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Energía Eléctrica

# PREPA Resource Planning

## An Action Plan for a Greener, More Resilient Puerto Rico

August 2019

# Opening Comments



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- Today, PREPA begins the process of obtaining PREB and stakeholder acceptance of an Integrated Resource Plan (IRP) that will enable PREPA to better serve its customers and the citizens of Puerto Rico
- The IRP's Action Plan has the full support of PREPA management. It reflects a year and a half of concerted effort, and incorporates new energy policy requirements, regulatory guidance and stakeholder feedback
- In a spirit of cooperation, the Planning Staff at PREPA are ready and eager to assist PREB in its evaluation of the IRP
- Our goal is to move PREPA out of an aging generation portfolio heavily dependent upon imported fuel oil towards a future in which it relies on renewable energy resources, energy storage and new, more efficient natural-gas fired generation

# Current State of Review



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## **PREPA submitted a revised IRP to the Puerto Rico Energy Bureau in June 2019**

- The revised IRP represents over a year of cooperative efforts between PREPA, the PREB and stakeholders, including COR3, multiple Puerto Rican Agencies, and the US Department of Energy, to find near and long-term solutions to the renewal of the electrical infrastructure

## **The proposed Action Plan results in a greener and more resilient generation mix**

- Installation of Renewable Generation and Energy Storage in accordance with Public Policy
- Construction of new natural gas-fired generation resources
- Conversion of existing oil-fired combustion turbines to allow for natural-gas combustion
- Retirement of displaced oil-fired units

**The IRP Aims to Reduce Costs & Emissions and Enhance System Reliability  
While Providing the Platform for Economic Success for Puerto Rico**

# Objectives of PREPA's IRP



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## 1. Advance Public Policy and “Green” the Supply

- Achieve renewable portfolio standards with addition of unprecedented amounts of renewable resources & energy storage
- Develop natural gas-fuel generation and supply infrastructure with a mind to retiring coal and heavy fuel oil generation and providing support for renewable resources

## 2. Enhance Resiliency and Recovery Capabilities

- Reconfigure the Transmission and Distribution system to support greater resiliency through distributed generation, modern MiniGrid and microgrid technologies

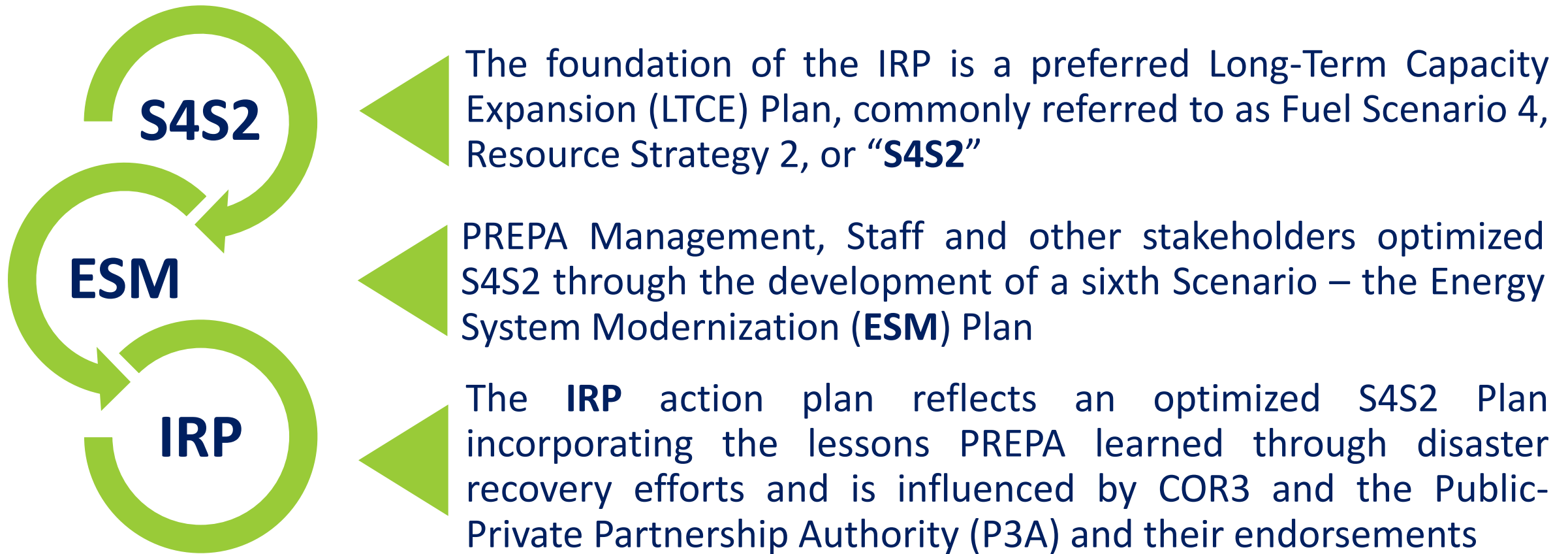
**The IRP Reflects Lessons Learned from the Hurricane on How to Improve Power Supply and Delivery Infrastructure to Enhance Resiliency and Speed Recovery**

