
**U.S. Department of Energy**

**Electricity Advisory Committee Meeting**

**Hosted Virtually via WebEx**

**October 21, 2021**

# Meeting Summary

PARTICIPANTS

**Electricity Advisory Committee Members:**

SHARON ALLAN
Smart Electric Power Alliance

CHRISTOPHER AYERS
North Carolina Utilities Commission Public Staff

LAUREN AZAR
Azar Law, LLC

TOM BIALEK
Toumetis

JENNIFER CHEN
ReGrid

ROBERT CUMMINGS
Red Yucca Power Consulting

SARI FINK
American Clean Power Association

FLORA FLYGT
American Transmission Company (Retired)

LISA FRANTZIS
Advanced Energy Economy

MICHAEL HEYECK
The Grid Group, LLC

MARIO HURTADO
Luma Energy, LLC

LYNNE KIESLING
University of Colorado-Denver College of Engineering, Design and Computing

CLAY KOPLIN
Cordova Electric Cooperative

BRIAN LIPSCOMB
Energy Keepers, Inc.

NICOLE LOWEN
Hawaii House of Representatives

MONICA MARTINEZ
Ruben Strategy Group, LLC

JAY MORRISON
ElectriCities of North Carolina

RICHARD S. MROZ
Resolute Strategies, LLC

DON PARSONS
Georgia House of Representatives

DELIA PATTERSON
American Public Power Association

DARLENE PHILLIPS
PJM Interconnection, LLC

WANDA REDER
Grid-X Partners, LLC

PAUL STOCKTON
Paul N. Stockton, LLC

RAMYA SWAMINATHAN
Malta Inc.

TOM WEAVER
American Electric Power Company (Retired)

**Registered U.S. Department of Energy, National Laboratories, and Power Marketing Administrations:**

MATT ARONOFF
Office of Electricity, U.S. Department of Energy

GILBERT BINDEWALD
Office of Electricity, U.S. Department of Energy

ADRIA BROOKS
Office of Electricity, U.S. Department of Energy

RAY BYRNE
Sandia National Laboratories

BO CHEN
Argonne National Laboratory

MICHAEL COE
Office of Cybersecurity, Energy Security, and Emergency Response, U.S. Department of Energy

GUENTER CONZELMANN
Argonne National Laboratory

CHRISTOPHER DRAKE
Office of the General Counsel, U.S. Department of Energy

ALI GHASSEMIAN
Office of Electricity, U.S. Department of Energy

CHARLES HANLEY
Sandia National Laboratories

PATRICIA HOFFMAN
Office of Electricity, U.S. Department of Energy

DAVID HOWARD
Office of Electricity, U.S. Department of Energy

HENRY HUANG
Pacific Northwest National Laboratory

SANDRA JENKINS
Office of Electricity, U.S. Department of Energy

DANNY JOHNSON
Southwestern Power Administration

TANYA KHIATANI
Office of the General Counsel, U.S. Department of Energy

CHRISTOPHER LAWRENCE
Office of Electricity, U.S. Department of Energy

STEPHANIE LOCKE
Office of the General Counsel, U.S. Department of Energy

MICHELLE MANARY
Bonneville Power Administration

SCOTT MIX
Pacific Northwest National Laboratory

WHITNEY MUSE
Office of Electricity, U.S. Department of Energy

JOSEPH PALADINO
Office of Electricity, U.S. Department of Energy

MARK PETRI
Argonne National Laboratory

BRIAN PIERRE
Sandia National Laboratories

JOSH SHIODE
Pacific Northwest National Laboratory

BENJAMIN SHRAGER
Office of Electricity, U.S. Department of Energy

MERRIL SMITH
Office of Electricity, U.S. Department of Energy

DAVID WELLS
Office of Electricity, U.S. Department of Energy

CYNTHIA WILSON
Office of Electricity, U.S. Department of Energy

**Registered Speakers, Guests, and Members of the Public:**

MATT ARMSTRONG
Baker Hughes

JACQUELINE AYER
The Acton Town Council

CHRIS BECK
EIS Council

DONNIE BIELAK
PJM Interconnection, LLC

CHRISTINA BIGELOW
Georgia System Operations Corporation

RICHARD BROOKS
Reliable Energy Analytics

CULLIN BROWN
BCS, LLC

LEE BRYAN
International Technology and Trade Associates

DANIELLE BYRNETT
National Association of Regulatory Utility Commissioners

LELAND COGLIANI
Lewis-Burke Associates

STEPHANIE CRAWFORD
National Rural Electric Cooperative Association

PAUL DE MARTINI
Newport Consulting

MIKE HANCOCK
Ansys

BRIAN HARRELL
Avangrid

TERENCE HILL
Passive House Institute US, Inc.

