

“Bureaucratic Challenges to Hurricane Recovery in Puerto Rico”

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March 21, 2018

Chairman DeSantis, Ranking Member Lynch, and members of the Subcommittee, thank you for the opportunity to testify. My name is Scott Aaronson, and I am Vice President for Security and Preparedness at the Edison Electric Institute (EEI). EEI is the association that represents all U.S. investor-owned electric companies. Our members provide electricity for 220 million Americans and operate in all 50 states and the District of Columbia. The electric power industry—which includes investor-owned electric companies, public power utilities, and electric cooperatives—supports more than 7 million American jobs and contributes \$880 billion annually to U.S. gross domestic product, about 5 percent of the total.

Yesterday marked the six-month anniversary of the day Hurricane Maria made landfall in Puerto Rico. On September 20, 2017, this devastating Category 4 hurricane swept over the island, impacting all critical infrastructure, including the energy grid. Puerto Rico has 2,400 miles of transmission lines across the island and 30,000 miles of distribution lines with 300 substations. It is estimated that at least 80 percent of the grid was affected by the storm.

As of March 18, the Puerto Rico Electric Power Authority (PREPA) reports that 93 percent of customers—or approximately 1.37 million out of 1.47 million customers—who can receive electricity have had their power restored.¹ While significant progress has been made to restore power, nobody deserves to be without electricity for this long, and EEI and our member companies remain committed to helping our fellow citizens in Puerto Rico.

The Unified Command, consisting of PREPA, the Federal Emergency Management Agency (FEMA), the U.S. Army Corps of Engineers (USACE), and the island’s Power Restoration Coordinator, estimate the date to restore electricity to 95 percent of customers across the island to be March 31; the 90-percent milestone was reached on March 8. Reaching 95 percent restoration in remote areas with mountainous terrain, like Arecibo and Caguas, will take until mid-April and late-May respectively.

The damage caused by Hurricane Maria is unlike anything we have ever seen on the mainland United States, and this power restoration mission is more difficult than other restoration efforts. Hurricane Maria caused historic damage to Puerto Rico’s infrastructure, creating considerable logistical challenges that complicated how crews, equipment, and materials were mobilized.

¹ It is important to remember that there will be some customers who will not be able to receive power due to the severity of damage to their homes and businesses. As of March 17, PREPA reported that current load was 91.6 percent of the average pre-storm load.

My testimony seeks to explain the role that EEI member companies and the industry on the mainland have played in the power restoration mission; enumerate the complexities and challenges on the island; and identify lessons that can be gleaned from this extraordinary event.

Mutual Assistance Is in Our Industry's DNA

Mutual assistance is a cornerstone of electric company operations during emergencies and is essential to contingency planning. Electric companies affected by significant outages often turn to the mutual assistance network—a voluntary partnership of electric companies from across the country and Canada—to help speed restoration whenever and wherever assistance is needed, when it is safe to do so.

Typically, when major natural disasters occur, electric companies utilize the mutual assistance process to increase their workforce. Crews do not arrive automatically; a formal request for mutual assistance must be made by the affected electricity provider. The recipient of the aid pays for it, and companies providing mutual assistance are compensated, at cost, for providing service.

Each segment of the industry—investor-owned, cooperative, and public power—has a mutual assistance network of crews and contactors. This shared responsibility and cooperative spirit are hallmarks of our industry and were on display throughout the historic 2017 hurricane season. All three networks work together to ensure customers, regardless of their electric company's ownership type, have their power restored as quickly as possible.

While there is an understandable urge to compare storms, the reality is that each storm is different and has its own set of unique circumstances and challenges. In this case, juxtaposing the responses to hurricanes Harvey and Irma with the response to Maria in Puerto Rico illustrates the value of mutual assistance and how preparation enables effective restoration. It also demonstrates the need for resilient infrastructure and ongoing investments in the energy grid, the importance of having a plan in place for response and recovery, and the value of a strong industry-government partnership.

