U.S. Department of Energy
Electricity Advisory Committee Meeting
National Rural Electric Cooperative Association Conference Center
Arlington, VA
June 20, 2019

Meeting Summary

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Lewis-Burke Associates

JOHN DONLEAVY
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Meeting Summary

This was the second day of the U.S. Department of Energy Electricity Advisory Committee (EAC) June meeting. Mark Manley of Black & Veatch Management Consulting presented on energy storage deployment risk, which set the stage for the panel discussion on risk mitigation for energy storage deployment. The panel was moderated by Laney Brown of Avangrid, Inc. Panelists were Tim Schneider of Tilson Technologies, Morris Schreim of the Maryland Public Service Commission, Matthew Satterwhite of American Electric Power Company, Gerard Fontana of the Boston Fire Department, and Kiran Kumaraswamy of Fluence. The panel was followed by an extensive question-and-answer session. Lola Infante of Edison Electric Institute provided an update on the Energy Storage Subcommittee's activities, work products, and priorities. John Adams of Electric Reliability Council of Texas provided an update on the Smart Grid Subcommittee's activities, work products, and priorities. During public comment, Leland Cogliani of Lewis-Burke Associates and head of government relations for Fermi Lab informed the EAC that National Lab Day will take place on Capitol Hill on July 24, 2019.

Opening Remarks

Michael Heyeck, EAC Chair, welcomed everyone and announced that the meeting was open to the public and being recorded. He noted there would be an opportunity for public comment at the end of the day.

Laney Brown introduced Mark Manley, Manager at Black & Veatch Management Consulting.

Discussion of Energy Storage Deployment Risk

Mr. Manley briefly introduced Black & Veatch, a large engineering company based in Kansas. He provided an overview of energy storage, its benefits, recent market trends, and hot topics, before proceeding to his main discussion of risks. He separated these risks into several areas: company and supplier risk, development and construction risk, equipment performance risk, investment performance risk, innovation and technology risk, and safety and fire risk. Mr. Manley's full presentation can be found on the EAC website.

Panel Session: Risk Mitigation for Energy Storage Deployment

Ms. Brown introduced the panelists:

- Tim Schneider, General Counsel, Tilson Technologies
- Morris Schreim, Senior Commission Advisor, Maryland Public Service Commission

- Matthew Satterwhite, Vice President of Regulatory Services, American Electric Power Company, Inc.
- Gerard T. Fontana, Chief of Operations and Field Services, Boston Fire Department
- Kiran Kumaraswamy, Vice President of Market Applications, Fluence

Mr. Schneider's Opening Remarks

Mr. Schneider said his presentation would focus on the potential risks to consumers of energy storage deployment, particularly related to energy storage mandates. He said he believed storage has the potential to benefit consumers, and defined consumer benefit as low and predictable, with prices broadly distributed across all consumers.

Mr. Schneider said storage can offer value in a variety of ways: energy market arbitrage, peak demand reduction, ancillary services, voltage support, and transmission and distribution deferral. In an ideal world, he said, this value stack provides the business case for the emergent deployment of battery storage. However, for the most part these revenue streams do not reliably exist yet, and even if they did there are nontrivial barriers to optimizing them. He believes value stacking is mostly used to provide a pro-consumer justification for state-level policy interventions.

Mr. Schneider said he is generally optimistic about the ability of regulators and utilities to use competitive procurements to obtain these resources at lower costs in the way they have done with renewables. But the renewables that have been bought over the last decade do not require subsequent management to ensure the promised consumer benefits. In the case of storage, however, to capture the presumed benefits, regulators have an ongoing obligation to monitor a deployment years and decades into the future. This takes place in an existing environment that already presents challenges—imperfect market knowledge, conflicting incentives, and a fluid regulatory environment. Mr. Schneider added that the marginal or absolute value of these technologies degrades over time as the markets change or due to associated risks.

Mr. Schneider continued that his concern is that by attempting to solve all the problems in the value stack, one might not be solving any of them. It is important for state regulators to know which values they are capturing. He thinks the best state policies right now are those that provide clear consumer benefits and deploy storage tactically to solve a specific problem associated with an identified value stream.

