U.S. Department of Energy
Electricity Advisory Committee Meeting

National Rural Electric Cooperative Association Conference Center

Arlington, Virginia

October 17, 2023

Day 1 Meeting Summary

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Meeting Overview

The Electricity Advisory Committee's (EAC) fourth meeting of 2023 was held on October 17 and 18 using a hybrid format at the National Rural Electric Cooperative Association building in Arlington, Virginia, with the option of virtual participation via the video conferencing platform Webex. On the first day of the meeting, Gene Rodrigues, Assistant Secretary (AS) for the U.S. Department of Energy's (DOE) Office of Electricity (OE), provided an update on OE programs and initiatives. Next, Commissioner Allison Clements of the Federal Energy Regulatory Commission (FERC) provided an update on FERC activities. EAC member and Smart Grid Subcommittee Vice Chair Darlene Phillips led a discussion of the EAC recommendations to DOE, entitled "Urgent Needs to Reliably Facilitate the Energy Transition." Day 1 of the meeting concluded with a discussion on near-term reliability needs moderated by Joe Paladino, Senior Advisor in OE.

All presentations, as well as recordings of the meeting, can be found at https://www.energy.gov/oe/october-17-18-2023-electricity-advisory-committee-meeting.

Welcome, Call to Order/Roll Call, Introductions, and Developments Since the June 2023 Meeting

Jayne Faith, EAC Designated Federal Officer, welcomed attendees, took attendance, covered several housekeeping items, and officially called the meeting to order. EAC Chair Wanda Reder outlined the agenda across both days, welcomed the five new members, and thanked Clay Koplin for assuming the role of EAC vice chair.

Introductory Remarks DOE Office of Electricity

AS Rodrigues said the electric grid is essential to modern life and the reliability of the grid is thus paramount. However, many energy decision-makers do not appreciate the importance of reliability as fully as does the EAC. Without focused, thoughtful, and strategic action on reliability, the country will squander the foundation that was built over the last century because the existing grid must be made ready for the future that is being built in real time. The work and collaboration of DOE and the EAC are vitally important for accomplishing grid reliability. AS Rodrigues welcomed new members and invited questions.

Discussion

Jon Wellinghoff noted that September 2023 was 40 percent hotter (1.47°C) than the average September temperature. Reliability is unquestionably important; however, he sees the reduction of greenhouse gas emissions as the overarching priority for addressing the existential threat of climate change. All reliability decisions should be viewed through the lens of optimizing greenhouse gas emissions.

AS Rodrigues said the reliability of the electric grid is the condition precedent before anything else can be accomplished. OE embraces reliability, resilience, security, and affordability as the key focus of its actions; however, decarbonization, electrification, and environmental justice are co-benefits. His experience convinces him that every elected representative on Capitol Hill recognizes the importance of the reliability of the electric system.

Questions and Answers

Q1. Ms. Reder asked AS Rodrigues to comment on DOE's role in convening stakeholders.

AS Rodrigues sees its convening power as one of DOE's most important tools because DOE's power derives from its influence rather than its ability to dictate stakeholders' actions.

Lauren Azar urged AS Rodrigues to rely on the expertise of the National Laboratories as another of DOE's most powerful tools.

Q2. Ms. Azar said one of the biggest challenges with regard to reliability is that new energy infrastructure is not being built quickly enough. Ms. Azar stated that DOE has jurisdiction over siting and approval of electric transmission infrastructure. Ms. Azar asked for a general timeline for the National Interest Electric Transmission Corridor (NIETC) designation process.

AS Rodrigues affirmed the importance of the National Laboratories. He said new NIETCs are critical for the country. Also important is accelerating the adoption of grid-enhancing technologies (GETs), better grid planning and operational practices, and the reconductoring of existing transmission corridors. OE's role is to advise and support the infrastructure work being done in the DOE Grid Deployment Office, including the NIETC study.

Q3. Andrew Barbeau said that, in addition to the inadequate pace of new infrastructure deployment, workforce limitations are also a limiting factor. Many state energy offices, regional transmission organizations (RTOs), and other entities are consumed by applying for grants and do not have the spare personnel to also think strategically about improving energy planning or addressing other needs. How can DOE help build personnel capacity? Mr. Barbeau also noted that the energy transition will require the aggregation of hundreds of millions of individual actions by energy users and the pace and effort associated with this are not fully appreciated.

