

**Written Testimony of Assistant Secretary Bruce J. Walker**  
**Office of Electricity Delivery and Energy Reliability**  
**U.S. Department of Energy**  
**Before the**  
**Senate Committee on Energy and Natural Resources**  
**November 14, 2017**

Chairman Murkowski, Ranking Member Cantwell, and distinguished Members of the Committee, I appreciate the opportunity today to discuss the hurricane response and recovery efforts in Puerto Rico and the U.S. Virgin Islands.

Upon being sworn into my current position as Assistant Secretary for the Office of Electricity Delivery and Energy Reliability (OE) last month, my first order of business was to travel to Puerto Rico and the U.S. Virgin Islands, where I spent two weeks assisting with the response and recovery efforts. It was imperative to see firsthand the destruction wrought by Hurricanes Irma and Maria and to understand how DOE could continue to best assist our fellow Americans.

The mission of OE is to develop innovative, cutting-edge solutions to ensure that our Nation's energy infrastructure remains reliable, affordable, and resilient. In order to fulfill this mission, the U.S. Department of Energy (DOE or Department) leverages the technical capabilities of the National Laboratories and partnerships with key private sector stakeholders to focus on early-stage research and transformative projects.

Our organization is also the lead for providing energy-related expertise to the Federal Emergency Management Agency (FEMA), interagency partners, and the Administration as part of DOE's emergency response activities. DOE serves as the lead agency for Emergency Support Function #12 - Energy (ESF-12) under the National Response Framework and as the Sector Specific Agency for Energy under Presidential Policy Directive 21. As the lead for ESF-12, DOE is responsible for providing information and analysis about energy disruptions and for helping to facilitate the restoration of damaged energy infrastructure.

**Hurricanes Irma and Maria Response**

In early September, Hurricane Irma, the second hurricane to make landfall at Category 4 intensity in the United States this year, swept through the Caribbean and into the southeast United States, causing billions of dollars in estimated damages, millions of customer power outages, and tragically, over 100 fatalities.

Just two weeks later, before Puerto Rico and the U.S. Virgin Islands had recovered from Irma, Hurricane Maria made landfall in Puerto Rico as a dangerous Category 4 hurricane, bringing powerful winds and major flooding that rendered inoperable much of the Commonwealth's

transmission and distribution infrastructure and left virtually all 1.6 million electricity customers on the island without power. According to ESF - 12 personnel on the ground, as of November 9, DOE estimates 43.2% of normal peak load has been restored in Puerto Rico and 27.0% of customers have been restored in the U.S. Virgin Islands. While the percent of peak load metric for Puerto Rico does not indicate customer-level restorations, it is currently the best proxy available to measure progress in this challenging environment.

In the wake of these catastrophic events, DOE has received \$11.7 million in mission assignments from FEMA to provide technical assistance for hurricane response and recovery (Irma: 6 mission assignments, \$2.3 million; Maria: 8 mission assignments, \$9.4 million). The Department has provided personnel to support the National Response Coordination Center in support of FEMA response operations, bilingual public information personnel to provide life safety and life sustaining communications, subject matter experts as part of FEMA's Incident Management Assistance Teams, as well as technical advisors in electrical distribution, transmission, generation, energy efficiency, renewable energy, and related topics to advise the United States Army Corps of Engineers (USACE) on the assessment, planning, and reconstruction of the electrical grid in Puerto Rico.

Twenty-nine DOE responders, including 25 personnel and 10 line-trucks from the Western Area Power Administration, are in the U.S. Virgin Islands to provide mutual assistance through multiple mission assignments from FEMA and DOE has worked to facilitate additional mutual assistance with industry.

In Puerto Rico, DOE has a responder deployed to coordinate with FEMA as well as seven subject matter experts from the Power Marketing Administrations to provide technical support to USACE with restoration planning, cost estimates, validation, and quality assurance.

Additionally, through DOE-funded projects, we are leveraging the expertise of our National Laboratories to develop potential long-term solutions to improve the resiliency of the Puerto Rican infrastructure. I want to assure the Committee that DOE will continue to support the work needed to restore power to the U.S. Virgin Islands and Puerto Rico. And I'd also like to thank all of the utility crews and responders for their dedication and hard work in restoring power.

## **Resilience**

The hurricane season of 2017 serves to highlight the need for a continued and adaptive focus on energy system resilience. The recent severe weather events, changing resource mix, and dynamic nature of grid technologies—including changes on the demand side—are bringing grid resilience to a new, more prominent place in the national dialogue. Specifically, as we keep one eye on day-to-day reliability and resource adequacy, we must also do better to incorporate resilience into the discussion.

As part of a comprehensive effort to reduce the impact of severe weather events, utilities in three hurricane-prone regions invested hundreds of millions of dollars over the last several years to improve their systems, including advanced communicating technologies across their transmission, distribution, and customer systems to mitigate and recover from grid disturbances.

In Florida, while it's difficult to compare storms, during Hurricane Wilma in 2005, more than 11,000 Florida Power and Light (FPL) poles fell or snapped, and 241 substations experienced major damage while close to 100 transmission structures were damaged. However, grid hardening since Wilma limited the damage to less than 1,500 toppled poles, no major damage to substations, and no damage to transmission structures during Hurricane Irma.

In Houston, at the peak of outages 800,000 were without power from Hurricane Harvey, whereas when Hurricane Ike hit Houston in 2008, 2.1 million customers were knocked offline. Some of this dramatic reduction was due to CenterPoint Energy's enhanced physical and remote operational protections to prevent damage at the vast majority of their 250 substations. CenterPoint's investment also built out their capability to safely reroute power around damaged grid equipment to maintain connections for more customers.

The immense challenges that New Orleans faced in the aftermath of Katrina were intensified by electric grid failures. System-wide power outages made it difficult to resume essential recovery activities such as flood control operations, water supply and treatment, transportation, emergency response, and banking. Even Memorial Medical Center had its backup generator fail 48 hours after the storm.

In January 2016, researchers at Sandia and Los Alamos National Laboratories teamed up with the City of New Orleans and other partners through DOE's Grid Modernization Laboratory Consortium (GMLC) to identify grid modernization priorities to minimize the negative consequences to particularly vulnerable communities. The analysis identified the lifeline services that receive greatest benefit from improved power resilience, and subsequently, identified clusters of high-impact infrastructure in those areas that can be served by advanced microgrids.

As a result of this research, the City of New Orleans is now equipped with a prioritization and implementation plan, developed in conjunction with the local utility and community stakeholders, to protect the grid that serves areas of most critical need.

### **Conclusion**

I am grateful for the hard work of DOE's emergency responders in this active and challenging hurricane season. We have made progress, but there is still more to do. Over the next several months, DOE's primary focus in Puerto Rico and the U.S. Virgin Islands will be working with our partners to support the mission of restoring the power grids and critical infrastructure.

Secretary Perry and our DOE team look forward to a thoughtful conversation focused on our response to this season's hurricanes, and on the reliability, affordability, and resilience of the electricity system from hurricanes, as well as other extreme weather events.

Thank you, and I look forward to your questions.