Hurricane Harvey

Harvey, a Category 4 hurricane, was the first major hurricane to make landfall in the United States since Hurricane Wilma in 2005. The storm brought historic flooding to southeastern Texas, including nearly 52 inches of rain in some locations, and strong winds in places not impacted by flooding. The daily peak outages during Harvey were around 350,000 customers. However, an estimated 1.4 million restorations occurred throughout Texas and Louisiana due to flooding and the slow-moving nature of the storm.

More than 10,000 electric power industry workers from at least 21 states mobilized to restore power to customers impacted by Harvey. Throughout the storm, affected electric companies coordinated closely with federal, state, and local governments to assess damage and to expedite power restoration, where it was safe to do so. The CEO-led Electricity Subsector Coordinating Council (ESCC)² also held daily coordination calls for industry and government to ensure unity of effort and unity of message around the storm and associated restoration activities.

² The ESCC is discussed in more detail later in this testimony.

During Hurricane Harvey, electric company investments in smart grid technologies helped companies respond faster to major outages. Digital infrastructure, including smart meters, helped companies to identify where outages were occurring. Drones were deployed by companies to speed damage assessment, and real-time water monitors in substations provided an advanced warning of flood threats, which helped to mitigate damage to the energy grid.

Hurricane Irma

Irma, a Category 4 hurricane when it made landfall in Florida, was the most intense storm to hit the United States since Hurricane Katrina. More than 7.8 million customers were impacted in Florida, Georgia, Alabama, South Carolina, and North Carolina at the peak on September 11, 2017. (Before hitting the mainland, Irma skirted Puerto Rico on September 6, leaving more than 1 million people without power.)

More than 60,000 workers were involved in the restoration, coming from more than 250 electric companies across the United States and Canada. This was one of the largest power restoration efforts in U.S. history. That effort resulted in 95 percent of customers being restored within one week. The speed of the recovery was noted by the U.S. Energy Information Administration:

“About 15% of customers were without power at noon on September 10, and power outages peaked at 3:00 p.m. on September 11, affecting 64% of customers. In contrast, Hurricane Wilma moved quickly across the southern part of the state, knocking out power to 36% of customers in Florida. Although the percentage of Florida customers without power during Irma was significantly higher than during Wilma, the rate of electric service restoration has been more rapid. Five days after Irma’s landfall, the share of customers without power had fallen from a peak of 64% down to 18% (a recovery rate of about 9% of customers per day). Power outages during Wilma declined from 36% of customers to 16% by the fifth day after landfall (an average recovery rate of about 4% of customers per day). ...Since 2005, Florida Power & Light and other utilities in the state have made significant investments to improve their hurricane preparedness. These utilities have upgraded electric infrastructure, including replacing wooden utility poles with concrete poles. Utilities have also deployed smart grid technologies, which provide more timely and more accurate information about outages and can help utilities better target restoration efforts.”³

As was the case throughout Hurricane Harvey, EEI and the industry worked through the ESCC to coordinate with the federal government, other segments of the industry, and critical infrastructure operators.

Hurricane Maria

Maria made landfall in Puerto Rico as a Category 4 hurricane with maximum sustained winds of 155 mph. Soon after landfall, President Trump signed a major disaster declaration for Puerto Rico to provide federal assistance with the storm response and recovery efforts. On September 26, the President announced that the federal government would cover 100 percent of the costs associated with debris removal and various emergency protective measures in Puerto Rico for the first 180 days of the response mission. On February 23, the President extended the 100-

³ <https://www.eia.gov/todayinenergy/detail.php?id=32992>

percent cost share for emergency protective measures, including emergency power restoration, an additional 60 days.

In the initial days and weeks after Maria, the government's focus was on damage assessments, life-saving rescues, and medical missions, as well as providing emergency support, temporary power, food, water, and other commodities for devastated communities. At the same time, Puerto Rico Governor Ricardo Rosselló entered into intergovernmental agreements with the governors of New York and Florida, which led to electric power industry subject matter experts, damage assessors, and crews from New York and Florida being deployed to Puerto Rico to conduct damage assessments and assist with the initial response efforts.

PREPA did not make an official request for mutual assistance until October 31, when EEI and the American Public Power Association (APPA) received a letter asking for support on the island. On November 4, PREPA expanded its aid request to include the National Rural Electric Cooperative Association (NRECA).

