"Update on the Restoration of Puerto Rico's Electric Infrastructure"

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Summary

Since November 2017, I have served as the Power Restoration Coordinator in Puerto Rico and as a member of the Unified Command Group.

Prior to my current position, I worked for more than 30 years for Consolidated Edison in New York. During my career, I managed emergency and storm restoration efforts and oversaw Con Edison's response to major storms including Superstorm Sandy and Hurricane Irene, and emergencies such as the 9/11 attacks and the 2003 Northeast blackout.

However, the damage caused by Hurricane Maria is unlike anything any of us in the industry has ever seen on the mainland United States. Without question, this power restoration mission has been the most challenging of my career.

Having lived on the island now for more than five months, I can tell you that the people of Puerto Rico are the most resilient people I have ever met in my life. While their resiliency is admirable, nobody deserves to be without electricity for this long, and I and everyone involved in the restoration effort remain committed to working as one team, with one mission—providing power to our fellow citizens in Puerto Rico.

As of April 8, PREPA reports that 96.4 percent of its customers—or approximately 1.42 million out of more than 1.47 million customers—who can receive electricity have had their power restored. While significant progress has been made across the island, restoring power to the remaining customers, most of whom are in the hardest-hit and most remote areas, remains challenging and labor- and time-intensive.

To date, nearly 60 investor-owned electric companies and public power utilities have committed personnel, equipment, and materials to the effort. Overall, approximately 3,000 industry lineworkers and support personnel have been involved in the restoration effort on the island. That spirit of "mutual assistance" is a hallmark of our industry.

Testimony for House Energy and Commerce Committee

Oversight and Investigations Subcommittee

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Chairman Harper, Ranking Member DeGette, and Members of the Subcommittee, thank you for inviting me today. My name is Carlos Torres, and I am testifying in my capacity as a consultant to the Edison Electric Institute (EEI). EEI's member companies provide electricity for 220 million Americans and operate in all 50 states and the District of Columbia. In addition to the investor-owned electric companies EEI represents, the electric power industry includes public power utilities and electric cooperatives, which are represented by the American Public Power Association (APPA) and the National Rural Electric Cooperative Association (NRECA), respectively.

Since November 2017, I have served as the Power Restoration Coordinator in Puerto Rico and as a member of the Unified Command Group working to restore power to the island following Hurricane Maria. Also serving on the Unified Command Group are senior officials from the Puerto Rico Electric Power Authority (PREPA), the Federal Emergency Management Agency (FEMA), and the U.S. Army Corps of Engineers (USACE).

Prior to my current position, I worked for more than 30 years for Consolidated Edison in New York, retiring in October 2017 as Vice President of Emergency Preparedness & Business Resiliency. During my career, I managed emergency and storm restoration efforts and oversaw Con Edison's response to major storms (including Superstorm Sandy and Hurricane Irene) and emergencies such as the 9/11 attacks and the 2003 Northeast blackout.

Since those events, our industry has worked hard to improve our disaster preparedness, response, and recovery efforts. Based on my personal experience, I believe we have never been tested more than in the response and recovery effort in Puerto Rico following Hurricane Maria.

As you may know, March 20 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 April 8, PREPA reports that 96.4 percent of its customers—or approximately 1.42 million out of more than 1.47 million customers—who can receive electricity have had their power restored.[1] While significant progress has been made across the island, restoring power to the remaining customers, most of whom are in the hardest-hit and most remote areas, remains challenging and labor- and time-intensive.

[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 April 8, PREPA reports that current load was 96.4 percent of the average pre-storm load.

Having lived on the island now for more than five months, I can tell you that the people of Puerto Rico are the most resilient people I have ever met in my life. Every single person on the island was impacted by Hurricane Maria, and many continue life today, dealing without power, without water. While their resiliency is admirable, nobody deserves to be without electricity for this long, and I and everyone involved in the restoration effort remain committed to working as one team, with one mission—providing power to our fellow citizens in Puerto Rico.

The damage caused by Hurricane Maria is unlike anything any of us in the industry has ever seen on the mainland United States. Without question, this power restoration mission has been the most challenging of my career. Hurricane Maria caused historic damage to Puerto Rico's infrastructure, creating considerable logistical challenges that complicated how crews, equipment, and materials were mobilized.

My testimony seeks to explain the role that the industry on the mainland has 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. I'd like to share with the Subcommittee where we are today, how we got here, where we are going from here, and what lessons we have learned. To be clear, my work in Puerto Rico has been focused exclusively on the short-term restoration. I will leave it to others to address the future.

The Puerto Rico Response

I know first-hand from my years of handling storm response for Con Edison, mutual assistance is a cornerstone of electric company operations during emergencies and is essential to contingency

planning.[2] The mutual assistance network—a voluntary partnership of electric companies from across the country and Canada—helps to speed restoration whenever and wherever assistance is needed, when it is safe to do so.

Typically, when major storms or incidents occur, electric companies utilize the mutual assistance process to increase their workforce. It is important to remember that crews do not arrive automatically; a formal request for mutual assistance must be made by the affected electricity provider. The recipient of the assistance pays for it, and companies providing the 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. All three networks work together to ensure customers, regardless of their electric company's ownership type, have their power restored safely and as quickly as possible.