JOHN HOWES
Redland Energy Group

CYNTHIA HSU
Cynthia Hsu Associates

DAVID HUNTER
Electric Power Research Institute

ROGER JENKINS
Lockheed Martin

HEATH KNAKMUHS
U.S. Chamber of Commerce

STEVEN KUNSMAN
Hitachi Energy

MICHAEL KUSER
RTO Insider

DAVID LAMY
GE Grid Solutions

MICHAEL MABEE
Grid Security Now!
U.S. Army (Retired)

SCOTT MCKEE
U.S. House Committee on Appropriations

JUSTIN MEYERS
Nelson Mullins

DANIEL MOLZAHN
Georgia Institute of Technology

ED MONACHINO
RTI International

JEFFREY NELSON
Southern California Edison

MARIE PIENIAZEK
JERA Energy Americas

JASON PLAUTZ
Utility Dive

LUKE ROSE
Malta Inc.

JOE ROSTON
Southern States LLC

SAL SALET
PPL Electric Utilities

AVI SCHNURR
EIS Council

DANIEL SCRIPPS
Michigan Public Service Commission

JAMIE SIMLER
Ameren

DENICE SIMPSON
Ameren

JONATHAN STEWART
National Electrical Manufacturers Association

ELIZABETH STIPNIEKS
E. Stipnieks Strategies

JULIO TOKO
NKT Photonics

MARK UNCAPHER
Fiber Optic Sensing Association

SHANE WEISBERG
RTI International

CAITLIN WILLIAMS
Huntsville Utilities

GIZELLE WRAY
Solar Energy Industries Association

HENRY YOSHIMURA
ISO New England

**Registered ICF/Support:**

DANIEL GRAY
ICF

BENJAMIN STAFFORD
ICF

JASON KERBEN
ICF

SAMIR SUCCAR
ICF

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## Meeting Summary

The second day of the Electricity Advisory Committee's (EAC) October meeting began with an update by Joe Paladino, U.S. Department of Energy (DOE), on Section 8008: Establishment of Voluntary Model Pathways development and was followed by a discussion. Paul De Martini, Newport Consulting, presented about research related to operational coordination among transmission, distribution, and behind-the-meter (BTM) domains. The presentation was followed by a panel and discussion on Federal Energy Regulatory Commission (FERC) Order 2222 and operational coordination. The panel was moderated by Mr. Paladino and panelists included Donnie Bielak, PJM Interconnection; Henry Yoshimura, ISO New England; Daniel Scripps, Michigan Public Service Commission; Jeffrey Nelson, Southern California Edison; and Sal Salet, PPL Electric Utilities. Panel presentations and discussion were followed by subcommittee updates from the three EAC subcommittees: Energy Storage, Grid Resilience for National Security, and Smart Grid. Finally, public comments were made by Michael Mabee, U.S. Army (Retired), and Richard Brooks, Reliable Energy Analytics.

All presentations and recordings from this meeting can be found at https://www.energy.gov/oe/october-20-21-2021-meeting-electricity-advisory-committee

## Day 2 Opening Remarks

Christopher Lawrence, EAC Designated Federal Officer (DFO), opened the meeting and took attendance. Wanda Reder, Grid-X Partners, provided an overview of the day's agenda and, for the benefit of new members, an overview of how EAC work product development, meetings, and subcommittees typically operate.

