electric grid does not just shift costs—it can actually reduce integration costs. Instead of envisioning wholesale markets and DER markets as silos that occasionally (perhaps, begrudgingly) have to interact with one another, Dr. Taft recommended structuring them as layers that work together in a “peer-like relationship” to address the varied goals of 21st-century policymakers. When it comes to different resources (base load power resources, intermittent power resources, etc.), each has its strengths and weaknesses. If a grid architect can create a structure that harnesses the strengths of each resource (and minimize its weaknesses), a superior system will emerge. For example, even though intermittent resources may pose challenges to reliability, they can address security and sustainability objectives.

To be sure, the architectural changes that must occur to transition to a modern electric grid that meets both

31. Jeffrey D. Taft, *An Architectural View of Emerging Changes to the Grid* 3–6 (Pac. Northwest Nat'l Laboratory, Oct. 2016), [https://www.law.gwu.edu/sites/www.law.gwu.edu/files/downloads/Keynote\\_Taft.pdf](https://www.law.gwu.edu/sites/www.law.gwu.edu/files/downloads/Keynote_Taft.pdf).

32. *Id.* at 9.

33. *Id.* at 4.

34. *Id.* at 3.

35. See, e.g., Jeffrey D. Taft & Angela Becker-Dippmann, *Grid Architecture* 4.21 (Pac. Northwest Nat'l Laboratory, White Paper No. PNNL-24044, 2015), <http://gridarchitecture.pnnl.gov/media/white-papers/Grid%20Architecture%20%20-%20DOE%20QER.pdf>.

36. See Taft, *supra* note 31, at 14.

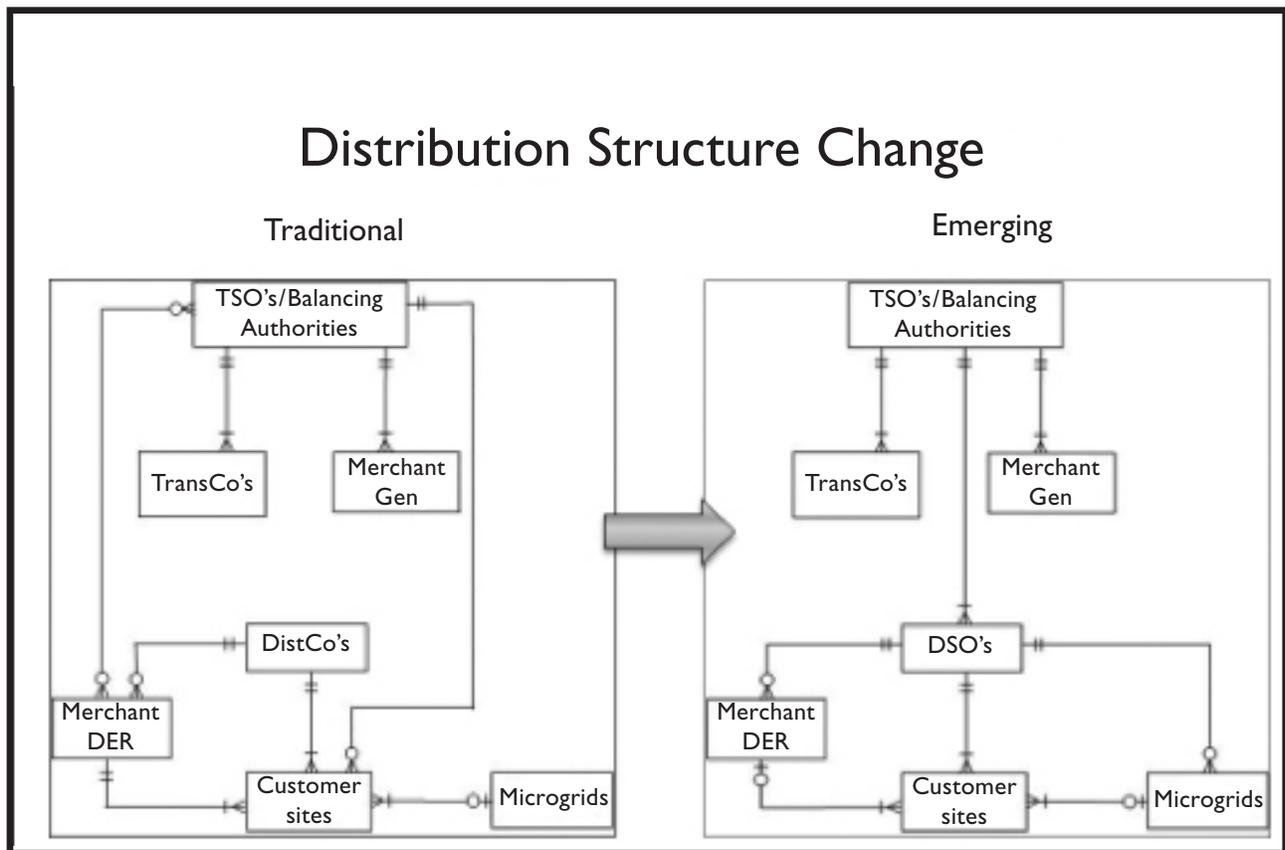
37. *Id.* at 8.