Mr. Schneider believes that given the wide diversity of storage technologies, another way to mitigate risk is by obtaining diverse portfolios of storage technologies. Otherwise procurements may end up with the cheapest technology, but not one that is ultimately the most cost-effective.

Last, Mr. Schneider said any state mandate needs to include a parallel regulatory roadmap to ensure storage provides the promised consumer benefits. For regulators, that means having tools to assess value over time. This is something he believes is not currently available.

Mr. Schreim's Opening Remarks

Mr. Schreim began by noting that Maryland has taken many steps to promote energy storage. He described several of the state's tax incentives, programs, organizational memberships, and pieces of legislation intended to encourage energy storage. The state recently created a working group to study the issue. In March 2019, the state held a technical conference examining the regulatory implications for incorporating more energy storage. Mr. Schreim described legislation the state passed to create an energy storage pilot project that launched in June 2019. For Mr. Schreim's full presentation, see the EAC website.

Mr. Satterwhite's Opening Remarks

Mr. Satterwhite said there are seven elements of risk for grid storage development. He stated he would not discuss them all during his presentation, but would attempt to incorporate them into the discussion that followed. Those elements are:

- National security and grid security
- Regulatory
- Legal
- Class warfare
- Technology
- Economic development
- Loss of regulatory control at the state level

For national security and grid security, Mr. Satterwhite said the potential fragmentation of the system that can occur when many actors are adding storage to the grid poses a challenge. There are vulnerabilities when there are so many actors and points of entry. There are additional supply chain risks when most batteries originate in China.

For regulatory risk, Mr. Satterwhite said it is hard for investor-owned utilities to invest upfront in new technologies. He stated there should be a flexible model that allows utilities to practice trial-and-error. He believes it is a positive sign that Florida Power and Light, Duke, and other utilities have invested in wholesale community battery storage.

Mr. Satterwhite concluded by saying storage technology is not just generation. He commented that people are siloed and only see generation, transmission, and distribution separately. He believes there is a missing opportunity for battery storage spanning all areas.

Mr. Fontana's Opening Remarks

Mr. Fontana stated the Boston Fire Department was left out of the regulatory process in Massachusetts for solar installations. His department saw various threats, such as solar farms being placed near liquified natural gas tanks within city limits. His department also realized inverters in houses and other facilities pose a risk. In some cases, the electrical flow to these devices cannot be shut off even in a fire. Adequate water supplies, access to the site, and proper evacuation protocols are all required. Mr. Fontana stated that initially they did not find regulatory language relevant to battery storage, compared to language that exists for propane, fuel oil, natural gas, and normal electrical installations. He pointed out that National Fire Protection Association regulations can take years to come into effect, during which time many systems can be installed.

Mr. Fontana referred to the Boston Fire Department's national training academy that has been built on an island near Boston and will include an active 125-kiloWatt rooftop photovoltaic system. Their facility will also train building inspectors and utility workers.

Mr. Kumaraswamy's Opening Remarks

Mr. Kumaraswamy discussed a 30-megawatt energy storage system for San Diego Gas & Electric. The project is the largest deployed energy storage project in North America, and Fluence is currently working on a 100-megawatt project in Long Beach, California. Mr. Kumaraswamy split energy storage development risks into two categories: technical and market. Technical and commercial flexibility are extremely important to ensure that the project delivers on its lifetime value. Interchangeable hardware and software are critical, and projects will need to be compatible with multiple product generations. On market risk, Mr. Kumaraswamy said there can be a risk related to inaction. Flexibility again is important. He specified several key questions to assess the capabilities of an energy storage solution provider. For Mr. Kumaraswamy's full presentation, see the EAC website.

Questions and Answers

Q1. Ms. Brown asked where the panelists see the maturity of procurement strategy and what best practices there are.

Mr. Kumaraswamy said he sees significant progress. He said it is best to be technology-agnostic and let the market work it out.

