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before the

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**Subcommittee on Economic Development, Public Buildings, and Emergency
Management**

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I. INTRODUCTION

Chairman DeFazio, Ranking Member Graves, Subcommittee Chair Titus, and Subcommittee Ranking Member Webster, and members of the Committee:

Thank you for the invitation to appear this morning to discuss one of the most important and urgent matters for the people of Puerto Rico: the transformation of Puerto Rico's electric grid system.

All of us at LUMA, the over 3,000 men and women who work hard every day, are determined to overcome the profound challenges we inherited and build a more reliable, more resilient, and cleaner energy future for the 1.5 million customers we are fortunate to serve.

Throughout this testimony, we will provide the members of this committee with key facts and information regarding the electric grid's condition prior to our commencement of operations on the island; LUMA's commitment to complete repairs in a more detailed and permanent manner; the nature of customer service improvements; as well as our accomplishments in areas where significant challenges still exists.

We will also discuss the status of reconstruction projects that have been submitted to FEMA; hurricane preparedness and emergency response planning; as well as our new Outage Reduction and Response Initiative ("ORRI").

Lastly, all of us at LUMA fully embrace the profound responsibility we have been entrusted with to address and redress the many operational and fiscal failures of the past operator, PREPA, that have so deeply impacted the people of Puerto Rico since Hurricane Maria and before. With the support of FEMA, the Puerto Rican government, and other partners, we will build an energy future that the people of Puerto Rico deserve and of which they can be proud.

II. HISTORICAL PERSPECTIVE OF PUERTO RICO'S ELECTRIC GRID

To understand the dynamics surrounding our mission to transform Puerto Rico's transmission and distribution system ("T&D") one must first start to analyze the electric

grid's condition prior to LUMA beginning operations on the island. As has been documented publicly, Puerto Rico's electrical grid suffered from years and decades of neglect and mismanagement under the past utility operator. These profound operational failures severely impact all areas of the energy system and represent an ongoing challenge that LUMA remains determined to confront and overcome.

With respect to the state of infrastructure that LUMA inherited 15 months ago, the following are just some examples of the conditions that were faced:

- **Poor Substations:** 30% of transmission and distribution substations, key nodes in the electric grid, were estimated to require safety and hazard mitigation to reach remediation.
- **Poor T&D Assets:** An estimated 20% of transmission and distribution line assets, including poles and wires, required safety and hazard mitigation to reach remediation.
- **Public Safety Hazards:** Approximately 50,000 streetlights, more than 10% of all of the streetlights on the island, were estimated to be physical and public safety hazards.
- **Lack of Sound Engineering & Planning:** Processes for engineering functions such as distribution planning, transmission planning, protection and coordination were lacking and not following industry standards. For example, a proper simulation model for the Island's transmission system did not exist to properly design the system.
- **Antiquated EMS:** The Energy Management System (EMS), a primary technology to facilitate the stable grid operations, had been purchased in the mid-1990s, poorly maintained and was no longer supported by the vendor. We found that PREPA had procured spare parts from eBay.
- **Lack of Safety Requirements:** The entire ground and air fleet used for utility operations did not meet U.S. Department of Transportation safety requirements.
- **Lack of Critical Maintenance:** Recommended baseline maintenance of transmission and substation assets were not completed, and manufacturers' guidelines were not followed.
- **Poor Vegetation Management:** Vegetation management was often delayed by PREPA, and vegetation was present and evident when visiting substations.
- **Lasting Impact of Hurricane Maria:** Hurricane Maria accelerated this deterioration and highlighted the flaws in legacy design, operation, and maintenance activities. Some customers didn't have power for more than a year after Hurricane Maria, which is unacceptable.

The above-referenced facts, while significant in scope and impact, do not come close to fully capturing the truly weakened and deteriorated state of the electric grid. As LUMA has

documented through photographic evidence that has been provided to the Committee, the T&D system inherited by LUMA was weakened by years, if not decades, of poor design, maintenance, lack of proper inspections, and other profound failures that continue to impact the stability and reliability of the energy system.

