LUMA ENERGY

MAKING IMMEDIATE PROGRESS

LUMA Energy, LLC (LUMA), a joint venture in which Quanta owns a 50% interest, has made an immediate and significant impact in improving customer service, increasing reliability, responding to outages and empowering the growth of solar energy in Puerto Rico.

The LUMA team is delivering on the mission of building a better energy future for its 1.5 million customers.

Hurricane Maria struck Puerto Rico with sustained winds of 155 miles per hour, uprooting trees, downing cell towers and ripping wooden and tin roofs off homes. Electricity was cut off to 100 percent of the island and access to clean water and food became limited for most. The powerful storm devastated the island and plunged all of its 3.4 million residents into a desperate humanitarian crisis.

The tenth most intense hurricane on record in the Atlantic according to the National Oceanic and Atmospheric Administration (NOAA), Maria was a humanitarian catastrophe and severe blow to critical infrastructure in Puerto Rico. In a National Hurricane Center report on Hurricane Maria in February 2019,[1] Maria's damage to Puerto Rico was estimated at US $90 billion, making it the third costliest hurricane in U.S. history.

[1] nhc.noaa.gov/data/tcr/AL152017_Maria.pdf

The Mission for Puerto Rico

LUMA is recovering and transforming the utility to deliver customer-centric, reliable, resilient, safe and sustainable electricity at reasonable prices:

- **Prioritize Safety:** Reform utility activities to support a strong safety culture focused on employee safety and the safety of the people of Puerto Rico.
- **Improve Customer Satisfaction:** Transform utility operations to deliver a positive customer experience and reliable electricity at reasonable prices.
- **System Rebuild & Resiliency:** Effectively deploy federal funding to restore the grid and improve the resilience of vulnerable infrastructure.
- **Operational Excellence:** Enable employees to pursue operational excellence through new systems, processes and training.
- **Sustainable Energy Transformation:** Modernize the grid and the utility to enable the sustainable energy transformation.
- **A World-Class Utility:** Create and develop the workforce necessary to achieve these goals.

TRANSFORMING PUERTO RICO'S ELECTRICITY INFRASTRUCTURE

LUMA was selected through a competitive process established by law by the Puerto Rico Public-Private Partnerships Authority to transform the island's electricity system. LUMA is a joint venture between Canadian Utilities Limited, an ATCO company, and Quanta Services, in which each partner holds a 50% interest. Taking over from the Puerto Rico Electric Power Authority (PREPA), LUMA entered into a T&D system operation and maintenance agreement in June 2020.

Between June 2020 and the start of its operations on June 1, 2021, LUMA performed a detailed assessment to identify gaps in planning, operations and procedures in Puerto Rico. Based on this assessment, LUMA has designed and submitted a comprehensive plan for improvement programs, budgets and operation principles as part of its transition.

The Unique Challenges of Rebuilding Puerto Rico's Grid

The Puerto Rican electric grid's performance was an ongoing issue prior to Hurricanes Irma and Maria, which ultimately led to PREPA filing for bankruptcy in July 2017. Reliability metrics before the hurricanes were below U.S. industry standards, with the trend worsening between 2014 and 2017. LUMA's assessment revealed that issues in Puerto Rico were not limited to damage from the hurricanes, but also included inadequate maintenance, aging infrastructure and operational issues which led to grid performance below industry standards.

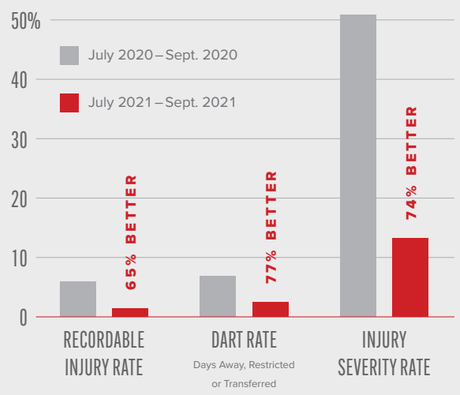
Puerto Rico also has many challenges that impact its vulnerability when outages occur. More than 40% of the Puerto Rican population lives below the poverty line. Additionally, approximately 15% of people under the age of 65 live with at least one disability. The overall population has also been declining, and because it is an island, it is not immediately accessible to an adjacent state or region for disaster assistance or electricity exchanges.

A functional grid can be achieved by remediating, recovering and repairing infrastructure and assets in the highest risk areas. LUMA has developed a system remediation plan for this purpose, designing improvement programs such as rebuilding distribution lines and repairing and rebuilding damaged substations.