AS Rodrigues said issues are too often compartmentalized, including workforce issues. There needs to be a better understanding that the human dimension, not just the technological

dimension, is integral to the modern grid. Beyond economic incentives, rate design, and technological capabilities, there needs to be more focus on the behavioral aspect of the grid.

Q4. Louis Finkel noted that there are major supply chain constraints for poles, reconductoring material, transformers, and other key items. How can DOE use its convening role to help solve supply chain challenges?

AS Rodrigues has been focused on working with the National Rural Electric Cooperative Association (NRECA), the American Public Power Association (APPA), the Edison Electric Institute, and collectively with distribution transformer manufacturers and components manufacturers. DOE has also brought in White House policy staff, the U.S. Department of Commerce, the U.S. Department of Labor, the U.S. Department of Homeland Security, and others. For distribution transformers, for example, they discussed creating component substitution lists to help identify alternative components. He views DOE's work in this area as an ongoing process.

Update on FERC Activities

Commissioner Allison Clements said the grid is composed of aging and outdated infrastructure. Even without the exigencies of the climate crisis and associated extreme weather events, the grid is not adequate for the task of serving the country's needs now and in the future. A rapidly changing and diversified resource mix and evolving cyber and physical threats all add to the challenges of managing the grid. The Federal Power Act provides FERC with broad authority over the bulk electric system, transmission system planning and cost allocation, and market design. The Energy Policy Act of 2005 (EPAct 2005) provides reliability authority under Section 215. Today, however, regulations lag behind markets and the pressing needs associated with grid reliability and affordability.

Commissioner Clements places grid modernization activities on a spectrum from nearest term, lowest cost to furthest term, highest cost. The grid needs a generational investment in new transmission infrastructure; however, decision-makers can take modest actions in the near term to increase capacity. For example, PPL Electric Utilities in Pennsylvania worked with their grid operator to implement dynamic line ratings and save $20 million in congestion costs annually, as well as other savings. FERC has proposed new GETs considerations in its regional transmission planning proposal, which has not been finalized.

In the near and medium terms, FERC has created a strong baseline for utilities related to interconnection policy. It is accelerating the deployment of projects in the pipeline to help replace retiring thermal generation. FERC Order 2023 provides a strong baseline for utilities to move from a serial approach to approving projects to a cluster study approach. It increases the stringency of commercial readiness requirements and site control requirements to ensure that project developers are serious about the projects they submit. Commissioner Clements concurrence in FERC Order 2023 notes that interconnection challenges will not be solved by one

FERC rule and deeper reform is required to continue the progress that FERC Order 2023 started. In particular, there will not be a successful interconnection program until the transmission planning process is fixed. There needs to be a more proactive regional transmission planning process and interconnection processes need to be better aligned with state-level resource solicitations. The Commissioner's concurrence also calls for better facilitating a focused interconnection process.

FERC recently put out a proposal on regional transmission system planning and cost allocation. The last time that FERC took action at this level was 2009–2010 with FERC Order 1000, and it is time for an update. The proposal asked utilities to use scenario-based planning to look forward 20 years and determine needed additions and portfolio projects.

There has been discussion about improving interregional transfer capacity in light of extreme weather events such as Winter Storm Uri and Winter Storm Elliott. Improved interregional transfer capacity is critical for improving reliability. FERC has held a joint task force meeting on the topic with the states.

Discussion

Questions and Answers

Q1. Mr. Wellinghoff asked Commissioner Clements to explain the relationship between FERC and the North American Electric Reliability Corporation (NERC).

Before EPAct 2005, FERC did not have authority over bulk electric system reliability. Following EPAct 2005, FERC established an electric reliability organization (ERO) and chose NERC to fulfill that role. As the ERO, NERC establishes standards based on its own determinations or at the direction of FERC, and FERC approves them. There are also regional NERC entities, some of which line up with the RTOs in which they sit. Findings from the joint FERC-NERC staff report on Winter Storm Elliott were recently shared and the findings overlap with the findings from the joint FERC-NERC staff report on Winter Storm Uri. With regard to system failures during extreme weather events, DOE can use its convening power to bring together stakeholders to find solutions.

Q2. Mr. Wellinghoff asked what FERC's role is with regard to behind-the-meter resources and reliability.