Since then, EEI, APPA, and NRECA have been working together and with our member companies, PREPA, and federal government partners to support this mission. Companies from across the country have responded to the call for help. Nearly 60 investor-owned electric companies and public power utilities have committed crews, equipment, and/or materials to the emergency power restoration mission.

Following is a brief timeline of the mutual assistance response.

November-December 2017

Within days of receiving the request for mutual assistance, two incident response experts from the electric power industry were deployed to Puerto Rico to assess the situation on the ground. Carlos Torres, who retired from Con Edison in late October as the Vice President of Emergency Preparedness & Business Resiliency, and Manny Miranda, Senior Vice President for Power Delivery at Florida Power & Light Company, arrived in Puerto Rico on November 3. They began assessing storm damage; met with officials from PREPA, FEMA, and USACE; and started to formulate a comprehensive restoration plan for the island.

On November 22, Torres was appointed by Governor Rosselló to serve as the Power Restoration Coordinator to oversee the multi-pronged restoration effort. As a first step, an incident command structure was created that included a command staff based in San Juan. An incident command structure did not exist at PREPA prior to Maria. Incident command structures commonly are used to manage large restoration efforts on the mainland and are essential to effective, efficient, and safe power restoration.

Because mutual assistance plans were not in place in Puerto Rico as they were in Houston and Florida (during Hurricanes Harvey and Irma), the command staff team first had to build operating infrastructure—logistics, coordination, supply chains, housing and food, etc.—before deploying crews. Applying lessons learned on the mainland, the team recommended that PREPA create seven regional incident management teams (IMTs) to expedite the restoration. These

IMTs (see map) arrived in December and continue to work with PREPA to coordinate and support the restoration effort.

This first wave of mutual assistance was designed to enhance the organizational structure and to get needed equipment and materials to the island.



January-March 2018

With the incident command structure and regional IMTs in place and fully staffed, the industry deployed additional crews, equipment, and materials in January to accelerate the ongoing power restoration efforts across the island. Nearly 1,500 additional restoration workers and support personnel from investor-owned electric companies were deployed to the island to work under the direction of the seven IMTs; public power utilities also sent mutual assistance crews.⁴ Nearly 20 barges carried more than 1,000 trucks and other equipment. The arrival of crews from mainland electric companies was the culmination of months of critical—but much less visible—work necessary to make this effort a success.

In addition to sending crews, trucks, and equipment, companies also identified and shipped from their stocks critical materials, including wood and concrete poles, transformers, insulators, wire, and other hard-to-manufacture components. It is important to note that some of the material needed on island was time-consuming to manufacture and the availability of some supplies and materials was strained due to the earlier hurricanes and the wildfires on the mainland.

The deployment of additional crews represented the next phase in the mutual assistance response. With this new wave, the power restoration workforce grew to more than 5,500 and included the resources already working on the island from PREPA's own crews, the contingent of crews from New York who were working as part of the intergovernmental agreement, and crews mobilized under contracts awarded by USACE.

⁴ Overall, approximately 3,000 industry lineworkers and support personnel have been involved in the restoration effort on the island.

As of March 18, 93 percent of customers across the island had their power restored, and we believe that the resources, equipment, and people put in place under the organizational structure helped to accelerate the restoration process and timeline.

The deployment of mutual assistance crews was facilitated by a memorandum of understanding (MOU) agreement that was developed by APPA, EEI, and NRECA. The MOU is structured on existing mutual assistance agreements and allows electric companies on the mainland (that are members of APPA, EEI, or NRECA) to enter into emergency agreements to provide resources and workers to PREPA on a not-for-profit basis. The MOU signed by PREPA and the companies providing mutual assistance also requires that this assistance be provided on a not-for-profit basis.

As of this writing, some mutual assistance crews have finished their mission and have returned to the mainland, while others continue to work to restore power to the people of Puerto Rico. As of March 16, about 900 mutual assistance workers remained on the island. It is common in any restoration effort (in Puerto Rico or on the mainland) for mutual assistance crews to be released at this point in the restoration. The restoration plan ensures that crews now will converge into the hardest-hit areas and that the right number of crews/workers remain actively engaged and continue to work safely and as quickly as possible.