38. *Id.* at 16; see also *infra* Figure 4.

39. Taft, *supra* note 31, at 22–24.

40. See Taft & Becker-Dippmann, *supra* note 35.

Figure 4



physical and policy goals are potentially daunting. Yet, just as new technologies can bring greater complexity, they can also bring greater opportunity. Grid modernization requires consideration of the complexities across the entire grid. By providing a blueprint, grid architects can help enable new opportunities where the electric grid is not simply a “backup” for DERs, but rather a dynamic system that meets modern needs.

### Session V: Federal Initiatives

*Karen G. Wayland, Deputy Director for State and Local Cooperation, Office of Energy Policy and Systems Analysis, U.S. Department of Energy*

Dr. Karen Wayland outlined the many ways in which DOE is actively participating in transformation of the electric system, including through transformation of its own research and development (“R&D”) programs into RD&D programs,

where the additional “D” is demonstration. This step helps companies move through the trough between concept and commercialization. Advanced Research Projects Agency—Energy (“ARPA-e”) is an example of how DOE has been helping the private sector move forward.<sup>41</sup>

DOE’s publication, “Revolution Now,” provides annual updates on key energy statistics.<sup>42</sup> The 2016 edition documents significant cost reductions in wind, LEDs, and other technologies that are benefitting consumers, some of which stem directly from the work of DOE, including ARPA-e.<sup>43</sup>

Another example is DOE’s loan guarantee program, which supported the first five utility-scale PV projects.<sup>44</sup> That proved the technology, such that subsequent projects were able to proceed with private funding. And the loan guarantee program is making money for taxpayers. But DOE’s work is not all renewables. It has also spent a lot of time on grid con-

41. See *ARPA-E: Changing What’s Possible*, U.S. DEP’T ENERGY: ADVANCED RES. PROJECTS AGENCY—ENERGY, <https://arpa-e.energy.gov> (last visited Feb. 24, 2017).