Source: Siemens Integrated Resource Plan June 7, 2019

# Creating the IRP Action Plan



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**PREPA Recommends that It Proceed with the Execution  
of the IRP Action Plan with Reassessment in 2-3 years**

# ESM Provisions Developed Collaboratively



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- **Convened Energy Sector Modernization (ESM) Summit in October 2018**
  - Brought key stakeholders together to discuss framework and approach for ESM Plan development
  - Built initial plan on insights from:
    - Build Back Better – Reimagining and Strengthening the Power System in Puerto Rico
    - DOE Energy Resiliency Solutions for Puerto Rico
    - The Governor's Report as specified courses of actions (COA)
- **ESM Plan further refined through Working Groups supported by Navigant, PREPA, DOE Labs, New York Power Authority and others**
- **'ESM scenario' refined and introduced into PREPA IRP process**
  - Mapped ESM Plan initiatives to Courses of Action (COAs)
  - Siemens modeled the ESM as a specific Scenario

**The ESM Plan has Gone Through Multiple Reviews with Key Stakeholders**



# Foundational Recommendations of the IRP

## 1. Renewable Generation

- Integrate the maximum amount of renewable generation achievable in the initial 4 years of the planning period

## 2. MiniGrids

- Create “Minigrids” of self-sufficient electric “islands” through the use of distributed resources and transmission and distribution (T&D) system hardening

## 3. Increase Energy Efficiency and Demand Response

## 4. Modernize Generation Fleet

- Construct new and convert existing combined-cycle units that burn LNG
- Retire obsolete oil-fired generation units

**The IRP Lays the Foundation for the Future of Puerto Rico’s Electrical System & Creates Options for PREPA as Future Uncertainties are Resolved**

# The Action Plan is Designed for Sustainability



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## Between 2019 and 2025 PREPA proposes to...

### 1. Install up to 1,800 MW of Solar Photovoltaics (PV)

- Provides distributed power to critical and priority loads
- Compelling economics of PV vs. existing fossil generation

### 2. Install 920 MW of Battery Energy Storage (BESS)

- Increase renewable utilization and grid resiliency by storing energy for use in periods when PV is not generating

### 3. Convert Select Existing Assets to Burn Natural Gas vs. Diesel or HFO

- Significantly improve environmental emissions rates
- Substantially reduce fuel costs in current energy market

### 4. Retire Old Oil-Fired Units as Soon as Practical

- Units are inefficient, uneconomic and noncompliant

Source: Siemens Integrated Resource Plan June 7, 2019

# PREB, EPA, and EQB are Key Stakeholders



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## Initiation of Development Activities is a Critical Component to the Action Plan:

### 1. New generation will require environmental studies and permits

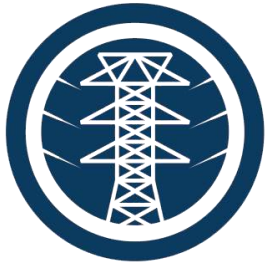
- PREPA will work with PREB, EQB and EPA to define an efficient process
- Need to improve resiliency and emergency preparedness will drive the selection of early-stage projects (new peak generation and conversion of San Juan 5 & 6)
- To support hurricane preparedness, new peak generation resources may be deployed at existing sites (advantaged by existing infrastructure) and relocated when new MiniGrid infrastructure is developed

### 2. The future is renewable energy & cleaner-burning natural gas

- Fuel selection supportive of re-designation efforts for SO<sub>2</sub> non-attainment areas
- Natural gas supports PREPA environmental compliance objectives
- Generation units will be dual-fuel to support resiliency
- Heavy fuel oil is not part of PREPA's long-term fuel strategy

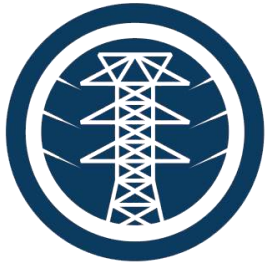
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## Long Form Presentation



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# The IRP Aligns with PREPA's 5 Pillars



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## Customer-Centric

Excellent customer service with increased customer engagement, including the ability to become prosumers