Soon after Hurricane Maria made 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

[2] The natural gas and steam sides of the electric power industry also utilize mutual assistance. In addition, nearly 140 electric and natural gas companies from all segments of the industry have joined an industry-wide cyber mutual assistance program that will help companies restore critical computer systems following significant cyber incidents.

100-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 APPA received a letter asking for support on the island. On November 4, PREPA expanded its aid request to include NRECA.

Since then, EEI, APPA, and NRECA have been working together and with their 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, EEI asked me to deploy to Puerto Rico to assess the situation on the ground. I was joined by Manny Miranda, Senior Vice President for Power Delivery at Florida Power & Light Company, and we arrived on the island on November 3. We began assessing storm damage and met with officials from PREPA, FEMA, USACE, and the Department of Energy (DOE). Working closely with these stakeholders, we started to formulate a comprehensive master restoration plan. Given the extensive damage to PREPA's transmission system, it was critical that the transmission reestablishment plan and the distribution/sub-transmission plan be well-coordinated to restore power safely to the island.

On November 22, I was appointed by Governor Rosselló to serve as the Power Restoration Coordinator to oversee the multi-pronged restoration effort. As a first step, Manny and I worked to create an incident command structure 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), for example, our command staff team first had to build operating infrastructure—logistics, supply chains, housing and food, etc.—before deploying restoration personnel. Applying the lessons we learned from our experiences, we recommended to PREPA that it create seven regional incident management teams (IMTs) to align with its already-existing seven regions (see map) to expedite the restoration. These IMTs

arrived in December and worked with PREPA, FEMA, and USACE to coordinate and support the restoration effort.[3]

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

January-April 2018

Once the incident command structure was in place with the central IMT and the regional IMTs were 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

[3] Logos in map correspond to the regional IMT organization.

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 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 that 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 nearly 6,000 and included the resources already working on the island from PREPA's own crews, PREPA's contractors, the contingent of crews from New York who were working as part of the intergovernmental agreement (an Emergency Management Assistance Compact), and crews mobilized under contracts awarded by USACE.

The deployment of mutual assistance crews was facilitated through 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

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

and the companies providing mutual assistance also requires that this assistance be provided on a not-for-profit basis.

As of April 8, 96.4 percent of customers across the island have had their power restored, and I truly believe that the resources, equipment, and people put in place under the organizational structure helped to accelerate the restoration process and timeline.

As of April 9, most mutual assistance crews have finished their mission and have returned to the mainland. About 90 industry representatives remain on the island through the New York contingent. It is common in any restoration effort (in Puerto Rico or on the mainland) for mutual assistance crews to be released as the restoration work winds down. The restoration plan ensures that PREPA and the remaining contractor 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.[5]

In every single restoration effort, 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

[5] It is important to note that many of the contractors released by the mutual aid companies to PREPA will continue to work for Cobra Contracting and PowerSecure, two companies that have been contracted by PREPA.

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 necessary. 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.

One Team, One Mission

A restoration of this complexity and magnitude demands a response to match it. It also requires an unwavering commitment to safety. I cannot overemphasize the focus that I and my team have placed on safety throughout the entire restoration effort. My goal was—and continues to be—to ensure that everyone involved in power restoration gets home safely at the end of each day and at the end of this mission.

The partnership among our industry, PREPA, FEMA, USACE, and the government also has been critical. I have said all along—this is truly one team with one mission: to restore power to the people of Puerto Rico. 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 DOE, is the presidentially and congressionally directed Sector Specific Agency for the energy sector. Like FEMA and USACE, DOE has been a great partner with us at every step, and I thank the agency for its role in ensuring unity of effort across government and industry responders.

What's Next?

I know there is a desire to know what lessons have been learned from Puerto Rico and how another situation like this can be avoided. This is understandable, especially given that the start of the 2018 hurricane season is less than two months away. While there is always an urge to compare storms, I have learned from experience 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 on the mainland 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.

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 or major events, we compile lessons learned and create strategies to close gaps and identify areas for improvement. Every incident tests this industry, and the 2017 hurricane season is no different. No two storms are the same, but

I know the entire industry and its government partners will use the Puerto Rico restoration, as well as the great work done after Hurricanes Harvey and Irma, to get better.

Electric companies routinely drill and exercise 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, our 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 their transmission and distribution systems.

While it is too early to launch a formal examination into lessons learned from Hurricane Maria, I believe 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 work 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" was a critical step to achieving a common understanding of the damage and, thus, to developing the restoration plans 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, insulators, 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: Investments in grid hardening and smart meters 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.

Conclusion

The 2017 storm season in general, and the experience in Puerto Rico specifically, has been historic. I firmly believe that no one company could have done this alone, and I am honored and humbled to have been involved as a team member in this mission.

I also know there are many conversations underway about the future of Puerto Rico and the structure of PREPA. Again, my focus over the past five months has been on the short-term emergency power restoration.

I have notified Governor Rosselló that I plan to wrap up my duties as the Power Restoration Coordinator in the coming weeks. I have discussed this with PREPA's newly appointed CEO, Walter Higgins, and the rest of the Unified Command Group, and we all agree that the responsibility for the long-term management of the island's energy grid ultimately must be borne by PREPA. My team on the island and I have been transitioning with PREPA to "dress them for success" to complete the mission of restoring power to the remaining customers and to prepare the company for its next phase of recovery and mitigation.

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.