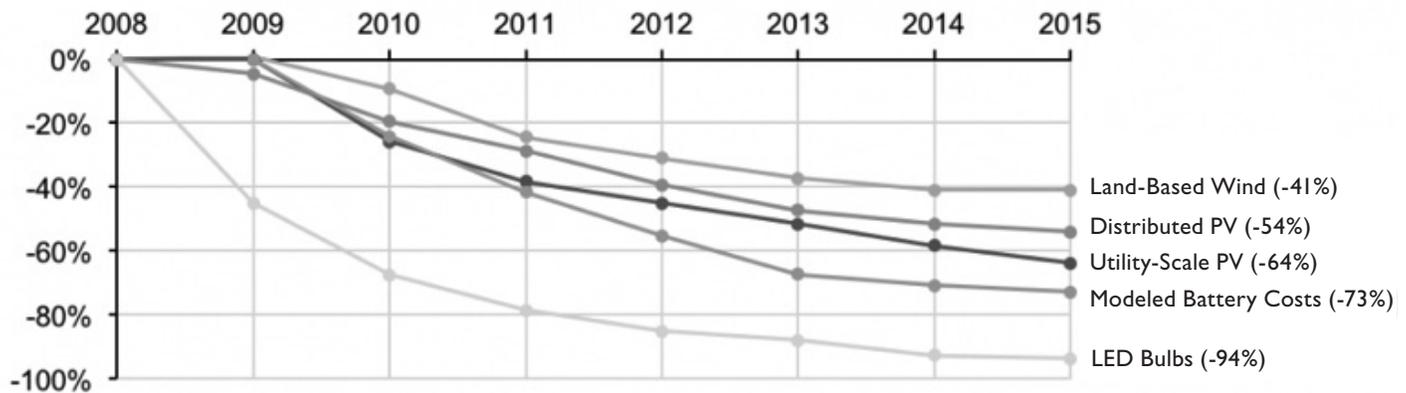
42. See U.S. DEP’T OF ENERGY ET AL., *REVOLUTION . . . NOW: THE FUTURE ARRIVES FOR FIVE CLEAN ENERGY TECHNOLOGIES—2016 UPDATE* (2016), <https://www.energy.gov/sites/prod/files/2016/10/f33/Revolution%20Now%202016%20Report.pdf>; see also *infra* Figure 5. The excerpted graph was not included in Ms. Wayland’s presentation; she did not utilize slides. However, because her remarks included reference to the cost reduction statistics documented in *Revolution . . . Now*, the figure was added to further illustrate her point.

43. See *infra* Figure 5.

44. See U.S. DEP’T ENERGY, LOAN PROGRAMS OFFICE, *Powering New Markets: Utility-Scale Photovoltaic Solar* (2015), [https://energy.gov/sites/prod/files/2015/02/f19/DOE\\_LPO\\_Utility-Scale\\_PV\\_Solar\\_Markets\\_February\\_2015.pdf](https://energy.gov/sites/prod/files/2015/02/f19/DOE_LPO_Utility-Scale_PV_Solar_Markets_February_2015.pdf).

Figure 5

## Cost Reductions Since 2008



trols. Southern Co.'s new Vogtle nuclear units and its Kemper project, which uses an integrated gasification combined cycle ("IGCC"), both included DOE funding.

DOE's next step is to move from silos of excellence (in solar, nuclear, energy efficiency, etc.) to projects that look across the industry, including grid modernization. Under Mission Innovation,<sup>45</sup> which President Obama announced in Paris in November 2015, DOE received funding for a number of new initiatives, including \$110 million for Regional Clean Energy Innovation Partnerships.<sup>46</sup>

The first installment of the Quadrennial Energy Review ("QER"),<sup>47</sup> released in April 2015, engaged participants from across the administration to examine reliability and resiliency. The report addressed transmission, distribution, and storage, but it's wider than that. Digitization and convergence must be considered. Electric and communication systems are also intertwined, with few differences between the systems. It is critical to look across systems to ascertain values, including those that result from convergence. There is also a growing overlap between distribution and wholesale. The QER illustrated the importance of a new emphasis on coordinating goals across systems. (Ms. Wayland noted at the conference that the second installment of the QER was scheduled for release in January 2017, and it has since been released).<sup>48</sup>

*J. Arnold Quinn, Dir., Office of Energy Policy & Innovation, Federal Energy Regulatory Commission*

The boundary between federal and state jurisdiction is increasingly blurry, yet interactions between the wholesale and retail markets are important, particularly in the

three areas of visibility, coordination, and valuation and market opportunities.

Visibility, coordination, and valuation are linked, as valuation rises when the resource is visible and can respond to the regional transmission organization ("RTO"). Currently, there is little visibility of DER, with most DER showing up only as a change in net load. The value of DER to the wholesale market will depend on penetration and the ability to monetize the value in a manner that is commercially viable. There is also a need to look more closely at the interaction of DER and wholesale markets, including the reliability implications (both for operation of the wholesale market and the DER), whether it is aggregators or distribution utilities who facilitate DERs' participation, and potential coordination issues if the distribution utility is by-passed. The California ISO has been particularly proactive on the topic of integrating distribution resources in the wholesale market.

