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U.S. Department of Energy

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Introduction

Chairman Murkowski, Ranking Member Cantwell, and distinguished Members of the Committee, thank you for the opportunity to discuss the issue of grid resilience during the recent cold weather event affecting the Northeast United States. Just two months ago, I testified before this Committee regarding the response and recovery efforts in Puerto Rico and the U.S. Virgin Islands. Secretary Perry and the Administration remain committed to supporting this recovery.

The topic of today's hearing is timely. The resilience and reliability of the energy sector are top priorities of the Secretary and a major focus of the Department of Energy (DOE). In fact, the first study requested by the Secretary was the *Staff Report to the Secretary on Electricity Markets and Reliability* (Reliability Report). The report examined the evolution of wholesale electricity markets, the effect on grid reliability and resilience as it relates to wholesale energy and capacity markets compensating specific attributes, and the connection between regulatory burdens and the retirement of baseload power plants. Many of the findings contained within the study were borne out in recent severe weather events across the Nation.

2018 Deep Freeze

The last several months have been quite demanding of the energy sector. From an extremely active hurricane season to the 2018 Deep Freeze, we have confronted challenges that tested the resilience and reliability of our energy infrastructure in different ways. During the recent cold snap from late December 2017 to early January of this year, the Northeast saw record low temperatures for several days. However, customer outages were minimal.

What was apparent during this weather event was the continued reliance on baseload generation and a diverse energy portfolio. Without action that recognizes the essential reliability services provided by a strategically diversified generation portfolio, we cannot guarantee the resilience of the electric grid. The grid's integrity is maintained by an abundant and diverse supply of fuel sources today, especially with onsite fuel capability. However, the real question is whether or not this diversity will be here tomorrow.

The Need for Resilience

Resilience for our electricity infrastructure has become more important than ever as major parts of our economy are now totally dependent on electricity. Even momentary disruptions in power quality can result in major economic losses. At the same time, we are in the early stages of a large transformation of our electricity supply system, with this process of change likely to continue for many years. Keeping the lights on during this transformation will require unprecedented coordination and collaboration amongst many parties.

Stakeholders are facing multiple, connected issues. With growing asset stress, the integration of increasing amounts of distributed energy resources, growing consumer participation, dynamic markets, increasing cybersecurity and physical threats, and the advent of the Internet of Things, the grid that sustained us for over a century must be designed to ensure reliability and resilience over the next century.

Today, the marketplace—rather than electrical engineering principles focused on building and maintaining a resilient energy system—is driving the design of the system. However, it is clear we need an in-depth understanding of the resilience of our electricity and related infrastructure in order to know how best to either modify existing market structures or build new resiliency standards into the system.

To that end, I propose that DOE undertake a detailed analysis that: 1) integrates into a single North American energy infrastructure model of the ongoing resilience planning efforts at the local, state, and regional level, including interconnections that reach into Canada and Mexico, and 2) fills any gaps and harmonizes any inconsistencies in the various efforts at the local, state, and regional levels. I understand that we currently do not have funds appropriated for such a task, so I am taking this opportunity to make my position clear: I believe building this resilience model should be the top priority for DOE's Office of Electricity Delivery and Energy Reliability over the coming years.

To address challenges posed by events such as the recent cold snap as well as systemic energy infrastructure issues, it is critical for us to be proactive and cultivate an ecosystem of resilience: a network of producers, distributors, regulators, vendors, and public partners, acting together to strengthen our ability to prepare, respond, and recover. DOE continues to partner with industry, Federal agencies, states, local governments, and other stakeholders to quickly identify threats, develop in-depth strategies to mitigate those threats, and rapidly respond to any disruptions.

Resilience is not a one-time activity but rather a habit. It is not something that can be done in the 24 or 48 hours before an event, and many events occur with little or no notice. Resilience is approaching our energy infrastructure with long term planning in mind, understanding the future benefits resulting from investments made today.

Ongoing DOE Resilience Activities

Another way DOE is working toward a more resilient grid is through our Grid Modernization Initiative (GMI). Last fall, we announced awards of up to $32 million to DOE's National Laboratories to support early stage research and development of next-generation tools and technologies to further improve the resiliency of the Nation's critical energy infrastructure, including the electric grid and oil and natural gas infrastructure.

Seven Resilient Distribution Systems projects awarded through DOE's Grid Modernization Laboratory Consortium (GMLC) will develop and validate innovative approaches to enhance the resiliency of distribution systems – including microgrids – with emerging grid technologies at regional scale.

In addition to the Resilient Distribution Systems awards, DOE also announced last year the award of over $20 million to DOE's National Laboratories and partners to support critical early stage research and development of next-generation cybersecurity tools, technologies, as well as building capacity throughout the energy sector for day-to-day operations. The 20 projects supported by this funding are expected to have broad applicability to the U.S. energy delivery sector by meeting their needs in a cost-effective manner with a clear path for acceptance by asset owners and operators.

The Department conducts and participates in exercises to prepare and enhance resilience. Last year, we held the Clear Path V Table Top Exercise in Houston, TX to explore interdependencies between the energy sub-sectors – oil, natural gas, and electricity – and the communications sector. The exercise provided a forum for Federal, state, local, and industry stakeholders to openly discuss and identify solutions to issues impacting the Nation's energy infrastructure before, during, and after a disaster.

DOE also participated in the Grid Security Exercise IV (GridEx IV) hosted by NERC last November. The GridEx IV exercise was designed to simulate a cyber/physical attack on electric and other critical infrastructures across North America and to find ways to enhance grid resilience.

The frequency, scale, and sophistication of cyber threats have increased. Cyber incidents have the potential to interrupt energy services, damage highly specialized equipment, and threaten human health and safety. As a result, cybersecurity and resilience for energy systems have emerged as one of the Nation's most important security challenges. This work will require continued partnerships with public and private stakeholders.

Our Cybersecurity for Energy Delivery Systems (CEDS) Research and Development program aligns activities with Federal and private sector priorities, envisioning resilient energy delivery control systems designed, installed, operated, and maintained to survive a cyber incident while sustaining critical functions.

The CEDS program is designed to assist the energy sector asset owners by developing cybersecurity solutions for energy delivery systems through a focused research and development effort. DOE's Office of Electricity Delivery and Energy Reliability co-funds projects with industry partners to make advances in cybersecurity capabilities for energy delivery systems. These research partnerships are helping to detect, prevent, and mitigate the consequences of a cyber incident for our present and future energy delivery systems.

Conclusion

Threats to our Nation's energy infrastructure from a full spectrum of natural and manmade events will persist and DOE is working diligently to stay ahead of the curve. The solution is an ecosystem of resilience that works in partnership with state, local, tribal, territorial, regional, and industry stakeholders to help protect local communities through increased reliability and flexibility.

To accomplish this, we must accelerate information sharing to inform better local investment decisions, encourage innovation and the use of best practices to help raise the energy sector's security maturity, and strengthen local incident response and recovery capabilities, especially through participation in training programs and preparedness exercises. Additionally, DOE has an opportunity, if funded, to integrate local, state, and regional models into a North American resilience model.

Building an ecosystem of resilience is a shared endeavor, and keeping a focus on partnerships remains an imperative. DOE is committed to continue building on its years of coordinating with and fostering vital energy sector relationships with our Federal partners, as well as investing in technologies to enhance security and resilience in order to support industry efforts to respond to, and recover quickly from, all threats and hazards.