In every single restoration, a point is reached where a substantial amount of work is completed and the amount and type of workers needed to complete the job are reassessed. In many cases, more people simply does not mean that work gets completed faster. This is especially true in Puerto Rico's mountainous regions with their narrow roads, where only so many trucks and so many workers can fit into one space at a time. Access to materials, not the size of the workforce, at times has slowed the restoration, but we have seen a steady improvement in materials being delivered to the island, and the remaining crews are well-positioned to continue making progress.

Again, this deliberate right-sizing of the workforce is typical, and companies continue to rotate in fresh crews from the mainland electric companies. As is the case with all restorations, the final customers are the most difficult and time-consuming to restore; in this case, the terrain on the island is a recurring challenge.

Partnerships: Key to Restoration

A restoration of this complexity and magnitude demands a response to match it. The partnership among our industry, PREPA, and the government has been critical. This is truly one team with one mission, and we are unified in our effort. So, if there is one message that I leave the Subcommittee with today, it is that strong partnerships result in strong response and recovery.

EEI and the industry appreciate the Administration's ongoing support throughout the emergency response mission. In particular, President Trump's extension of the 100-percent cost share allowed crews already on the island to continue working without interruption.

One of our key partners, the Department of Energy (DOE), is the presidentially and congressionally directed Sector Specific Agency (SSA) for the energy sector. DOE has been a

partner with us at every step, and we thank the agency for its role in ensuring unity of effort across government and industry responders.

A key reason for our strong industry-government partnership is the threat to energy grid security and our shared responsibility to protect infrastructure critical to the life, health, and safety of Americans, as well as to our national and economic security. As noted earlier, the ESCC was integral to the effective restoration following Harvey and Irma; it also was essential in the effort to get crews from industry on the mainland to Puerto Rico.

The ESCC is comprised of the chief executive officers of 22 electric companies and nine major industry trade associations, including EEI, APPA, and NRECA. This group—which includes all segments of the industry, representing the full scope of electric generation, transmission, and distribution in the United States and Canada—serves as the principal liaison between the federal government and the electric power sector, with the mission of coordinating efforts to prepare for, and respond to, national-level incidents or threats to critical infrastructure.

The ESCC meets three times a year with senior government officials to identify emerging security issues and to develop plans to mitigate those threats. Those “blue sky” meetings help to prepare the industry and government for response efforts.

Future Storms: Lessons Learned

In our industry, our mantra is that we want to be better today than we were yesterday, and better tomorrow than we are today. This means that, after storms, we compile lessons learned and create strategies to close gaps and identify areas for improvement.

The industry routinely drills and exercises for all threats as they constantly strive to apply lessons learned and to enhance their response and recovery capabilities for the benefit of customers. As an example, since Superstorm Sandy, the industry has worked even more closely together and with government partners to apply lessons learned from that significant storm, to streamline restoration efforts, and to improve how the industry prepares and responds safely to large-scale major events that cause significant outages.

Companies also continue to make significant investments to harden the energy grid and to make energy infrastructure more resilient. Since Superstorm Sandy in 2012, investor-owned electric companies have invested more than \$230 billion in transmission and distribution systems.

While it is too early to launch a formal examination into lessons learned from Hurricane Maria, there are a few practices on the mainland that could have allowed for a more efficient restoration in Puerto Rico.

Assessments: Knowing specifically what part of the energy grid is damaged, and where that equipment is located, is the first step in any restoration. Damage assessments allow crews to know where to work and to prioritize more effectively. The damage assessment process was hampered in Puerto Rico, first because of impassable roads and other logistical challenges, then because different organizations did their own assessments in their own ways. The creation of the “unified command,” bringing together the Power Restoration Coordinator, PREPA, FEMA,

USACE and its contractors, and mainland crews, was a critical step to achieving a common understanding of the damage and, thus, to developing a master plan to fix the system.