Arnold Quinn also noted that we do not have the luxury of stopping market operations and doing a redesign. We need to work on areas where mutual federal and state interests can result in conflict, without disruption to on-going market operations. He acknowledged that there are tensions regarding state preferences for certain types of resources, which may conflict with existing capacity markets. Conversations in the Northeast are among the efforts to bridge differences. Further, states can and do participate in FERC proceedings, including through regional organizations such as the Organization of PJM States, Inc. ("OPSI").

*Gerry Cauley, President and CEO, North American Electric Reliability Corp.*

Gerry Cauley also addressed the impact of DER on the existing system. He noted that as we go forward, the effect of operations at the distribution level on reliability will require greater consideration, and to the extent DER seeks to participate in the bulk electric system, it may need to be regulated.

45. See, e.g., Press Release, The White House, FACT SHEET: President's Budget Proposal to Advance Mission Innovation (Feb. 6, 2016), <https://obama.whitehouse.archives.gov/the-press-office/2016/02/06/fact-sheet-presidents-budget-proposal-advance-mission-innovation>.

46. *Id.*

47. The QER is available for download: *The Quadrennial Energy Review (QER)*, U.S. DEP'T ENERGY, <https://energy.gov/epsa/quadrennial-energy-review-qer> (last visited Feb. 24, 2017).

48. See *id.*

But, as illustrated in his presentation, NERC has many areas of concern to manage. NERC is an international organization, with responsibilities across North America, reflective of the interdependence of the North American systems. NERC's reliability standards are implemented and enforced through FERC in the U.S.<sup>49</sup> In Canada, NERC has reliability agreements with each of the eight provinces, with each province having reliability responsibilities. It has also worked with Mexico, which is trying to modernize its system.

Grid reliability is an enabler. Similar rules and standards are important because they are the foundation to a fair and stable system that encourages investment and enables achievement of economic and environmental goals.

Citing to Dr. Malcolm Sparrow, author of *The Regulatory Craft: Controlling Risks, Solving Problems, and Managing Compliance*,<sup>50</sup> Mr. Cauley noted the importance of fixing small things as you find them, not waiting for a catastrophic event. NERC collects and studies data for early detection of problems. The potential for human error and the complexity of the system are among the difficult areas it must manage. But, their data shows that over the last five years, the top ten grid events were weather events.<sup>51</sup> So, should NERC be focused on standards for withstanding weather events? Weather events are among the many challenges NERC must balance.

The system can be thought of as operating on a "reliability balance sheet." When a resource is removed from the system, the compensation for that resource must be assessed. As we shift the resource mix, reliability can be adversely impacted. Texas, for example, hit a point at which it was only one event away from a collapse due to a lack of the stability that coal or nuclear facilities provide. In August, California wildfires caused a significant amount of solar capacity to trip off line, creating a different type of grid disruption. The Aliso Canyon gas leak created a strain on the gas-fired capacity in California, underscoring the interdependence of the gas and electric systems. NERC continues to try to identify and address emerging issues such as these before they become critical issues.

But it must also remain aware of the extreme events. The success of the attack on the Ukrainian grid, ransomware attacks, and the recent denial of service attack are all of concern. As the internet of things expands, there is more susceptibility to coordinated attacks such as these. One basic defense strategy is to try to limit the number of outward-looking access points on the grid and increase detection efforts. NERC is doing test procedures, including at the local and regional levels, to better manage these risks.

\*\*\* At the end of the federal initiatives session, the moderator, George ("Chip") Cannon, Jr., Partner, Akin Gump Strauss Hauer & Feld LLP, asked the commentators to fur-

ther address the jurisdictional issues that had been touched on in their presentations, including whether it was time to "revisit" the Federal Power Act. Mr. Quinn pointed out that even under recent cases affirming FERC's exclusive authority over market rules for demand response and capacity markets, the decisions were narrow and states have a significant role that was preserved. Thus, he saw no need to try to rebalance. Mr. Cauley saw the system as already providing flexibility, and thought it better to focus on specific issues as they arise. But Dr. Wayland pointed out that uncertainty can be a deterrent to investment, and more discussion around the jurisdictional boundary is needed. All, however, found value in more interaction across jurisdictional boundaries, whether through participation in FERC proceedings, under the convening power of DOE, or in direct discussions with regulators.