## Update and Discussion on Section 8008: Establishment of Voluntary Model Pathways Development

Mr. Paladino provided an overview of the legislative mandate and timeline for model pathways development. The model pathways will facilitate DOE's priority of achieving a decarbonized grid by 2035 and developing the pathways will involve defining the following key features: participants' roles and responsibilities, decision/planning processes, supporting analytical methods and tools, and technological requirements. A steering committee deliverable is expected by March 2022. Following his presentation, Mr. Paladino invited questions and comments.

Flora Flygt, American Transmission Company (Retired), said that in the context of reaching the stated goals (e.g., decarbonization), she sees the task as determining what is needed on the transmission and distribution systems, as well as behind the meter, to achieve those goals. The steering committee can then articulate the policies, market mechanisms, and technologies that are needed.

Tom Bialek, Toumetis, noted the importance of not having a step in the process or pathway that simply says, "The magic happens here," without defining what actually needs to be done.

Bob Cummings, Red Yucca Power Consulting, raised the example of the challenges posed by the electrification of long-haul trucking. He noted that there are layers to the problem involving the distribution system, transmission system, capacity issues, and so forth.

Mr. Paladino commented that he sees the decision/planning process(es) as the central feature in developing the pathways. He sees the need for a multi-state regional planning process, something that does not currently exist.

Lisa Frantzis, Advanced Energy Economy, referenced a successful collaborative process undertaken by Arizona Public Services to develop decarbonization pathways. A key feature was having clear and agreed-upon objectives for the group to work toward. She also noted that coordination may be required across multiple regulatory domains. With transportation electrification, for example, coordination will be required between regulators in the transportation and electricity sectors. Ms. Frantzis also encouraged outside-the-box thinking and encouraged the steering committee to not be constrained by the status quo.

Darlene Phillips, PJM Interconnection, said that it would be important to acknowledge the differing decision-making structures that exist among stakeholders, domains, and jurisdictions. For example, with coordination between transmission and distribution planning, it will be important to acknowledge the currently existing decision-making structures, as well as the ways in which those structures may need to change to accommodate additional input to achieve agreed-upon goals.

Lauren Azar, Azar Law, LLC, recommended the foresight process, which works backwards from a desired end state to current conditions and helps reveal what is needed to achieve the desired end state. She noted that many utilities struggle to fully articulate a desired end state because they are so constrained by the status quo.

Mr. Cummings referenced the need for a project management approach and determining what can realistically be accomplished in the given timelines.

Sharon Allan, Smart Electric Power Alliance, said that it may make sense to initially focus on the regional level when developing the transmission model pathway in order to provide a manageable scope to work with. She cautioned that so-called “best practices” may not apply to all regions and jurisdictions, and reliance on a best practices approach can inhibit collaboration. Ms. Allan also noted that several investor-owned utilities in southern states have initiated a discussion on improving coordination for their transmission planning.

Mr. Paladino said that the steering committee will settle on its approach and report back to the EAC on a regular basis. The steering committee will share a deliverable with the EAC in the first quarter of 2022.

Tom Weaver, American Electric Power Company (Retired), said that it will be important to fully understand all factors associated with the issues that the steering committee is attempting to address, even if the steering committee will not attempt to address each of those factors. Without that full understanding, there is a risk of unintended consequences and overlooked opportunities.

Jennifer Chen, ReGrid, asked how the steering committee’s efforts will translate into something that is practical and implementable. She asked whether there would be specific recommendations produced by the steering committee and whether they would be voluntary.

Mr. Paladino affirmed that the steering committee will produce high-level recommendations that identify gaps and may recommend needed policies, and DOE will use those recommendations to engage

stakeholders. DOE will then report back to the EAC on outcomes from that stakeholder engagement and will iterate its efforts.

Andrew Barbeau, The Accelerate Group, noted that the primary audiences for steering committee recommendations will be states, regions, and regulators. He sees four main areas of need based on his interactions with state regulators: (1) What is the full set of issues and factors they should be thinking about? (2) What are other states doing and what are their best practices? Providing states with a menu of options would be helpful; (3) What are the known challenges in these areas? and (4) How do all the factors work together? States often operate in silos and presenting them with a holistic view of the interdependencies would be a big help. Mr. Barbeau also agreed with Ms. Allan that there should be different regional foci and said that it may make sense for there to be differing pathways according to the region. There may be drawbacks to that approach but he sees more benefits in that specificity. Mr. Barbeau emphasized the need to facilitate the efforts of state-level policymakers and regulators rather than dictating what they need to do since that inevitably causes pushback.