As a measure of the fragile and weakened nature of the energy grid, Puerto Rico has experienced a number of large-scale outage events since 2016 – five of which preceded a similar large outage event on April 6th of 2022:

- September 21, 2016 – Due to fire at Aguirre Power Generating Plant
- April 12, 2018 – Due to vegetation
- April 18, 2018 – Due to transmission repairs
- January 7, 2020 – Due to earthquake on the island
- July 28th, 2020 – Due to vegetation / equipment failure

Each of these events noted above affected more than 500,000 customers and restoration efforts lasted for longer than three days. This history of such events underscores how deeply fragile and severely vulnerable Puerto Rico's electric grid and critical infrastructure has been because of the failures of the past operator and reinforces the need for LUMA to remain focused on the fundamental improvements needed to modernize and transform the energy system.

In order to ensure greater transparency and efficiency, the legal framework for the electric sector in Puerto Rico establishes clear roles for different participants in the electric sector. Generators, including PREPA and independent producers, are responsible for operation and maintenance of the power plants, while LUMA is responsible for the operation of the transmission and distribution system as well as overall system coordination, planning and analysis. All of LUMA's customers are critically dependent on the performance of PREPA's power plants that make up over 70% of the generation fleet to meet expected customer demand.

- As a result of PREPA's poor and declining generation plant reliability, the Puerto Rico electrical system had less than the minimum required reserve margin during 33 percent of the time during the past year.
- Though the minimum industry benchmark target standard for planning is that generation should result in load being shed, or customers losing power, 0.1 days per year, a resource adequacy analysis found that in Puerto Rico, the expectation is for it occur over 8.81 days per year, which is 88 times higher than the planning standard for North American utilities.
 - The potential for load shed from lack of generation in California made national news.
 - Meanwhile, generation has caused load shed on 30 separate days since LUMA commenced service.

III. LUMA'S COMMITMENT TO COMPLETE REPAIRS IN A MORE DETAILED AND PERMANENT MANNER

Given the need to address these past infrastructure failures and overall fragility of the energy grid, LUMA takes very seriously the need to improve the reliability and resiliency of Puerto Rico's transmission and distribution system. Accordingly, we have implemented a markedly different approach that is grounded in data, rigorous engineering, sound planning aligned with industry standards, and transparency about the progress being conducted and the challenges that are being faced. Given this approach, and in spite of the challenges we have faced, LUMA has made substantial progress across key areas, including:

- **Improving Reliability (Reducing the Number of Outages Experienced):**
 - The System Average Interruption Frequency Index ("SAIFI"), or the number of outages that an average customer experiences in a year, has been reduced by 30% (improvement from a PREPA baseline of 10.6 to 7.6).
 - What this means is that instead of an average customer experiencing 10.6 outages in a year, they're experiencing 7.6.
 - 15% fewer substation events than in PREPA's last year.
 - Restored and re-energized two transmission lines that were out since Hurricane Maria, and two additional lines that were out since before Hurricane Maria, representing 43 miles of transmission lines.
 - Restored and re-energized 5 substations that had been out since Hurricane Maria.
 - Restored and re-energized 496 pieces of equipment, including in substations and on the transmission and distribution systems.
- **Empowering the Growth of Solar/Clean Energy/Renewables:**
 - Before LUMA began operations, there was a severe backlog of customers applying for inclusion in PREPA's solar net-metering program.
 - We have successfully reduced this backlog and have now integrated more than 28,000 customers to the program, which represents more than double the number of customers than before.
 - In a little over a year, LUMA added more customers to the residential solar program than PREPA ever did over a full decade. Average time for approval of interconnection has dropped to under 30 days and over 70% of customers are interconnected within 30 days.
 - Completed studies to support the interconnection of 844 MW of renewable utility-scale generation and completed solar hosting capacity analyses.