Commissioner Clements hopes there can be closer collaboration between DOE and FERC on these issues.

Q3. AS Rodrigues asked what Commissioner Clements thinks are the top issues that FERC needs to address.

The Commissioner mentioned requiring GETs in a targeted manner or incentivizing deployment appropriately. Section 219 of the Federal Power Act directs FERC to provide incentives for

advanced transmission technologies; however, to date, FERC has not done this. Also, the Commissioner would have FERC address interregional transfer capability.

Q4. Jennie Chen asked where Commissioner Clements believes DOE can best contribute to reliability issues and the clean energy transition.

It would be helpful if DOE could continue to contribute to consistent modeling approaches for interconnection and transmission system planning between and across jurisdictions and utility territories. Commissioner Clements also sees opportunities related to automation as it relates to interconnection. DOE analysis that informs gas-electric interdependencies would also be helpful. The Commissioner said DOE may be able to act on some of the recommendations related to gas-electric reliability challenges developed at FERC's direction by the North American Energy Standards Board. FERC required the development of a heat map for interconnecting utilities that shows customers where there is headroom on the grid. DOE could contribute technical assistance to utilities that want to develop their own heat maps. DOE could assist with modeling extreme weather scenarios that inform FERC's development of reliability standards related to extreme weather events.

Q5. Mr. Barbeau emphasized the inadequate pace of implementation of forward-looking transmission planning and asked what can be done to build planning capacity.

Commissioner Clements referenced the Interconnections Seam Study, the National Transmission Needs Study, and the Atlantic Offshore Wind Transmission Study as very helpful work products developed by DOE. The challenge is integrating the insights and knowledge from those studies into regional planning processes. DOE should continue its efforts to ensure that those studies are integrated into regional planning processes.

Q6. Daniel Brooks asked how DOE and the EAC can help FERC facilitate the improvement of transmission planning processes.

Commissioner Clements noted that planning processes differ by region. Since the failure of standard market design in the early 2000s, FERC has continued with the approach of letting regions have differing planning processes. However, there needs to be a certain level of consistency in planning between regions, including in the modeling used. DOE can contribute to the development of modeling tools.

Howard Gugel noted several of the challenges that transmission planners face, including determining peak load for models that look five years into the future, how to evaluate summer and winter models, and what ratings to use in models when dynamic line ratings are being used. Vastly different tools will be required compared with what has been used in the past.

The Commissioner noted a pending FERC docket on inverter-based resources reliability issues, which will explore some of the issues that Mr. Gugel referenced. The Commissioner views the recent FERC transmission planning rule as attempting to forge a clear path forward in the face of the many uncertainties that have been mentioned.

Q7. Lisa Frantzis said there needs to be better integration of planning for the gas and electric systems and asked Commissioner Clements for her input.

The Commissioner said the Federal Power Act and Natural Gas Act are designed differently and have different intentions. A proposed interstate electric transmission line goes through a robust evaluation process, while there is a less robust process for gas pipelines. The Commissioner affirmed the need to see the interrelationships between gas and electric infrastructure.

Mr. Gugel noted that interconnection studies are complicated because they need to take into account the reliability of services and other factors. Recent events have shown that new resources being connected to the grid are not behaving in the manner predicted by the models, which adds another complicating factor.

EAC Reliability Working Group Recommendations/Vote

Darlene Phillips, the EAC Smart Grid Subcommittee Vice Chair and reliability working group lead, provided an overview of the effort to develop the EAC's reliability recommendations. Ms. Phillips' presentation slides, as well as the final reliability recommendations, can be found on the meeting's webpage (see the Meeting Overview section above).

Discussion

Questions and Answers

Q1. Regarding Finding No. 4, related to immediate reliability needs, "The lack of tight collaboration and communication across federal and state agencies and regulators fails to create an atmosphere necessary to vet solutions to grid reliability issues rapidly." Mr. Gugel said that NERC indicated, in its 2023 risk report, that energy policy is a major risk to reliability. He asked whether Finding No. 4 includes policy.

Ms. Phillips said it is included and that one of the recommendations contained in the report asks DOE to be more proactive in helping to inform policy decisions.