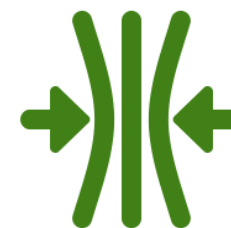
## Financial Viability

Reasonable rate structures that provide affordable power for all residents and businesses



## Reliable and Resilient

Resilient energy system able to meet the growing demands of electricity users and withstand future disasters



## Sustainable

Diverse energy structure with less dependence on fossil fuels



## Economic Growth Engine

Economic expansion that provides employment opportunities and attracts additional industrial and commercial development

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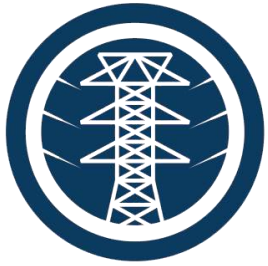
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## Integrated Resource Plan Summary

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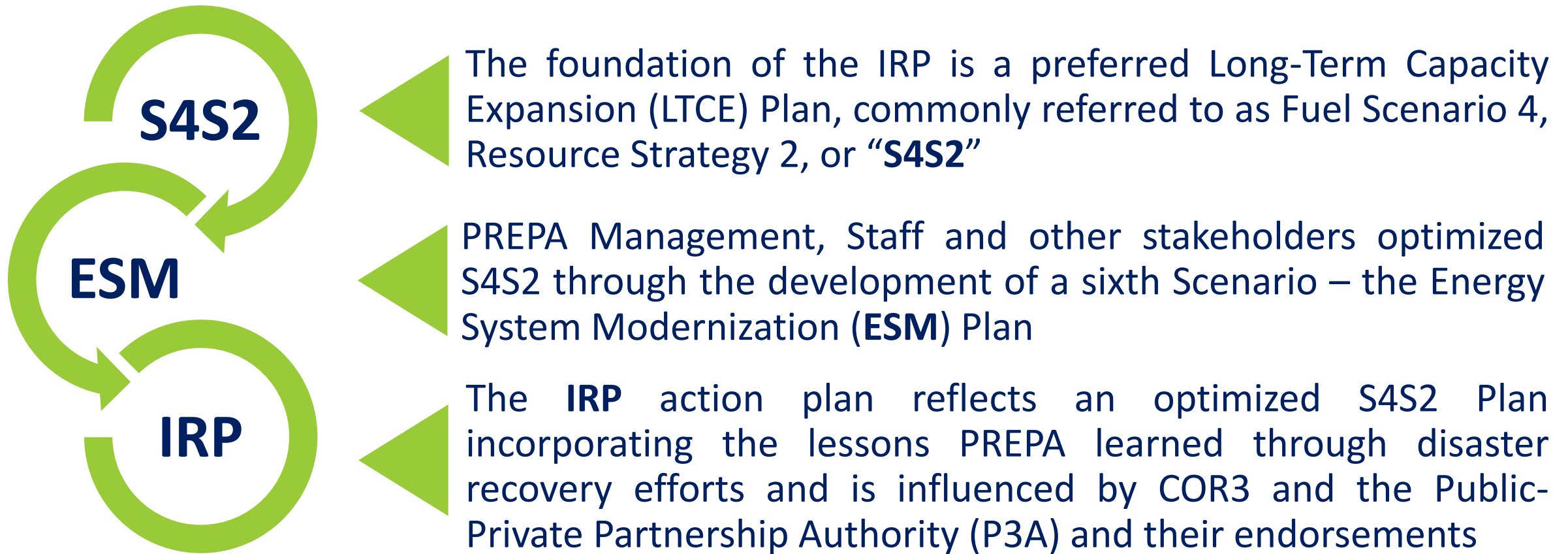
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# Incorporating the ESM into the IRP Action Plan

## The S4S2 Plan is the foundation of the IRP’s Action Plan:

- Preferred LTCE plan that supports resiliency objectives
- Siting and integration of solar and energy storage resources to comply with Puerto Rico’s Energy Public Policy
- Thermal generation resource locations to serve critical loads

| Ambitious Renewable Requirements |                                                     |
|----------------------------------|-----------------------------------------------------|
| Act 17                           | 2025: 40% of generation<br>2050: 100% of generation |
| IRP                              | 2020: 300 MW<br>2021:780 MW (total)                 |

## The ESM Plan optimizes the S4S2 Plan to Provide:

- Locations for new generation resources that reflect lessons learned from disaster response activities
- Expeditious deployment of new peak generation
- Flexibility to respond to deviations from model assumptions like load forecasts through near-term development efforts that will hedge against resource development and deployment uncertainties