Mr. Satterwhite said that as a regulated company, American Electric Power can only do what regulators allow them to do. Batteries offer certain benefits such as addressing congestion, and can later be physically relocated. He suggested there should be more incentives placed on storage for transmission. To have the desired flexibility, he said it is important to encourage utilities to get involved now.

Mr. Schreim said the purpose of Maryland's pilot program is to evaluate different models and determine their impacts and long-term benefits. The state's tax incentives allow for consideration of rebates, which could serve as a bridge during the continuing evaluation of the value associated with different technologies and capabilities associated with battery storage.

Q2. Clay Koplin stated that a battery plus an inverter is a prime mover and that he believed the benefits of a prime mover represent the largest value stream for battery storage. He asked Mr. Kumaraswamy what the true state of the technology is and whether batteries can independently provide full grid services.

Mr. Kumaraswamy said inverters are getting better and better and that grid-forming inverter capability exists today.

Mr. Koplin followed up by saying he hears the answer as no. He said successfully setting up an island microgrid would be a case study for people to learn from.

Mr. Satterwhite commented that the isolated valleys and mountains of Kentucky represent similar situations to the coastal utility (in Alaska) that Mr. Koplin represents.

Mr. Schreim noted the diversity of Maryland's geography and said the value and applications of storage may differ. He praised the EAC as a good model for bringing together diverse perspectives from across the country.

Q3. Christopher Lawrence asked if Mr. Fontana anticipated training non-firefighters at the Boston Fire Department's training facility.

Mr. Fontana said they have a mutual aid agreement with 35 cities and towns. Utilities, as well as local and state building and electrical inspectors, will also have access to the training facility.

Mr. Lawrence followed by asking if this facility is the first of its kind in the country to train non-firefighters.

Mr. Fontana said he believed the first facility was in Texas.

Mr. Lawrence asked whether any knowledge gained from the training facility would inform National Fire Code regulations.

Mr. Fontana responded that the National Fire Protection Association will be involved in developing curriculum for the training facility.

Mr. Satterwhite noted the potential role of battery storage when power lines are required to be shut down due to forest fire risk.

Q4. Dr. Infante asked how to look past the concept of least cost.

Mr. Schneider said he believes there is value in thinking more flexibly about the meaning of least cost. Due to uncertainty, finding the least-cost resource across the broadest range of possible futures may not be the cheapest technology upfront.

Mr. Satterwhite said regulated utilities are not conducting research and development independently sufficient to drive the development of battery storage. Private development of battery storage technologies for private benefit could leave out state regulators and lead to loss of control over comprehensive development of the grid for the common benefit.

Mr. Schreim said Maryland's pilot program takes into account different value streams.

Q5. Darlene Phillips asked Mr. Satterwhite to elaborate on states losing regulatory control. She also asked Mr. Schneider to speak about challenges across state and federal jurisdictions.

Mr. Satterwhite clarified that battery storage technology will develop regardless of regulator involvement, so it is better if regulators are involved to ensure equitable development and deployment.

Mr. Schneider stated that the conversation has not addressed the retail/grid distinction that drives uneven investment. To elaborate on state regulatory control, he said grid operators are often left to react to actions and policies taken by the states. A small number of states can have a big impact.

Q6. Sheri Givens asked panelists if their national associations have created training materials, white papers, or policy statements in relation to energy storage to protect communities and assist first responders.

Mr. Fontana said organizations like the International Association of Firefighters are working toward planning common policy. This type of standardization will help battery storage technology become more mainstream.

Mr. Satterwhite said he does not know what the Edison Electric Institute is doing in that area.

Mr. Schneider said keeping pace with 18-month technology cycles is a real challenge for policymaking.

Mr. Schreim said he is not aware of what the National Association of Regulatory Utility Commissioners (NARUC) is doing in that area.

Q7. Bob Cummings recognized the challenges faced by regulators in trying to evaluate the many uses and configurations of battery storage. He also acknowledged the pace at which regulators must adapt. He had no question for the panelists.

Q8. Delia Patterson asked panelists to summarize the biggest risk for energy storage.