Pre-positioning of Crews: Hurricanes, while devastating, typically are forecast in advance and give electric companies time to plan. When responding to Irma in Florida, for example, crews mobilized days in advance and were pre-positioned just outside the impact zone to go to work once the storm cleared. While pre-positioning is a profound challenge in an island situation—companies do not want crews to become victims—it is a key element to initiating a quick restoration process.

Access to Equipment and Materials: Having access to materials is critical to any restoration. There were limited equipment reserves (e.g., poles, wire, transformers, etc.) in place in Puerto Rico prior to Maria and certainly not enough to support an emergency power restoration effort of this magnitude. This dearth of materials on the island, combined with the strong demand for material on the mainland and the fact that materials from the mainland had to be flown or barged to Puerto Rico, made everything more time-consuming. Companies on the mainland, particularly those in hurricane-prone areas, stockpile as much material as possible so that mutual assistance crews have what they need to support the recovery. Again, this was not the case in Puerto Rico.

Investments in Grid Hardening: As noted, investments in grid hardening and smart meters in Texas and Florida reduced the number of outages and expedited restoration efforts following Harvey and Irma. There were no such investments made in Puerto Rico, and vegetation management had not been done in years.

While there are many conversations underway about the future of Puerto Rico and the structure of its electric company, we are focused on the short-term emergency power restoration and on restoring power to those customers still in the dark.

Thank you again for having me here today, for the Committee's interest in Puerto Rico, and for your support of the restoration. I look forward to your questions.

Scott Aaronson

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Scott I. Aaronson is Vice President, Security and Preparedness for EEI. Scott joined EEI in 2009 in the government relations department focusing on security and technology issues, and most recently served as executive director of security and business continuity. He leads the EEI teams focused on cyber and physical security, storm response and recovery, and associated regulatory policy.

In addition to his role at EEI, Scott also serves as the Secretary for the Electricity Subsector Coordinating Council (ESCC). The ESCC serves as the primary liaison between senior government officials and industry leaders representing all segments of the electric power sector. This partnership is held up as a model for how critical infrastructure sectors can work with government, yielding dramatic improvements in security and preparedness for the industry and the nation.

Prior to joining EEI, Scott was a senior adviser to Members of Congress serving the 12th Congressional District of California, including former House Foreign Affairs Committee Chairman Tom Lantos. From 2001 to 2007, he served as an economic policy adviser to U.S. Senator Bill Nelson.

Scott received a Bachelor's Degree in journalism from the University of Colorado at Boulder for his undergraduate studies, and a Master's Degree from The George Washington University in political management. He lives on Capitol Hill in Washington, DC with his wife, two daughters, a mutt, and a not-so-Great Dane.

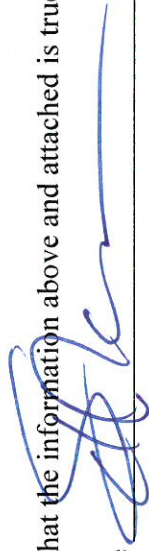
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Pursuant to House Rule XI, clause 2(g)(5) and Committee Rule 16(a), non-governmental witnesses are required to provide the Committee with the information requested below in advance of testifying before the Committee. You may attach additional sheets if you need more space.

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1. Please list any entity you are representing in your testimony before the Committee and briefly describe your relationship with each entity.					
Name of Entity	Your relationship with the entity				
EVANSON ELECTRIC INSTITUTE	VICE PRESIDENT, SECURITY & PREPAREDNESS				
2. Please list any federal grants or contracts (including subgrants or subcontracts) you or the entity or entities listed above have received since January 1, 2015, that are related to the subject of the hearing.					
Recipient of the grant or contact (you or entity above)	Grant or Contract Name	Agency	Program	Source	Amount
3. Please list any payments or contracts (including subcontracts) you or the entity or entities listed above have received since January 1, 2015 from a foreign government, that are related to the subject of the hearing.					
Recipient of the grant or contact (you or entity above)	Grant or Contract Name	Agency	Program	Source	Amount

I certify that the information above and attached is true and correct to the best of my knowledge.

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Date: 3/19/2018