

Written Testimony of Acting Assistant Secretary Patricia Hoffman
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U.S. Department of Energy
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Subcommittee on Energy
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Chairman Upton, Ranking Member Rush, and distinguished Members of the Subcommittee: I appreciate the opportunity to discuss with you electric reliability issues in a rapidly transforming electricity industry. The issue of grid resiliency is inextricably linked to this vital topic.

The U.S. electricity sector is in the midst of sweeping changes. Looking ahead, I see little reason to expect that this process will slow down or that we will reach some new equilibrium anytime soon. Accordingly, I think the fundamental challenge now is to understand this process and manage it, so that our Nation's electric infrastructure remains reliable, affordable, and resilient.

The mission of the Office of Electricity Delivery and Energy Reliability is to develop innovative, cutting-edge solutions. The Department leverages the technical capabilities of the National Laboratories to focus on early-stage research and transformative projects.

Our organization also is on point for providing energy-related expertise to FEMA and the Administration as part of our emergency response activities. We have been actively engaged in the response and recovery efforts for Hurricane Harvey and Hurricane Irma.

Actions that the Department has taken in support of the whole-of-government response to these major disasters include: deploying 23 people in support of state emergency operations centers, regional and national response coordination centers (FEMA); authorized up to 5.3 million barrels of oil for exchange from the Strategic Petroleum Reserve; supported state and regional fuel waivers under the jurisdiction of EPA; and hosted coordination calls with DOE and response personnel in the electric sector, oil and natural gas sector and state energy offices.

Exploring Key Issues

The Administration's priorities are focused around innovation, regulatory reform and infrastructure investments. Our organization has been developing innovative solutions to address transmission permitting issues, improved visibility and coordination. We all know that the issues affecting the grid are complex, have regional variations, and lack simple answers.

Over the last several months, DOE staff—led by my office—have explored issues central to protecting the long-term reliability and resiliency of the electric grid. We are seeking to inform

policymakers of facts and trends in the electricity sector, and provide a common focal point of discussion for all affected stakeholders.

We have been particularly focused on three issues:

- The evolution of wholesale electricity markets, including the extent to which Federal policy and the changing electricity fuel mix affect grid reliability;
- Whether wholesale and capacity markets are adequately compensating attributes such as on-site fuel supply, storage and other factors that strengthen grid resilience; and
- The extent to which regulations and legislation affect early retirement of baseload generation plants.

Critical Issues

There are several critical issues central to protecting the long-term reliability and resiliency of the electric grid:

- Changing circumstances are challenging electricity markets. While centrally-organized markets (managed by regional transmission organizations, or RTOs, and independent system operators, or ISOs) have achieved reliable wholesale electricity delivery with economic efficiencies in their short-term operations, changing circumstances are challenging the ability of both centrally-organized and, to a lesser extent, vertically-integrated markets to sustain these efficiencies over the long term.
- Markets recognize and compensate reliability, and must evolve to continue to compensate reliability, but more work is needed to address resilience. While reliability is important, recent disruptive events such as the Polar Vortex, Superstorm Sandy, and other major disruptions that have cascading impacts on other sectors demonstrate the critical need for improved system resilience. Markets are beginning to recognize and compensate resilience-enhancing resource attributes, including fuel assurance. More work is needed to ensure a resilient grid.
- A major contributor to coal and nuclear plant retirements has been the economic advantages of natural gas-fired generation (i.e., low fuel prices and efficient new designs for generators). Three additional factors have contributed to the retirements: low electricity demand; the low operating costs of variable renewable energy (VRE) resources, which leads to their being dispatched before baseload resources; and the cost of new investments needed to keep existing plants in compliance with regulatory requirements.
- Evolving market conditions and the need to accommodate VRE resources have led to the need for increased flexibility in the operation of generation and other grid resources. Some generation technologies originally designed to operate as baseload were not

intended to operate flexibly, and in nuclear power's case, do not have a regulatory regime that allows them to do so.

Of particular interest to me is the glaring need for a new focus on energy system resilience. The changing resource mix, recent severe weather events, and the dynamic nature of grid technologies—including changes on the demand side—are bringing grid resilience to a new, more prominent place in the discussion. Specifically, as we keep one eye on day to day reliability as well as resource adequacy, we must also begin to incorporate resilience into the discussion. Weather events such as the Polar Vortex or Hurricanes Harvey and Irma are stark reminders of the need to have a bulk power system that can withstand stresses and recover from them quickly.