Monica Martinez, Ruben Strategy Group, echoed the need to make recommendations practical. She also emphasized the need for participatory justice in order to ensure equitable outcomes. There will not be a one-size-fits-all solution across the regions and jurisdictions.

Mario Hurtado, Luma Energy, recommended mapping the governance models associated with planning processes across regions and jurisdictions. Different governance models may need to be adopted to ensure that the planning processes work more effectively, especially in the context of collaborating across the regions and jurisdictions. Mr. Hurtado also emphasized the need for the pathways, models, and tools to have some level of standardization so that conversations can take place with a common vocabulary.

**Presentation on Transmission and Distribution Coordination**

Mr. De Martini presented on research related to operational coordination among the transmission, distribution, and BTM domains. With regard to distributed energy resources (DERs), he noted that improved operational coordination, which provides a range of services at different tiers of the system, will require a different paradigm than what currently exists. Based on the efforts he has been involved with in the United Kingdom and Australia, Mr. De Martini presented five lessons learned: (1) top-down approaches to determine operation coordination of DER do not work; (2) details matter regarding the specifics of services, performance requirements, and reconciliation of anticipated multiple uses of DER; (3) focusing only on near-term coordination issues risks making poor decisions in relation to the larger and more complex coordination needs later this decade; (4) it is essential to distinguish DER compensation methods from operational mechanisms. They are not the same thing, but are complementary; and, finally, (5) operational coordination includes edge devices and unregulated services to meet customers' needs.

Most DERs belong to customers or operate primarily to serve the individual, not the power system. Any coordination framework needs to address the customer. Mr. De Martini outlined the steps of an Operational Coordination Architecture Method that results in developing a transition plan to move from

the current operational configuration to a more optimal one. Following his presentation, Mr. De Martini invited questions and comments.

*Questions and Answers*

**Q1.** Lynne Kiesling, University of Colorado – Denver, connected the lessons learned presented by Mr. De Martini to Paul Spitsen's presentation from the previous day. She emphasized the importance of thinking in terms of co-optimization models and suggested that it could serve as a good framework for incorporating the perspectives and opportunity costs of the customer.

Mr. De Martini said co-optimization has been the "holy grail" for operational coordination. He referenced a recent project he participated in with ICF for the Ontario, Canada, Independent Electricity System Operator. The project attempted to co-optimize transmission and distribution needs associated with the potential replacement of a substation transformer. Mr. De Martini noted that if bottom-up issues are not reconciled, then co-optimization cannot be achieved. He believes that patterns and opportunities emerge when systems and needs are diagrammed since this can reveal alignment and nodes between the layers in the diagram.

**Q2.** Mr. Cummings lauded the bottom-up perspective that Mr. De Martini proposed for operational coordination. He also emphasized the importance of distinguishing among concepts (e.g., frequency control and frequency response). For fast frequency response, a device can be controlled in terms of set points; however, the device cannot be fully controlled centrally. Rather, it must have the capacity for autonomous action because the required response times are too fast to allow for central control.

Mr. De Martini noted that the Australia Open Energy Networks Initiative referenced in his presentation moved toward the idea of operating envelopes, which was their version of set points. They considered how to align market structures with dynamically changing operating envelopes; however, more research was required. To enable more autonomous operations, Mr. Cummings indicated that market efficiency concepts need to be linked to the operating envelopes concept. He will have more to report in the next year or two.

**Q3.** Richard Mroz asked who would be making those critical decisions. He said there may be policies or regulations put in place that affect currently unregulated entities. He proposed that the Voluntary Model Pathways steering committee take both of those topics into consideration.

Mr. De Martini agreed on the need to rethink the role of oversight for currently unregulated entities participating in the market.

## Panel on Federal Energy Regulatory Commission Order 2222 and Operational Coordination

Ms. Phillips said that the intent of the panel is to discuss how the panelists' organizations have responded to FERC Order 2222, the role they see their organizations playing in relation to the order, remaining challenges to be addressed, and how their organizations plan to move forward. Mr. Paladino added that an important issue to discuss will be how to develop long-term coordination that facilitates optimal functioning of the grid.