- Completed cutting-edge optimization analysis to identify locations in the system with zero network upgrade cost for affordable and economical renewable energy integration.
 - We have gone from approximately 450 distributed generation interconnections monthly to approximately 2,100 interconnections.
 - Reenergized transmission line that connected a 27 MW wind farm to the system that was out of service since Hurricane Maria.
- **Improving Customer Service:**
 - 2 million customers have been provided support by LUMA, through 2.5 million calls, 350K+ e-mails, 430K+ DMs on social media.
 - The average wait time of customers on the phone decreased from more than 10 minutes while under PREPA to approximately 3 minutes under LUMA.
 - The rate of call abandonment declined from more than 50% with PREPA to 15% under LUMA.
 - 560,000+ downloads of MiLUMA application.
- **Improving Workplace Safety & Trainings:**
 - Developed procedures to support the operation of interconnected generation resources, the reliable dispatch of power, black start¹ and restoration, as well as numerous other critical operations. These procedures did not exist prior to our arrival as operator of the T&D system.
 - We have renewed the service fleet with 1,200 new or repaired vehicles, fully compliant with safety and transportation requirements.
 - Graduated the first class of Puerto Rican electric line workers from LUMA Technical College, with subsequent graduating classes during the last year.
 - Total recordable injury rate went from 8.63 under PREPA to 2.88 under LUMA.
 - Injury severity rate declined from 62.9 under PREPA to 11.64 under LUMA.

¹ Black start refers to restarting the grid after an island-wide blackout. The other procedures referenced above are related to managing energy generation to provide reliable power.

IV. STATUS OF FEMA FUNDED RECONSTRUCTION PROJECTS

When LUMA assumed operations of Puerto Rico's transmission and distribution system, one of our highest priorities was to work together with FEMA, the Puerto Rico Energy Bureau, the Puerto Rico Public-Private Partnership Authority, the Central Office for Recovery, Reconstruction and Resiliency and PREPA to develop and advance a series of federally funded infrastructure improvement projects to transform and modernize Puerto Rico's energy system.

In 15 months, LUMA has advanced FEMA projects in Puerto Rico at a historic pace – a stark comparison to the previous five years under the prior operator.

A. FEMA Reconstruction Projects

As of September 8, 2022, LUMA has initiated 225 projects with FEMA², representing more than \$5 billion worth of federally funded projects. In contrast, only 35 project submissions had even been made before LUMA assumed operations on June 1, 2021.

- **Obligated FEMA Projects:** LUMA has received, to date, FEMA approval for 29 critical infrastructure projects³ including:
 - **Over 21 distribution projects** that will address critical infrastructure, such as streetlights and pole replacement, targeting the municipalities of San Juan, Arecibo, Mayaguez, Caguas, Bayamon and Carolina to reduce outages and increase the reliability of the electric system.
 - **Three transmission reconstruction projects** targeting Line 2200, Line 13300 and Line 6700 that will help improve the critical energy infrastructure that delivers energy across the island.
 - **Five substation modernization projects** that will address the critical role played by substations in helping deliver energy to communities across Puerto Rico beginning in the municipalities of Cataño, Vieques, Culebra, Manati and Costa Sur.
- **FEMA Projects Under Construction:** LUMA has started construction on 14 FEMA funded projects across Puerto Rico including:
 - **Five initial streetlight projects** as part of LUMA's \$1 billion Community Streetlight Initiative in the municipalities of Guanica, Lajas, Aguada, Maunabo and Luquillo – **in less than three months, LUMA has installed over 12,000 streetlights.**

² At the time of our latest filing to the Puerto Rico Energy Bureau ("PREB"): the number of initiated projects stood at 206. Of those, 204 projects have a FEMA FFAST number and two were awaiting confirmation.

³ At the time of our latest filing to the PREB: 19 projects had received FEMA approval. This represents \$756.5 million and includes the equipment and materials for projects.