## Session VI: Consumer Perspective

*John Howat, Senior Energy Analyst, National Consumer Law Center*

John Howat expressed concern that in the push to transform the energy industry, small commercial and residential consumers are not being considered, and the impact these changes could have on them is not always going to be positive.

Most consumer protection advocacy in the energy sector is at the state level. Small commercial and residential consumers do not have a voice with regulatory agencies like FERC. FERC should have an Office of Consumer Advocate that is specifically devoted to looking at the interests of consumers who are not presently represented, he argued.

The big proposals for changes to the energy market may be necessary investments that are expected to have a positive long-term impact, but the short-term effects must be given more weight. It is important to keep in mind that people are always going to need energy, and that not everyone can afford the high rates that will come with new infrastructure. Changes like time-varying rates, electric vehicle infrastructures, and solar panels are going to have a large impact on the rates that consumers are being charged, and many people in the U.S. do not have the funds to afford these increased rates.

Further, while some people do want advanced metering infrastructure, solar panels, and other advanced technologies, the desire is not as wide-spread as the proponents of these changes would like to think. Many people only want affordable electricity. If the costs of new technologies are allocated in a manner that adversely impacts affordability, then consumer protection advocates are going to step in and go against the proposals. Revenue decoupling is an example of a policy that is not favored by consumer advocates.

This is not a stance against innovation. Rather, he stressed, it is as important to be as creative about revising consumer protection policies as thinking about proposals for new investment, changes in rate design, and other big changes of this nature. People should continue to be innovative and try to advance the energy industry, but they need to

49. See *About NERC*, NORTH AM. ELECTRIC RELIABILITY CORP., <http://www.nerc.com/AboutNERC/Pages/default.aspx> (last visited Feb. 22, 2017).

50. MALCOLM K. SPARROW, *THE REGULATORY CRAFT: CONTROLLING RISKS, SOLVING PROBLEMS, AND MANAGING COMPLIANCE* (Brookings Inst. Press, 2000).

51. See *Event Analysis*, NORTH AM. ELECTRIC RELIABILITY CORP., <http://www.nerc.com/pa/rfm/ea/Pages/default.aspx> (last visited Feb. 22, 2017) (showing a list of major weather events impacting the grid).

be consumer-friendly when making these changes. As long as different groups can be collaborative, then consumer protection groups will not be opposed to these policy changes and progress should still be possible.

### **Closing Session: Reactions, Insights and Conclusions; Panel-Led Audience Discussion**

The discussion portion of the program was led by a panel consisting of Gregory K. Lawrence, Shareholder, Greenberg Traurig, LLP; Diane Munns, Senior Director, External Affairs, Environmental Defense Fund; Daniel J. Oginsky, Executive Vice President and Chief Administrative Officer, ITC Holdings; and Chris Villarreal, Dir. of Policy, Minnesota Public Utilities Commission, moderated by Donna Attanasio.

The panelists were asked to provide their top “take-aways” from the day’s discussion and then the floor was opened to discussion amongst the panelists and the audience. The topics touched upon were wide-ranging. The panelists all agreed that there are many issues that need to be addressed, and there is a good amount of consensus on what these issues are, however solutions remained elusive. Some of the elements that demand priority attention were identified as distribution planning, valuation of distributed energy resources (including locational value), grid modernization, and consumer satisfaction. There was also a general consensus that solutions require a collaborative approach, outside of a contested proceeding. There were also uncontested points made that private investment will be critical, and requires a stable regulatory approach with clear rules; and that state regulatory bodies need additional resources in the form of R&D and expertise, which could be a productive role for the federal government.

There also seemed to be a general consensus that while it would be ideal to build and implement a model for a reformed system that incorporates operational, market, and regulatory solutions to the identified problems, there are too many different issues, priorities, and regional variations for a single solution. While large and converged systems can unlock more value, they are also more complex.

The jurisdictional issue surfaced and resurfaced repeatedly across many of the points of discussion, but particularly in the context of how a model reformed system would be developed, given the unclear boundaries between federal and state jurisdictional authorities and the differing approaches from state to state. There was a strong preference for letting states try different approaches. Federal planning will likely be necessary, some argued, but a line needs to be drawn to give states room to work things out on their own. Particularly in the absence of a clear or proven path forward, regional variation and experimentation have value and should be continued and encouraged.