**Donnie Bielak** presented on PJM Interconnection's communications model for its DER aggregations (DERA) day-ahead wholesale market. He noted that the market agent will vary across the jurisdictions with which PJM Interconnection operates. Mr. Bielak proceeded to discuss the operations model for the DERA real-time wholesale market, explaining the role of the dispatch agent. Finally, he addressed PJM Interconnection's efforts that are still in progress: collecting as much telemetry as possible, calibrating the geographic size of aggregation, ensuring adequate cybersecurity, and addressing registration data exchange and sensitivity.

Dr. Kiesling asked whether the dispatch agent will also process bids/offers submitted by the DER aggregator, or whether that goes directly to the market agent.

Mr. Bielak replied that the dispatch agent and market agent can be the same entity. They are split up in his presentation slide because they have different functionality. If they are the same entity, then that entity will process the bids/offers submitted by the DER aggregator. If they are separate entities, the bids/offers will go directly to the market agent.

**Henry Yoshimura** noted that the increase in BTM technologies contributes to making net demand less predictable and that a high-DER future will make power flows more variable, bidirectional, and less predictable. Those dynamics will make real-time operations, as well as wholesale and retail market design and regional planning, more complex. He went on to describe ISO New England's three main pain points:

1. A top-down approach to DER participation in markets will be inefficient and unreliable in the context of high DER adoption.
2. Participation of DERs or DERA in wholesale markets likely will be limited.
3. With limited participation, the benefits will likely be low, but the cost of compliance is expected to be high.

Mr. Yoshimura recommended focusing on the development of distribution system operators (DSOs) rather than a top-down approach. Maintaining efficiency and reliability will require that the operation of DERs be managed within the distribution system in which they are located, and the DSO would determine the feasibility of operating DERs in its footprint and coordinate with ISO New England on the economic dispatch of DERs along with wholesale market resources.

Ms. Frantzis noted that Advanced Energy Economy initiated a collaboration between utilities and other private companies to develop a guidance document on how companies can comply with Order 2222 and engage with state-level regulators. That collaboration has also resulted in greater alignment between DER aggregators and utilities.

**Daniel Scripps** discussed several features that make Michigan's electric system unique: (1) Michigan straddles two regional transmission organizations (RTOs)—PJM Interconnection and the Midcontinent Independent System Operator (MISO); (2) the state has a quasi-vertically integrated structure where 90% of power is supplied by incumbent utilities while 10% is served by alternative electric suppliers under retail open access; and (3) Michigan utilities largely divested their transmission assets, meaning that electric transmission service is offered by different companies from those that provide generation and distribution services. He further noted that in 2018, the Michigan Public Service Commission (MPSC) began requiring larger utilities to file distribution plans to better understand how proposed investments

are tied to longer term strategies. MPSC launched MI Power Grid in 2019. Mr. Scripps noted several challenges associated with the implementation of Order 2222:

1. Within Michigan's unique regulatory framework, how can double counting be avoided while also unlocking the full value stack of DERs?
2. How to plan for BTM resources and ensure that they are included in resource adequacy demonstrations?
3. How to anticipate continuing trends and changes in energy markets?

Mr. Paladino asked whether distribution utilities have expressed a need to build out their system to fully enable the participation of DERs in wholesale markets.

Mr. Scripps replied that they had. He referenced transportation electrification and the challenges associated with that. The amount of investment required to modernize the distribution grid is large and presents challenges in terms of customer affordability as well.

Mr. Cummings asked whether MPSC had considered taking integrated resource plans to the next level and incorporating year-round, 8760 planning in order to better understand the capacity and energy requirements.

Mr. Scripps replied that while they do not consider 8760, they do undertake resource adequacy demonstrations that are modeled around peaks. The models go 3 to 4 years out and assist in ensuring that utilities have the resources they need. MISO, which accounts for approximately 90% of the Michigan market, is moving toward an hourly approach for their resource adequacy construct and he believes that they are going in the right direction.