As Secretary Perry has noted on numerous occasions, America is blessed to have the incredible energy systems and resources we have today. The millions of dedicated men and women who work in the electricity industry and supporting functions do a tremendous job, and they should be recognized for their dedication and success.

Transmission Regulatory Reform

Over the last several years DOE has led Federal government actions to improve the siting and permitting of electric transmission infrastructure development. Our efforts include creating a process by which DOE acts as lead for coordination of timely agency review of electric transmission projects requiring multiple Federal authorizations as required by section 216(h) of the Federal Power Act.

DOE's Integrated, Interagency Pre-application (IIP) Process Final Rule went into effect on November 23, 2016. The IIP is intended to improve early project planning through a simplified two-meeting process that is voluntary with timing driven by the transmission developer(s). An important strength of the process is that other agencies (Federal, State/Local, Tribal) with authorizations or permit decisions for a proposed transmission project would be invited to participate. This provides a transmission developer an early opportunity to share information about its proposed project with all agencies at one time, thereby reducing redundancy in planning activities on the part of the transmission developer.

The IIP also helps in ensuring that potential issues are identified by permitting agencies before a project proponent files an accurate and complete application, thereby streamlining later review and permitting processes. DOE Transmission Permitting and Technical Assistance (TPTA) intends to bolster the IIP process through guidance and policy in such a way to make the process more appealing to transmission developers and supportive of the goals of effectively and efficiently meeting the reliability and resiliency needs of the nation's electric grid.

Research Innovation

Working with the national laboratories and industry partners, DOE has focused on delivering new technologies for operating, planning, monitoring and protecting the grid. The Department announced Tuesday up to \$50 million to national laboratory led teams focused on resiliency and cybersecurity. All states and regions face challenges as the grid evolves and these projects are

helping move innovative research into practical and timely utilization by the electricity sector, including cooperatives, municipalities and investor owned utilities from all regions of the country.

The awards include:

Grid Resilience and Intelligence Platform – GRIP: The objective of this project is to anticipate, absorb, and recover from grid events by demonstrating predictive analytics capabilities, combining state-of-the-art artificial intelligence and machine learning techniques, and controlling DERs.

Resilient Alaskan Distribution System Improvements using Automation, Network Analysis, Control, and Energy Storage (RADIANCE): The objective of this project is to enhance the resilience methods for distribution grids under harsh weather, cyber-threats, and dynamic grid conditions using multiple networked microgrids, energy storage, and early-stage grid technologies.

CleanStart-DERMS: The objective of this project is to validate and demonstrate at scale a DER-driven mitigation, blackstart and restoration strategy for distribution feeders with integration of applied robust control, communications and analytics layer, and coordinated hierarchical solution.

SASS-E (Safe & Secure Autonomous Scanning Solution for Energy Delivery Systems): Develop scanning methodologies, models, and architectures to transform a network vulnerability scanner widely deployed in the IT space, into a scanner that can be used in the operational space.

Energy Delivery Systems with Verifiable Trustworthiness: Provide a tool to verify the integrity of firmware used in energy delivery system devices, without taking the equipment offline.

DarkNet: Define the requirements for a secure energy delivery control system network that is independent of the public internet, and uses existing but currently unused optical fiber, so-called “dark fiber”.

Conclusion

Secretary Perry and our DOE team look forward to a thoughtful conversation focused on the reliability, affordability, and resilience of the electricity system. I began by noting that the electricity sector is in a period of major change, that the pace of change may be accelerating, and that this process of change may continue indefinitely. The implications are profound: we only have one electric grid, and we are more dependent on it than ever for our economic well-being and national security. The grid must function, and it must function well, in that it must meet a number of competing technical and economic requirements, simultaneously and continuously. This means that we must learn, collectively, to manage this process of change.

To me, managing this process of change means:

- We must think about the grid holistically, as a single, interactive set of policies and components that have to be designed to operate synergistically in order to meet a diverse set of design requirements simultaneously.
- We need to monitor the grid's characteristics and performance routinely and systematically, according to key parameters, so that we will be able to recognize significant change when we see it and respond with appropriate market and policy mechanisms.
- We need to develop more systematic ways of looking ahead – that is, we need periodically to identify a range of future directions in which the grid could evolve, and assess their implications, so that if our current data tells us that the grid is trending in one direction or another, we will know how to respond effectively.
- Finally, managing change will require new processes and practices for collaboration and coordination across the electricity community, including partnerships with the private sector, in order to achieve our shared objectives.

Thank you, and I look forward to your questions.