Q2. Regarding Finding No. 5, related to immediate reliability needs, "The industry lacks the communication standards and technology to meet today's need for the global secure data access and sharing needed for real-time situational awareness." Mr. Gugel asked whether adequate cybersecurity for associated communications will be included in the recommendations.

Ms. Phillips said that the recommendation will include cybersecurity considerations.

Q3. Louis Finkel asked why the report does not specifically reference U.S. Environmental Protection Agency (EPA) regulations in relation to resource adequacy. DOE has a recent memorandum of understanding with EPA.

Ms. Phillips said that specifically referencing EPA would raise too many issues and potentially alienate some stakeholders.

Q4. Mr. Finkel asked why load growth is not mentioned in the report.

Ms. Phillips said the issue was removed from the latest version of the report in order to reach consensus.

Tom Bialek said part of the reason the issue was not addressed more fully was to make the report more concise.

Q5. Mr. Finkel asked about the significance of the supply chain not being mentioned in the report.

Ms. Phillips acknowledged that "supply chain" did not make the list of the top five issues of concern.

Q6. Erik Takayesu asked whether the tools referred to in the recommendations include better-integrated planning processes across generation, transmission, and distribution.

Ms. Phillips said the recommendation on developing additional tools is focused on assessing reliability.

Mr. Brooks added that the language in the report's recommendation does not preclude considering better-integrated planning processes as a tool/process that DOE should pursue.

Q7. Principal Deputy Assistant Secretary Gil Bindewald asked how much of the recommendation associated with Issue 1 is about needed tools versus the need for convening stakeholders to reach consensus and share information.

Ms. Phillips said the recommendation is focused on the operation of the grid and the associated analysis and tools.

Q8. Ms. Chen asked whether the language about DOE's role associated with Issue 2 could be expanded to address the interconnection issues identified in FERC Order 2023.

Ms. Phillips said that more analysis is needed before the EAC can recommend actions for DOE in relation to FERC Order 2023.

Q9. Mr. Finkel asked why the reference to the differing capacity factors of generation sources was removed from the current draft.

Ms. Phillips said there was concern that presenting the differing capacity factors could suggest that some resources are not as valuable as others. Also, some members indicated that the capacity factor table presented in previous drafts was misleading and oversimplified.

Mr. Finkel said that the failure to acknowledge the difference between resource types in terms of capacity factor presents them as an "apples to apples" comparison when they are not.

Ms. Phillips pointed out that the subsequent issue in the report discusses the differing reliability attributes of generation resource types.

Ms. Azar emphasized that the capacity factor table had been oversimplified. In the context of an 8760 grid, there needs to be a more sophisticated discussion of resource adequacy. She does not see anything in the language of the current draft that says all resource types are equal. In fact, the recommendation calls for the development of differing accreditation models to help identify the differences between resource types.

Mr. Gugel said the key concept is an "energy for energy comparison." In a scenario where 100 megawatts of base load are being retired, the question is how much equivalent energy in new resources needs to be added.

Bob Cummings said that system operators must balance load and generation every hour of the year and, if a generation asset is removed, the system operator may not be able to balance properly. He pointed out that battery storage cannot provide the same attributes as coal-fired generation.

Q10. Regarding the recommendation associated with Issue 5, Ms. Chen suggested the wording should refer to all technologies, not just new technologies.

Ms. Phillips said that the recommendation refers to new technologies because the working group did not see any issues with the existing technologies.

Q11. Mr. Takayesu asked how the recommendation associated with Issue 5 takes into account assessing risk.

Ms. Phillips acknowledged that the risk component of data access and sharing is important. She noted that the Grid Resilience for National Security Subcommittee may take on the issue.

Q12. Mr. Finkel asked whether the recommendation associated with Issue 5 is calling for DOE to develop mandatory interoperability and performance standards on its own or in consultation with stakeholders, which involves industry consensus.

Ms. Phillips said the original intention was for DOE to develop and propose the standards. However, she is open to the wording that calls for a consultation process. The key issue is that mandatory standards are needed.

Sharon Allan noted that the interoperability standards developed in association with EPAct 2005 had deficiencies because there was not adequate testing to confirm that the technologies being added to the grid were, in fact, interoperable. In considering the codification of any new standards, there needs to be adequate testing as well as data mapping.

OE Moderated Discussion on Reliability

Joe Paladino presented on near-term reliability needs. His presentation slides can be found on the meeting's webpage (see the Meeting Overview section above).