**Jeffrey Nelson** offered insights from Southern California Edison's (SCE) experience as, in part, a distribution utility. In 2016, prior to Order 2222, the California Independent System Operator (CAISO) filed a DER aggregation proposal with FERC. Since its approval, there has not been much interest in the filing because other mechanisms exist that allow for robust DER participation. Following Order 2222, CAISO submitted a compliance filing and received a 20+ page response from FERC requesting additional information. Mr. Nelson enumerated several new considerations that SCE is dealing with in relation to complying with Order 2222, including the need for additional studies that address how to avoid both double payment and double billing.

Mr. Cummings commented that double counting is not strictly a financial issue. If a unit of capacity is sold to an RTO that is not, in fact, available when the RTO needs it, that becomes a reliability issue.

Jennifer Chen asked whether it is possible to have electric vehicle (EV) fast chargers hooked directly to the transmission system, enabling charging at wholesale prices, and whether such a connection could mitigate transmission/distribution coordination difficulties, lack of dynamic retail pricing, and concerns about visibility and overloading the distribution system.

Mr. Nelson said that some entities are already taking that approach within SCE's territory.

**Sal Salet** provided an overview of PPL Electric Utilities' efforts to operate in the context of an evolving, dynamic grid with two-way power flow, including investments in DER management systems (DERMS) and advanced distribution management systems. He also discussed findings from a soon-to-be-published Electric Power Research Institute DER Grid Modernization White Paper, noting that without

careful planning and operations, the growth of DER can significantly compromise grid safety, reliability, and stability.

Dr. Kiesling asked which data privacy practices have been implemented in relation to integrating BTM data into DERMS.

Mr. Salet said their systems and processes have had extensive cybersecurity testing. They do not share customer data with third parties.

Mr. Paladino asked about PPL Electric Utilities' approach to developing a staged strategy for deploying visibility communication and control systems. To get to real-time capability, PPL Electric Utilities will have to understand how much DER exists on the system and the optimal deployment strategy.

Mr. Salet replied that PPL Electric Utilities' approach to real-time visibility is straightforward and involves communicating directly with each BTM device. They use a ConnectDER collar with communications functionality placed at the base of a utility meter. He stated that the only way to get real-time visibility is through real-time communication.

**Subcommittee Update: Energy Storage**

Clay Koplin, subcommittee vice-chair, provided an overview of the subcommittee's efforts over the past year. During the February 2021 full EAC meeting, the subcommittee organized a panel on the integration of energy storage into the bulk power system. Mr. Koplin explained how the May 2020 panel on the electric industry's experience with long-term energy storage and power-to-gas storage led to the June 2021 panel on a zero carbon emissions future through the use of hydrogen, batteries, and natural gas. He summarized the subcommittee's efforts to meet the statutory requirement to produce an energy storage 5-year plan, which entailed a review of and recommendations regarding DOE's Energy Storage Grand Challenge. Mr. Koplin said that the subcommittee will be planning a panel in 2022 that considers the big picture: What does 2030 and beyond look like? How is the state of energy storage and enabling technologies contributing to that goal? And what is the role of EV storage on the grid?

Mr. Paladino referenced embedded network storage, which he described as a system comprised of storage units deployed across a transmission system and potentially located at substations at the interface between the transmission and distribution subspace. With the right capacity and the ability to control the units, the system could be deployed to provide grid services. DOE is investigating the concept.

Dr. Bialek noted the tradeoffs between that type of storage system and a highly distributed form of storage (e.g., at every transformer).

Mr. Koplin remarked that his small, rural electric cooperative has considered embedded network storage and sees potential benefits related to power factor correction, as well as pre-energizing or energizing transmission lines in a black start scenario.

Ms. Chen asked how those types of assets would be funded.

Mr. Paladino replied that costs could be recovered through the rate base but added that more exploration of the area is needed.

**Subcommittee Update: Smart Grid**

Dr. Bialek, subcommittee chair, discussed past achievements and planned future work efforts. The subcommittee has interacted with Mr. Paladino in regard to the Smart Grid Annual Assessment. The subcommittee produced recommendations related to big data analytics and will have further discussions with DOE on the topic. The subcommittee also produced recommendations related to state-federal coordination. Dr. Bialek proceeded to explain how subcommittee discussions related to advanced grid issues merged into the Section 8008 Voluntary Model Pathways effort. He explained that the subcommittee is coordinating with the Grid Resilience for National Security (GRNS) Subcommittee on a resilience metrics work product.