Additionally, not all states want the same framework. Some will be committed to market-based solutions and others want to maintain a cost-of-service regulatory structure. There are benefits to both, and there is no clear answer as to

which will work the best. A cost-of-service regulatory structure is more effective for long-term planning and at resolving the tension between long-lead time resources, such as major transmission lines, and shorter lead time resources, such as solar development, which might change or mitigate the need for the longer lead-time investment. But market-based systems can often be more nimble and may better encourage innovative and cost-effective solutions.

There are also technological differences that make any type of standardization difficult. For example, different utilities often have different communication networks, or systems that will react differently to new technology. We need to improve our means of investing in R&D and field testing new technologies to better decide which new investments to make. This will help to more smoothly integrate new resources and new technology, which will in turn enhance the value of the grid. As noted above, a federal role in RD&D that supports state work was viewed favorably.

Allocating cost and risk is another of the significant challenges, particularly given the amount of investment required. Increased collaboration and more expansive conversations, including with participants who have not traditionally participated in regulatory proceedings or other industry activities related to market formation and operation of the electric system, are important to finding the sweet spot that balances the interests of all of the relevant constituencies involved.

Another important area of concern is customer behavior and customer satisfaction, although this also is an area of great mystery. While customer satisfaction as determined through surveys is often cited as a good measure of how well a utility is doing, in reality most customers do not know much about how the industry works or how their electricity is being provided. For example, even if many customers do not care about things like AMI (advanced metering infrastructure), as John Howat had argued earlier, AMI might still be beneficial to customers. So, should the industry be shaped by consumer choices in an open marketplace? Or should utilities and regulators keep a tight rein? Utilities have a history of stewardship, including an obligation to look at the long-term needs of the system, but with increasing options available to consumers, fulfilling that role is becoming more difficult. One panelist expressed the view that it may be impossible to anticipate and plan, given the increasingly active role of customers, and instead all that can be done is to monitor it, do scenario planning and attempt to find the “no regrets” strategy. An alternative view is that the industry can try to “recruit the customer to the resource” using economic signals.

Other issues that were addressed multiple times throughout the day included climate change and the fact that we need to address this quickly, which means we have to get regulation right and get everyone on the same page, as well as addressing grid security issues and preventing cyber threats. Further, the need for consistent and reliable rules that allow for appropriate price signals in the distribution

system, including location value, is a necessary condition to investment.

Renewable energy and the role of government incentives drew diverse comments. It was noted that some corporations are demanding that their utilities invest in renewable resources because the corporations have renewable energy goals. Others utilities are motivated by price or state policies. But, where renewable resources are less economic, utilities seeking to invest in renewables may meet resistance from regulators and other consumers. Further, even if economic, utilities also have to be concerned with overinvesting and stranding their legacy assets. For one utility, its solution was to accelerate the depreciation of its coal assets and reposition itself in the wind market, because wind resources were favorable in price. Other pro-renewable arguments included the stability of wind's "fuel" price as a hedge and its environmental profile. Further, distributed renewables in general do not take long to construct, can be part of a reliability plan, and "customers love it."

Whether the federal or state governments should continue to provide incentives for renewables was more contentious. The importance of investing in renewables as a source of reliable and economic power that is low-carbon was cited as justification for continued government support, with others expressing the view that the role of incentives is only to kick-start the market, and renewables are close enough to grid parity to stand on their own. Overall, no one saw renewables disappearing from the market, even if government support diminished, because of their strong appeal on various grounds, but the continuation of incentives is still important in some markets.

One of the growing areas of concern with renewables is integrating them into planning and operations. Doing this effectively is critical to realizing their value and maximizing their benefits to the system. There seemed to be a general consensus that clean energy is the future, so the industry must be prepared to handle transformation of the generation fleet and the dynamics that will result on the grid. This requires a focus on the transmission planning process as well as distribution system architecture and planning to integrate renewables across the entire system.