WORKING **SAFER**

Built on an unwavering commitment to training and safety, the 3,000 men and women of LUMA are proud to serve the people of Puerto Rico. From the outset, LUMA made safety and training a key focus and provided field personnel with access to modern functioning tools, PPE, safety-compliant vehicles and heavy equipment. Public safety education was also a focus, using social media, presenting electrical safety best practices to first responders and participating in public safety and emergency management events. Put together, these efforts resulted in an immediate dramatic improvement in safety metrics.

IMPROVEMENTS IN SAFETY, FIRST THREE MONTHS



Making Immediate Progress		PRIOR TO LUMA	LUMA[2]	IMPROVEMENT
CUSTOMER SERVICE	Average customer call wait time	>10 minutes	<1 minute	98%
	Call abandonment rate	>50%	5%	90%
	Mi LUMA app	N/A	560K+ downloads	100%
ENHANCED RELIABILITY	Improvement in outage frequency	10.6 outages	7.5 outages	30%
HEALTH & SAFETY	Total Recordable Injury Rate (TRIR)	8.63	2.74	68%
	Injury severity rate	62.9	9.5	85%
RENEWABLES	Net metering connections	8,000 customer backlog	25,000 approved in 12 months	400%
	Monthly distributed generation installations	450	2,100	366%
FEDERAL PROJECTS	Number of projects advanced	37 projects (initiated)	186 projects	400%

[2] First 12 months of LUMA operations, July 1, 2021, to June 30, 2022

SUSTAINABLE ENERGY TRANSFORMATION

Since inception, LUMA has:

- activated net energy metering service for 95% of projects inherited on June 1, 2021, many of which had been pending for over a year;
- presented the plan for the offshore wind study currently underway with the National Renewable Energy Laboratory and participated in the proceeding to further deployment of electric vehicle infrastructure in Puerto Rico and
- passed two important milestones by signing LUMA's first transmission for net metering contract (a process the applicant started with PREPA three years ago) and performing the first-ever system analysis focused on minimizing network costs for utility-scale renewable integration to reduce the cost of renewable energy.

NET ENERGY METERING

25,000

customers activated

130 MW

distributed solar generation

PHASE III STUDIES

844 MW

solar

220 MW

battery storage

Building Resiliency & Reliability Through Microgrids & Renewables

A consequence of the growing impacts of climate change is an overall increased risk of future disruptions related to extreme weather events in Puerto Rico. This underscores the importance of focusing on resilience and reliability in grid transformation, modernization and planning efforts.

A resilient electric grid is a building block for integrating clean energy and advanced technologies. However, when planning reliability and resilience improvements, the needs and overall status of the region and grid must be considered. This is especially important for damaged infrastructure, such as that of Puerto Rico.

A new approach like the use of microgrids demonstrated value to communities during widespread outages after a series of earthquakes hit the island in early 2020. Based on this experience, LUMA began developing a technical requirement and interconnection procedure for microgrids. LUMA believes bringing microgrids and other innovations to scale is the next big step toward building its resilience. Puerto Rico shares the unique challenges of an island electric system. This emphasizes the need for a diverse set of resources, like utility-scale smart inverters and grid investments to ensure redundancy.

Building a Twenty-First Century Grid

LUMA's purpose is to rebuild and transform Puerto Rico's electricity system after years of neglect, lack of maintenance and disrepair made worse by a series of devastating hurricanes and earthquakes. In addition to restoring outages, LUMA is fixing infrastructure, so we can prevent them in the first place. This is a unique opportunity to introduce new ideas, technologies and methods to improve on pre-disaster conditions. In this manner, LUMA has started key repairs and has been collaborating with all levels of government to achieve these aims. LUMA plans to move Puerto Rico's twentieth-century grid to a twenty-first century grid, on par with industry standards and allowing an accelerated sustainable energy transformation to a resilient and renewable resource-leveraging grid. LUMA has:

- replaced 3,000 poles,
- reduced outages experienced by customers by 30% and
- cleared 100% of substations of hazardous vegetation.

I was a Paratrooper in the Army. I worked jumping out of the aircraft as an instructor. I ended up as staff sergeant in charge of a platoon. After 20 years of service, I retired from the Army. I found out about work in the electrical field, and it began to interest me.

During my time at Northwest Lineman College, an instructor approached me and informed me about an opportunity in Puerto Rico called LUMA. I was very interested. I wanted to return to Puerto Rico to offer the same I had offered my country.

I HAD SERVED MY COUNTRY AND WANTED **TO SERVE PUERTO RICO IN THE SAME WAY.** THAT IS WHY I CHOOSE THIS CAREER.

ANGEL COTTE

United States Army, Northwest Lineman College Graduate & Electrical Lineman Program