- **One critical transmission line repair project** to reduce the potential for future outages.
- **Eight distribution pole replacement projects** to increase the reliability and resiliency of the electric grid.

In addition to the projects initiated, approved, and under construction, LUMA has also taken the following FEMA-related actions:

- LUMA has submitted a critical EMS (emergency management system) project to FEMA for approval, which is the first phase of transforming the system operations control center with state-of-the-art technology and software to modernize the way Puerto Rico's energy grid is monitored and managed.
- Received approval for \$656M to procure long-lead material, mainly grid equipment including breakers, transformers, and reclosers.
- Developed four proposals of Hazard Mitigation for non-damaged infrastructure that COR3 is reviewing before submission to FEMA, which would represent \$900 million for deployment of technologies, including an advanced metering infrastructure, an advanced microgrid project, and mobile microgrids to enable renewable energy and make communities resilient.
- Taken in totality, over the coming months and years, FEMA-funded projects that are being directed by LUMA will not only represent the largest capital energy program in Puerto Rico's history, it will represent the largest ever funded by the federal government to repair and rebuild an electric system across any state and/or territory. As a result, LUMA is excited by the significant progress that has been made to date that will, as more FEMA projects begin construction, strengthen and transform the long-term future of Puerto Rico's energy grid.

B. Working Closely with FEMA on Emergency Preparedness

In addition to moving forward critical federally funded infrastructure projects, LUMA continues to prioritize emergency preparedness and taking the necessary steps and actions to be able to respond to hurricanes and other emergencies.

Given the historic impact of Hurricane Maria and the lasting effects it has had on the people of Puerto Rico, LUMA has made preparing for emergency events, like hurricanes, a daily and year-round priority.

As part of our emergency preparedness efforts, we have worked closely with FEMA, PREMB and ESF 12 and other partners to establish and adopt industry emergency preparedness standards. Among the actions we have taken include the following:

- **Establish Emergency Response Plan:** In May, LUMA submitted its 2022 Emergency Response Plan (ERP) to the Puerto Rico Energy Bureau as part of its continuous effort to plan, prepare for and respond to the major emergencies and the 2022 hurricane season.
 - LUMA's 2022 ERP outlines the actions LUMA takes in an emergency event and helps direct the company's response, recovery and restoration efforts.
 - More specifically, the ERP addresses how LUMA responds to any emergency, including hurricanes, earthquakes or any other major event that impacts the electric power system.

- **Adopt Industry Best Practices:** The LUMA ERP follows industry best practices for emergency response and follows the National Incident Management System as established by the Federal Emergency Management Agency (FEMA).
 - The National Incident Management System framework establishes a standardized Incident Command System (ICS) which is used across industries and is the basis for LUMA's ERP.

- **Emergency Preparedness, Training & Readiness:** LUMA has undertaken extensive efforts to improve preparedness, training, and readiness, including:
 - **Emergency Preparedness:**
 - Three emergency preparedness tabletop exercises completed with FEMA and DOE/ESF 12/PREPA/PREMB and other local stakeholders.
 - Procuring and maintaining a fleet of 1,800 vehicles available to support emergency response efforts.
 - Installing equipment in the LUMA Emergency Operations Center and purchasing supplies for emergency operations.
 - **Emergency Training:**
 - Completing more than 8,000 hours of ICS training.
 - Completing an Emergency Operations Center mock drill based on Category 4 Hurricane making landfall on May 12, 2022, with 75 attendees.
 - **Emergency Readiness:**
 - To date, LUMA maintains a total on-hand inventory of T&D equipment and materials available for daily operations and emergencies amounting to \$130 million including:
 - 21,000 poles

- 17 million feet of cables
 - 3,200 transformers
 - 58,000 LED luminaries
 - 154,000 insulators
 - 1,800 switches/breakers
 - 29,000 crossarms
- As part of our more than 3,000 employees, LUMA has 1,300 transmission and distribution workers across Puerto Rico who are trained and available to respond to serious emergencies, in addition to resources from contractors and mutual aid.
- We also have established mutual aid agreements with the Caribbean Electric Utility Services Corporation (CARILEC), Edison Electric Institute (EEI) and the American Public Power Association (APPA) for response to critical events in cases where additional resources for restoration and response become necessary.
- We have also been working with US DOE on development of a Storm Damage Prediction Tool for estimating material needs. The Storm Damage Prediction Tool helps forecast storm damage to transmission and distribution infrastructure.