Another area of discussion was performance-based utility compensation, with a particular emphasis on the difficulty of identifying and measuring appropriate indicators of performance. Go slowly seemed to be the theme of this discussion. Picking a few performance areas initially with reasonable, measurable metrics was suggested as a starting point. At the beginning, revenue should not be attached to the performance standards, but rather the data should be collected and monitored. This will allow regulators, utilities and other stakeholders to figure out which metrics are verifiable enough to use. After identifying reliable measures, discussions should take place to figure out if some performance areas should get incentives or penalties, or if instead the metrics should just be used to track performance, which can then be published publically.

One risk with performance-based compensation is that the metrics could incentivize utilities to not over-perform when they have already met the metric; that is, it could become a ceiling on performance, rather than the floor. Further, there is a risk that metrics could track the wrong indicator, which could yield perverse results. An alternative to setting a metric is to use yardstick competition, with rewards for "above average" performance, which has the benefit of "floating" as competition raises the bar.

Except for one member of the audience, there seemed to be a general consensus on the continued need for a strong grid, made "smarter" and more flexible. Given the need for investment to create this smarter, more flexible grid, the issue of who should invest and own new assets was also discussed. Utility-ownership can create a concern (perception or real) that the marketplace will be unfair, and that utility ownership will be used to create barriers to entry. Also of concern, perhaps even more so, is the fear that utilities may not provide the most cost-effective or innovative solutions. Competition was seen as very important for inventiveness and creating a network that is receptive to all technology. Competition can also diversify the risk. Bidding was suggested as a means to incorporate competition into redevelopment of the grid, but it can be complicated to compare different types of resources and solutions.

A related issue is that a vertically-integrated, cost-regulated model is structured to reward utilities for being prudent and to discourage risk-taking with rate-payer money. This has created an environment where utilities are used to playing it safe by avoiding risks. Changing that paradigm by throwing them into competitive markets is difficult, but with respect to products where consumers may be able to make choices for themselves, utilities may need to take risks to compete and remain healthy. If utilities are going to be expected or required to compete, however, then regulators will also need to change their outlook.

Others disagreed with the need for utilities to be competitors at all, taking the position that distribution companies should just be facilitating grid transactions. Having utilities solely in the role of the facilitator provides a more stable environment than when the utilities are risk-takers, and a stable environment encourages more vigorous competition among others to deliver value to customers.

Planning was flagged as an important issue that needs to evolve. Regardless of whether the market is competitive or under traditional regulation, it is important that the regulators and stakeholders have a concept of the direction in which they want to go in order to create a platform that people will invest in. However, it is becoming increasingly difficult to forecast, and we may not be appropriately taking into account the new changes that are occurring. Relying too heavily on forecasts creates the risk of over building or underinvesting. On the other hand, we need to establish clear rules in order to get investors to commit their capital. If the grid can send appropriate price signals that let investors know where a particular asset is needed, then people will be able to invest and help enhance the grid.

## Conclusion

The day ended up identifying more questions than answers, but it is clear that collaboration will be the key. Federal regulation will be necessary in some areas, but experimentation by states is beneficial and should be encouraged. Key areas of concerns are maintaining customer satisfaction and modernizing the grid in a manner that is affordable, efficient and robust.

Overall, the panelists and audience seemed optimistic that we will continue to have a robust electric system that will be reliable, resilient, greener, and affordable, if:

- utilities embrace change rather than seek to maintain the status quo;
- there is increased communication and collaboration, across jurisdictions, among states, and across industries (electric, natural gas, telecom) to solve problems as they are identified and to work toward longer-term goals;
- states maintain the flexibility to try new ideas and implement policies based on regional needs;
- the regulatory system (at all levels) recognizes and adapts as needed to encourage and facilitate the implementation of new technologies (including through nimbler use of pilots), new business models, and the important roles of new market participants;
- the industry is encouraged to make necessary system upgrades and changes, while recognizing the impacts on grid security from increased decentralization;
- utilities seek out and invest in programs and technologies that elicit system efficiencies to reduce customer costs, which may include building load through new offerings such as electric vehicles and improved customer communication offerings;
- the industry places renewed emphasis on system planning (in the sense of working toward a unified vision, not a central-resource plan);
- the locational value of resources is better reflected in prices and procurement decisions; and
- the industry tunes into customer desires and recognizes the need to send both opportunities and better prices signals to the customer segment that wants to actively engage with the sector.