Mr. Schneider said the biggest risk he sees is putting a lot of storage on the system without a clear plan for how to use it. There is a risk associated with inaction, as well, due to the need to comply with state mandates calling for large increases in renewables, which will require large amounts of storage.

Mr. Satterwhite said the biggest risk is not allowing utilities to be proactive, take risks, and occasionally fail. Technologies can exist. but without utility-scale deployment they are not viable.

Mr. Fontana said that for local public safety, the risk is not just the new technology but a new way of doing business. The Boston Fire Department relies on local utilities for information. Private companies installing energy storage do not work with the fire department and do not coordinate with public utilities.

Mr. Kumaraswamy said the key is to build analytic tools and include storage as a resource in all resource planning.

Mr. Manley said incentives drove the growth of solar, and surety of cash flow is critically important to getting projects developed and built.

Q9. Jeff Morris asked Mr. Schreim which risk-reduction model (mandates or risk-sharing) has received more acceptance among commissioners. He asked Mr. Satterwhite if he is aware of efforts to update state-level integrated resource plan (IRP) processes.

Mr. Schreim said their pilot program only launched recently and has not reached conclusions. The four models available within the program allow for different initiatives.

Mr. Satterwhite said IRP requirements often rely on old models or formulas and this is a challenge.

Q10. Paul Cicio said the conversation has not referenced electricity-intensive manufacturers on the wholesale grid. He asked if manufacturing is embracing battery storage.

Mr. Satterwhite said allowing industrial customers to shop for best prices can lead to fixed prices for residential customers. American Electric Power does not want to drive industrial customers away through their rate allocation. He believes storage has the potential to help industrial customers.

Q11. Shaun Mann asked how utilities mitigate the risk of making mistakes in transmission and distribution (T&D) planning by accidentally building too much or too little load.

Mr. Kumaraswamy said the answer may be to overbuild. Battery assets are transportable, which makes them an inventory item.

Q12. Mladen Kezunovic commented that the physical infrastructure for cybersecurity is vulnerable. He had no questions for the panelists.

Mr. Heyeck thanked the panelists and moved to a break.

Energy Storage Subcommittee Update

Dr. Infante, EAC Energy Storage Subcommittee Vice Chair, said the subcommittee recently finished a work product called "Assisting State-Level Implementation, Valuation, and Policy Treatment of Energy Storage" and received DOE comments.

Dr. Infante thanked Ms. Brown for moderating the previous panel on risk mitigation and energy storage and said the subcommittee would decide whether to develop a work product based on the panel or keep exploring the issues.

Dr. Infante said the subcommittee had begun thinking about the scope and process for the 2020 Energy Storage Assessment. The subcommittee would like to begin early to provide DOE with a timely work product.

Dr. Infante outlined potential new work products:

- Reducing the physical and cybersecurity risks of deploying energy storage and other distributed energy resources: technology and practices.
- The value of energy storage in enabling a lower carbon grid.
- Maximizing the value of distributed energy resources: the standardization of interfaces.

Dr. Infante motioned to vote on approval of the subcommittee's *2018 Biannual Energy Storage Review*. The vote passed with no dissent and the review was approved.

Mr. Lawrence said DOE would work to provide a formal response to the review within 30 days.

Smart Grid Subcommittee Update

Mr. Adams, EAC Smart Grid Subcommittee Chair, said DOE had asked the subcommittee to review DOE's *2018 Smart Grid Report* to make recommendations for the 2020 report. Mr. Lawrence thanked the EAC for its quick response to the 2018 report and noted that EAC recommendations will be incorporated into the 2020 report. Mr. Adams asked for approval of the subcommittee's recommendations.

Tom Weaver moved to approve the subcommittee's *Electricity Advisory Committee Recommendations for the 2020 Smart Grid System report*. The motion was seconded and carried with no dissent.