V. NEW OUTAGE REDUCTION AND RESPONSE INITIATIVE (ORRI)

All of us at LUMA share our customers' frustration with outages and the reliability of Puerto Rico's fragile electric system, which has suffered from years – if not decades – of mismanagement and neglect.

To address these sincere concerns, LUMA has undertaken a series of additional actions to build on the progress we have made, reduce the impact of outage events, and improve our response when such outages occur.

The new initiative launched by LUMA, named the Outage Reduction and Response Initiative (ORRI), is part of an increased operational activity designed to reduce customer outage duration by 55 million Customer Minute Interruptions (CMI) in the next 90 days – which will represent a 20% improvement for highly impacted customers.

The seven key organizational and operational actions that define ORRI include:

- Establishing a New LUMA Outage Reduction Task Force that will Lead ORRI and the Operational Effort to Reduce Outages Across the System.
- Increasing Outage Response Crews and Resources.
- Enhancing Vegetation Management to Target Critical Areas.

- Installing New Automated Devices to Reduce the Number of Customers Impacted.
- Increasing Inspections of Critical Substations and Lines that Serve Essential Services Like Hospitals and Work with these Facilities to Assess Status of Back-up Generation and Resiliency.
- Expanding Aerial Patrols of Key Lines with Thermal Imaging to Identify and Repair Potential Failure Points.
- Accelerating Inspections of Substations to Identify and Address Issues.

Since the new initiative was launched on August 24, 2022, LUMA teams have already accomplished the following:

- **Formed the Outage Reduction & Response Initiative task force**, which includes a cross-functional LUMA team who have initiated an action plan designed to improve outage response and address the root cause of outages.
- **Increased utility and vegetation crew numbers** by onboarding 201 additional highly trained utility workers to help improve overall outage response and target areas for reliability improvement.
- **Installed 24 new automation devices** in San Juan, Ponce and Humacao, which are innovative devices used to detect outages within milliseconds, shorten outage duration and reduce the number of customers that experience an outage.
- **Cleared hazardous vegetation** from 69 miles of critical lines identified as impacting frequent outages, in addition to the 700 miles cleared of vegetation this year across transmission and distribution powerlines.
- **Completed critical aerial inspections and thermal imaging of 262 miles of key lines** using special thermography equipment used to inspect key equipment.
- **Completed inspections and performed thermal imaging of 16 critical substations.**
- **Launched essential services outreach** to hospitals and the hospital association to determine areas impacting their energy reliability and discuss the status of their backup generation.

Over the coming weeks and months, LUMA will continue to take additional actions and expand on current programs and efforts in order to improve the reliability of the energy grid. While we are transparent about the fact that challenges in the reliability of the energy

grid will remain given the years and decades of neglect it has suffered, LUMA will focus with greater urgency on the goal of addressing the root cause of outages and advancing projects that will improve the reliability and resiliency of the island's electric system.

VI. CONCLUSION

Looking forward, it is more important than ever that all of us work together to achieve what the Puerto Rican people deserve given the many hardships they have suffered from poor financial and operational stewardship under the past operator: a better energy future that moves Puerto Rico forward. In the face of ongoing challenges, all of us at LUMA – the more than 3,000 women and men of our workforce – remain more committed than ever to this goal.

We believe that the energy future we are building in Puerto Rico will, over the coming months and years, close the chapter on the failures of the past operator and usher in a new era in which the energy grid is not only more reliable and more resilient, but serves the energy needs of Puerto Rico for generations to come.