Mr. Mroz noted that many of the issues that the EAC has been addressing over the past year are intertwined and suggested that continuing efforts could be portioned out differently so that one working group or subcommittee is not disproportionately burdened.

Mr. Paladino noted that he has seen a gap in appreciation at DOE in terms of how much the electric grid needs to evolve to meet future needs. He does, however, see an appreciation for the amount of renewable resources that will need to be integrated or the fact that EVs will need to be integrated.

Mr. Cummings referenced the Section 8008 Voluntary Model Pathways scenarios and noted that some scenarios/pathways will intersect. He thinks that the steering committee discussions will help identify those intersections. Capacity and energy are core needs that must be supplied, and he does not see adequate planning to account for those needs.

Ms. Allan said that she often avoids the term “smart grid” because it seems to be plagued by connotations from the 2009 era associated with the American Recovery and Reinvestment Act. She sees a lack of understanding of how interdependent systems and subsystems are in terms of achieving policy goals. Part of the problem is a lack of education.

**Subcommittee Update: Grid Resilience for National Security**

Paul Stockton, subcommittee chair, referenced the Defense Critical Electric Infrastructure work product draft that the subcommittee has produced and said that he has received extensive stakeholder/industry feedback. The subcommittee also will be developing a work product related to black start, especially the cyber resilience of black start capabilities. Rob Lee, subcommittee vice-chair, said that he is nearing completion of a first draft of a work product on grid cybersecurity. The work product will lay out approximately 10 major issues to be addressed, some of which the GRNS Subcommittee will expand on in future work products. He invited EAC members to contact him with any cybersecurity topics they think should be addressed. Mr. Mroz summarized his efforts related to resilience metrics and assessment tools, which will result in an eventual subcommittee work product. He has been working with DOE staff in the Cybersecurity, Energy Security, and Emergency Response office and will have updates for the subcommittee soon.

**Public Comments**

Mr. Mabee asked that the EAC treat the security of the electric grid as a paramount concern. He provided background about attempts by China to hack the U.S. grid and imports of large transformers and smart meters from China for use on the U.S. electric grid. Mr. Mabee also submitted, for the record, a complaint he filed with FERC requesting that the commission take official notice of the October 2021 report from the Office of the Director of National Intelligence, titled *National Intelligence Estimate: Climate Change and International Responses Increasing Challenges to U.S. National Security Through 2040*.

Mr. Brooks said that smaller entities lack the cybersecurity guidance provided by the North American Electric Reliability Corporation's Critical Infrastructure Protection standards, which pertain to the bulk power system. He stated that the U.S. Department of Homeland Security's Cybersecurity and Infrastructure Security Agency Information and Communications Technology Supply Chain Risk Management Task Force has been working with smaller electric and gas utilities through the National Rural Electric Cooperative Association and the American Public Gas Association to develop improved cybersecurity guidelines.

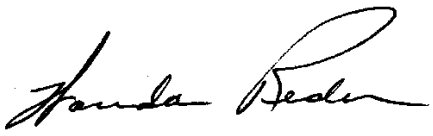
**Wrap-Up and Adjournment of the October 2021 Meeting of the EAC**

Ms. Reder noted the 2022 EAC meeting dates and said that they intend to hold the meetings in person. Ms. Reder thanked Mr. Lawrence for his service as he will be transitioning out of his role as DFO. Mr. Lawrence noted that all presentations will be posted to the EAC website.

The next full EAC meeting will take place March 9 and 10, 2022.

Mr. Lawrence, EAC Designated Federal Officer, officially adjourned the meeting.

Respectfully Submitted and Certified as Accurate,



Wanda Reder

Chair
DOE Electricity Advisory Committee

2/4/2022
Date

Michael Heyeck

Vice-Chair
DOE Electricity Advisory Committee

2/4/2022
Date

Christopher Lawrence

Designated Federal Official
DOE Electricity Advisory Committee

2/4/2022
Date