Discussion

Mr. Paladino invited discussion on what issues related to grid reliability may be missing from the list that he provided in his presentation.

Rick Mroz pointed out that state-level policies and incentives related to distributed energy resources are an important driver. He added that markets may be the best mechanism to address that.

Mr. Wellinghoff said the problem with markets is that, even though FERC has jurisdiction over wholesale electric markets, FERC has historically allowed them to be completely different across the country. To make them rational in terms of driving the desired end results, they need to be more uniform.

Mr. Paladino asked EAC members whether they believe there needs to be greater coordination in terms of market design among the states and regions. He asked what DOE could contribute to that effort.

Mr. Wellinghoff said DOE could conduct analysis and studies that show the benefits of more rational and uniform markets.

AS Rodrigues said OE could produce studies that provide guidance on how to improve alignment across markets.

Mr. Finkel pointed out that there are markets on the supply side but not the demand side.

Mr. Wellinghoff said FERC Order 2022 mandates markets for all demand-side resources.

Ms. Phillips suggested that rather than undertaking the monumental task of creating uniform markets nationwide, there could be several top priorities that FERC works to achieve.

Ms. Allan said the issue should not be framed in terms of needing markets. Improved reliability and planning should be framed in terms of their impediments, the strategies to overcome those impediments, and improved coordination.

Ms. Phillips suggested that economic signals and incentives could be better terms than markets because actors will not take action unless it makes sense economically.

Mr. Brooks said there are a number of market redesigns needed to achieve improved grid reliability. In a scenario with an abundance of zero variable cost renewable energy, current market designs do not provide for resources that offer other reliability attributes to the grid.

Dave Herlong pointed out the need for incentives to provide for reliability during extreme weather events and cyber attacks.

Mr. Finkel said rural electric utilities are seeing rapid and major load growth (e.g., in the form of data centers) that, in the context of retiring fossil-based generation, will not be adequately supported by renewables plus storage solutions.

Mr. Takayesu added that electrification of commercial fleets will require significant charging infrastructure to support these vehicles and utilities cannot guarantee fleet operators that the needed infrastructure will be in place. He said current grid operating systems are not adequate to the task. Based on projections of load growth and decarbonization goals, utilities will have to build infrastructure that exceeds existing load levels.

Mr. Paladino asked whether Mr. Takayesu believes FERC understands the investment requirements for meeting the expected load growth and decarbonization goals. He asked how DOE can help inform FERC.

Mr. Takayesu said the challenge is that the existing regulatory process is based on a system of precedence. It is very difficult for utilities to get regulatory approval for spending related to load that does not yet exist.

Chris Ayers said there is not enough distribution system planning, particularly in the context of increasing electrification. He pointed to the National Association of Regulatory Utility Commissioners/National Association of State Energy Officials task force, which DOE convened, as being very helpful in supporting and encouraging increased distribution system planning. A follow-up report which identified best practices that emerged from the task force's efforts would be very helpful.

Mr. Gugel said there needs to be a policy that enables developers to more readily obtain the rights-of-way to build infrastructure. He would look to DOE to identify which agency holds the authority to enable this.

Ms. Reder said that many grid devices and tools do not talk to each other, which poses a major challenge. There is both an increasing number of stakeholders involved in grid operations and an increasing need for communication among stakeholders and grid devices. There is a large amount of education required for stakeholders to understand the pain points of other stakeholders. There is a strong sense of urgency because the demands placed on the grid are increasing and the timeframe for meeting decarbonization goals is compressed. DOE has a major role to play in terms of educating stakeholders, convening stakeholders, and developing tools and analysis.

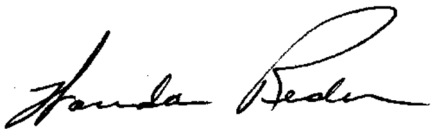
Dr. Bialek said data sharing is critical. For example, transmission planners generally cannot conduct a dynamic analysis and thus they rely on distribution planners for this. There are many models available to work with and there needs to be adequate data sharing among stakeholders to effectively utilize the information across these models.

Concluding Remarks

AS Rodrigues thanked everyone for their contributions and engagement. Ms. Faith adjourned the meeting for the day.

Signature Page

Respectfully Submitted and Certified as Accurate,



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December 27, 2023
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