Puerto Rico and Hurricane María

Lessons Learned about Resilience in Puerto Rico

Power & Energy Automation Conference

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The Energy Bureau of the Puerto Rico Public Service Regulatory Board is the independent and specialized entity created by Act 57-2014, as amended, to ensure the transparent and compliant implementation of the energy reform. As such, the PREB is responsible for the regulation, oversight, and enforcement of the energy public policy of the Government of Puerto Rico.
Puerto Rico – Quick Facts

Municipalities: 78

Land Area: 100 x 35 miles

Population: 3.1 Million

Topography: Mostly mountainous in the center, with large coastal valleys in the north and south

Highest Elevation: 4,390 ft above sea level

GDP (2018): $104 Billion
History of PR’s Electric Power Sector

- Multiple Private Power Companies (1893 – 1941)
- Nationalization of Private Electric System (Started 1937)
- Puerto Rico Electric Power Authority was created (May 1941)
- PREPA built centralized generation (1950 – 2000)
PREPA’s Snapshot

- PREPA is a vertically integrated utility
- 1.5 Million customers
- $ 3.2 Billion Annual Revenues
- 2,478 Miles of Transmission Lines (230kV, 115kV, 38kV)
- 31,446 Miles of Overhead Distribution Lines (13.2kV, 8.32kV, 4.16kV)
- 1,723 Miles of Underground Distribution Lines
- 341 Substations
- 5.8 GW of installed capacity
  - 4.8 GW PREPA Owned (Thermal, Hydro)
  - 961 MW of Thermal IPP (Coal, Natural Gas)
  - 250 MW of Renewable IPP (Wind, Solar, Landfill Gas)
PREPA vs US Largest Utilities

**PREPA**
- 1.5 Million customers
- $3.2 B annual revenue

**Cooperative**
- 334,000 customers
- $563 M annual revenue

**IOU**
- 5.2 Million customers
- $15.5 B annual revenue

**Municipal/State/Federal**
- 1.43 Million customers
- $3.6 B annual revenue
Longest and Most Massive Power Outage

Hurricane-related power outages in Puerto Rico

Number of customers:
- Maria: 1,600,000
- Irma: 1,400,000

Percent of total customers:
- Maria: 100%
- Irma: 70%

Dates:
- 4-Sep
- 18-Sep
- 2-Oct
- 16-Oct
Restoration Efforts

- 1,600+ Generators
- 9 Microgrids
- 61,000+ poles
- 8,400+ miles of wire
- 6,000 line workers @ the peak
- $5.4 Billion in Federal Aids for Emergency Power and Grid Restoration
Immediate Measures

- Use of Emergency Power Generators (Large Scale)
- Microgrids Development Regulation (9028)
- Executive Order No. 2019-064
- Increase of Renewables with Storage
PREPA’s Proposed Future Grid
Puerto Rico Grid Planning

Integrated Resources Plan

New RPS: 20% - 2022  40% - 2025  60% - 2040  100% - 2050

Grid Modernization

Reliability and Resiliency

Interconnection Reform
Lessons Learned

- Multiple Logistical Challenges
- Importance of Materials and Mutual Assistance Agreements
- PREPA’s Financial Problems
- Magnitude of the Disaster
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