

Autoridad de Energía Eléctrica

Puerto Rico Electrical Power Authority



Integrated Resource Plan - Summary

January 29, 2019



- 1. Address the operational and environmental impacts of an aging generation fleet which limit the incorporation of renewable resources because:**
 - They burn costly liquid fuels (mostly heavy fuel oil)
 - They do not meet environmental regulations (e.g. MATS and NAAQS)
 - They have poor reliability
 - They are inflexible
- 2. Achieve a reduction of cost and increase in diversity of supply by the incorporation of renewable resources**
- 3. Achieve or exceed compliance with the Renewable Portfolio Standards (RPS)**
- 4. Shift from centralized generation located in the South of the island to more decentralized generation resources distributed across the island**



Working in conjunction with the Puerto Rico Energy Board (PREB), PREPA commissioned Six Scenarios for analysis:

Scenario 1: No new natural gas (gas) delivery infrastructure added combined with expected (base case) cost of renewable and availability

Scenario 2: Gas delivery is made available only in the north combined with expected (base case) cost of renewable and availability (this scenario was dropped after the first screening)

Scenario 3: Gas is made available at multiple, new LNG terminals (north, east and west locations) combined with further reduction in the cost of renewable and higher renewable availability

Scenario 4: Gas is made available at multiple, new LNG terminals (north, east and west locations) combined with expected (base case) cost of renewable and availability

Scenario 5: Similar to Scenario 4, but with the Aguirre Offshore Gas Port as an option, larger combined cycle units and centralized Strategy 1

ESM Plan: Similar to Scenario 4, but with renegotiated Eco Electrica PPOA, new baseload generation in the east, and utilization of the Public Private Partnership Authority procurement process for new fossil & renewable generation and energy storage systems



The scenarios were evaluated with the following resource strategies:

Strategy 1: Reflects a traditional, centralized energy program with generation resources predominately located at a few centralized locations emphasizing reliability and economic metrics.

Strategy 2: Reflects a system of more distributed, flexible generation, emphasizing resiliency and closer proximity of generation sources to the customer. The strategy incorporates micro or mini-grids and hardening of existing PREPA infrastructure. In this strategy, most of the load is supplied from local supply resources that can be isolated from the remainder of the grid during a major event, but still supply all or a portion of the nearby load.

Strategy 3: Reflects a hybrid of the first two strategies that embodies a combination of the benefits of Strategy 1 and Strategy 2. In this strategy, economies of scale are considered, which results in some of the load potentially served, under normal conditions, from remote resources. During a major event, the potential for greater levels of rotating load shed in this strategy is greater than with Strategy 2, but should also result in lower operating costs.

The IRP Resulted in 2 Potential Options for PREPA



	Scenario 4	ESM	Dvlmt. Start	EPC start	IRP COD
F - Class Palo Seco 2025	✓	✓	Jul-2019	Jan-2022	Jan-2025
F - Class Costa Sur 2025	✓	Eco Instead	Jul-2019	Jan-2022	Jan-2025
F-Class Mayaguez 2028	✓	X	Jul-2022	Jan-2025	Jan-2028
F-Class Yabucoa 2025	High Load S3	✓	Jul-2019	Jan-2022	Jan-2025
Small CCGT (LPG/NG) North	X	✓	Jan-2019	Jan-2020	Jan-2022
Jobos Mobile 23 MW	2	2	Jan-2019	Jul-2019	Jan-2021
Mayaguez North Mobile 23 MW	2	4	Jan-2019	Jul-2019	Jan-2021
Carolina (Daguao) Mobile 23 MW	4	5	Jan-2019	Jul-2019	Jan-2021
Caguas (Yabucoa) Mobile 23 MW	4	5	Jan-2019	Jul-2019	Jan-2021
Cayey Mobile 23 MW	1	2	Jan-2019	Jul-2019	Jan-2021
LM2500_SAC_diesel Carolina (21 MW)	1	0	Jan-2019	Jul-2019	Jan-2021
Mayaguez RICE (16 MW)	2	0	Jan-2019	Jul-2019	Jan-2021

- The IRP Analyses have led PREPA to consider two least cost options: Scenario 4 Strategy 2, and the ESM Plan
- Scenario 4 Strategy 2 and the ESM Plan emphasize resiliency through the deployment of micro grids and distributed generation
- Each scenario has optimized the locations of distributed (peak) generation to ensure that critical loads can be served by local resources



The Action Plan will employ a staged execution strategy:

- **Seek immediate PREB Authorization to implement IRP recommendations that are common to Scenario 4 Strategy 2 and the ESM Plan:**
 - Maximize the deployment of renewable energy and storage resources
 - Harden the transmission and distribution system grid so that it can be segregated into eight self-sufficient micro grids
 - Add distributed, or peak, generation resources to support the eight micro grids
 - Support development of new LNG importation infrastructure
 - Pursue new base-load generation in the San Juan metropolitan area
- **Renegotiate the Eco Electrica PPOA, and present new terms and contract to PREB for approval**
- **Seek PREB authorization to pursue new base-load generation at Yabucoa in lieu of new base-load generation at Mayaguez**