Mr. Adams discussed the priorities developed during the subcommittee's last meeting:

1. Resilience Handbook framework proposal for DOE
2. Recommendations on optimal reserves
3. Panel and recommendations on data analytics, Part I—Impediments to Leveraging PMU Data & Synchrophasors
4. Workforce planning
5. Grid planning with renewables and distributed energy resources
6. State and federal coordination on resiliency projects

Ms. Phillips said state–federal coordination activities might warrant higher priority.

Mr. Heyeck suggested holding a webinar with Mr. Koplin to better understand the situation his utility is facing in Alaska. He recommended webinars as an opportunity for other EAC members to provide case studies.

Joe Paladino said the Office of Electricity (OE) has an effort underway to develop resilience guidance at the state level. Mr. Paladino will share what they are developing and would like to collaborate.

Mr. Paladino said OE also has a project on T&D coordination that they initiated based on EAC feedback. OE would like to cooperate on that as well.

Mr. Paladino continued that OE has a robust initiative with the National Association of State Energy Officials (NASEO) and NARUC on integrated grid planning. It is a 2-year initiative involving 16 states. The initiative examines the current state of forecasting methodology, resource options, and other aspects of the issue.

Mr. Adams said he would like EAC members to take leadership on the priority items.

Representative Morris said that Washington state received assistance on grid planning and distributed energy resources from the National Labs. The Washington state legislature recently passed a distributed energy resources law. He asked Mr. Paladino what the need gap is for states that are not among the 16 states involved in the grid planning initiative.

Representative Morris continued that the need for data analytics and Bayesian algorithms is one of the most pressing needs. He believes data analytics should receive greater emphasis in priority 5.

Representative Morris concluded by saying that all the priorities intermingle. He is troubled by ranking them.

Mr. Adams agreed but said the subcommittee needs to prioritize actions and schedule its activities.

Mr. Weaver said there is already a lot of work in progress for priorities 1 through 3, and pre-work on priority 4. He said priorities 5 and 6 will be informed by the OE/NASEO/NARUC initiative and suggested waiting for results from that effort before continuing.

Kimberly Denbow asked which definition of resilience they will use and pointed out that there is not a general consensus. Ms. Denbow further pointed out that priority 6 is a subset of priority 1.

Mr. Heyeck recommended case studies for priority 6. He also pointed out that different energy infrastructures are interdependent.

Mr. Weaver said he thinks it is important to do case studies in areas that are further behind in adopting new technologies.

Mr. Cummings said NERC has a gas-electric task force that may be useful when considering the interdependence of different energy infrastructures.

Dr. Kezunovic said it is important to understand the different layers of the smart grid: physical components, software and communications, and policies. He agreed with Mr. Heyeck's and Mr. Weaver's comments about case studies and said some case studies should be top-down to reveal the bigger picture.

Ms. Phillips said PJM incorporates gas-electric cooperation. She suggested a webinar to educate the subcommittee.

Mr. Paladino said he will share grid architecture diagrams with Dr. Kezunovic that show the layers of the smart grid.

Public Comment

Leland Cogliani, from Lewis-Burke Associates and head of government relations for Fermi Lab, announced that the next National Lab Day on Capitol Hill is July 24, 2019. The topic will be grid modernization and the event will showcase various technologies under several categories: resiliency, reliability, security, flexibility, and sustainability. The event will include a panel discussion with Paul Dabbar, Under Secretary of Energy for Science, and past undersecretaries.

Wrap-Up and Adjourn

Acting Deputy Assistant Secretary Michael Coe, who replaced Katie Jereza, said he looks forward to working with the EAC. He said he would like DOE to be more responsive to the EAC and improve response time.

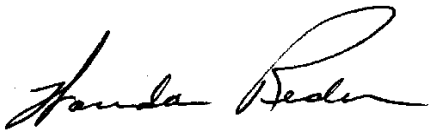
Wanda Reder said she was happy to see members so engaged over the last two days, especially during panel discussions. She thanked all for their participation.

Mr. Lawrence closed the meeting.

Respectfully Submitted and Certified as Accurate,

Michael Heyeck
The Grid Group, LLC
Chair
DOE Electricity Advisory Committee

07/29/2019
Date



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