**Optimized Resource Locations and MiniGrid Technologies Will Allow Isolated Operation of Systems Impacted by Severe Weather Events**

Source: Siemens Integrated Resource Plan June 7, 2019



# Implementing the IRP Action Plan

## 1. Pursue Resources Solutions Identified in the LTCE Model (S4S2)

- Large-scale procurement of renewable energy and energy storage
- Begin development activities for new F-Class CCGT at Costa Sur
- Develop new F-Class CCGT at Palo Seco

## 2. Preserve Optionality and Hedge Against Uncertainties (ESM)

- EcoEléctrica – Renegotiated PPOA reduces development risks and cost uncertainties
- Yabucoa - Begin development activities for LNG Terminal and F-Class CCGT
- Mayaguez - Begin development activities for LNG Terminal, Peaker Fuel Conversion, and possible F-Class CCGT

## 3. Prepare for Near- and Long-Term Disaster Response (ESM)

- Replace existing Frame 5 GTs with modern Peaker GTs as soon as practicable
- Optimize locations of peak generation resources to support MiniGrids

Source: Siemens Integrated Resource Plan June 7, 2019

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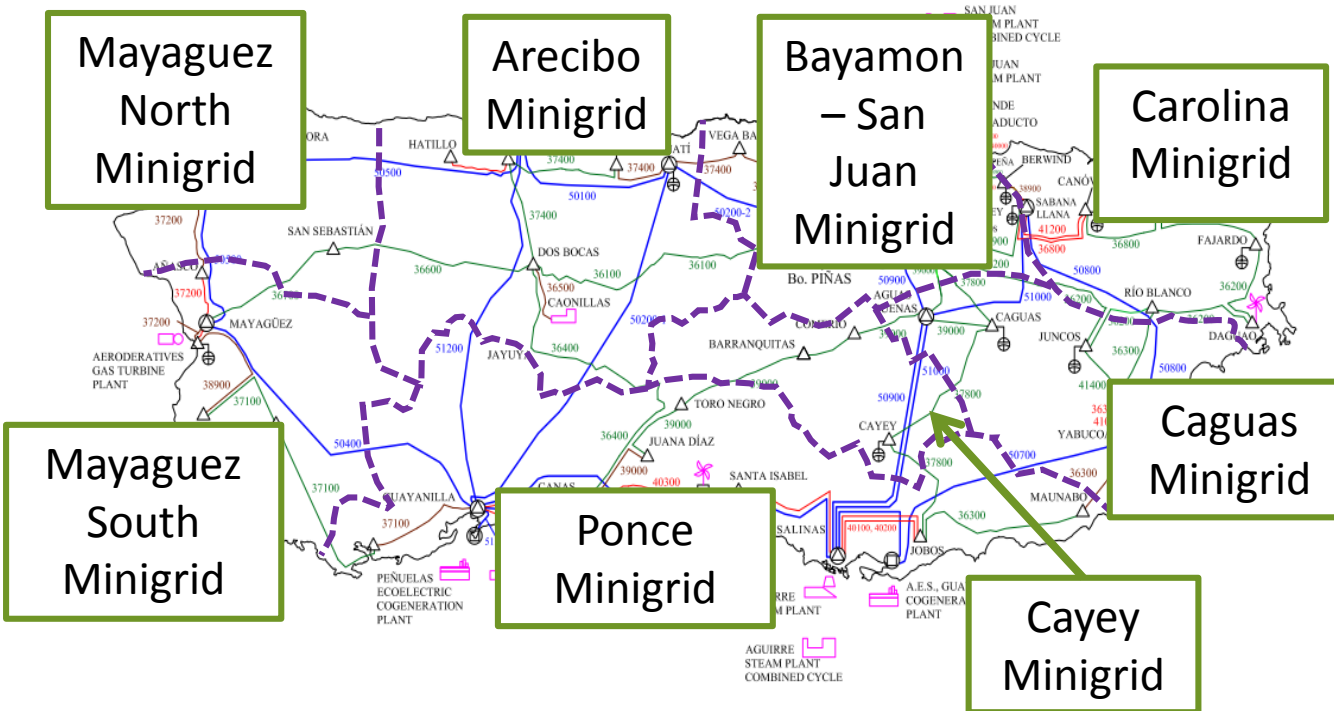
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# Transform the Transmission & Distribution System



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1. Create “Minigrids” of self-sufficient electric islands through the use of distributed resources and transmission and distribution (T&D) system hardening
2. Convert Some Retired Plants to Synchronous Condensers

**Central to the IRP is Developing the Capability to Segregate the Current Electric Transmission System into MiniGrids to Improve Resiliency**

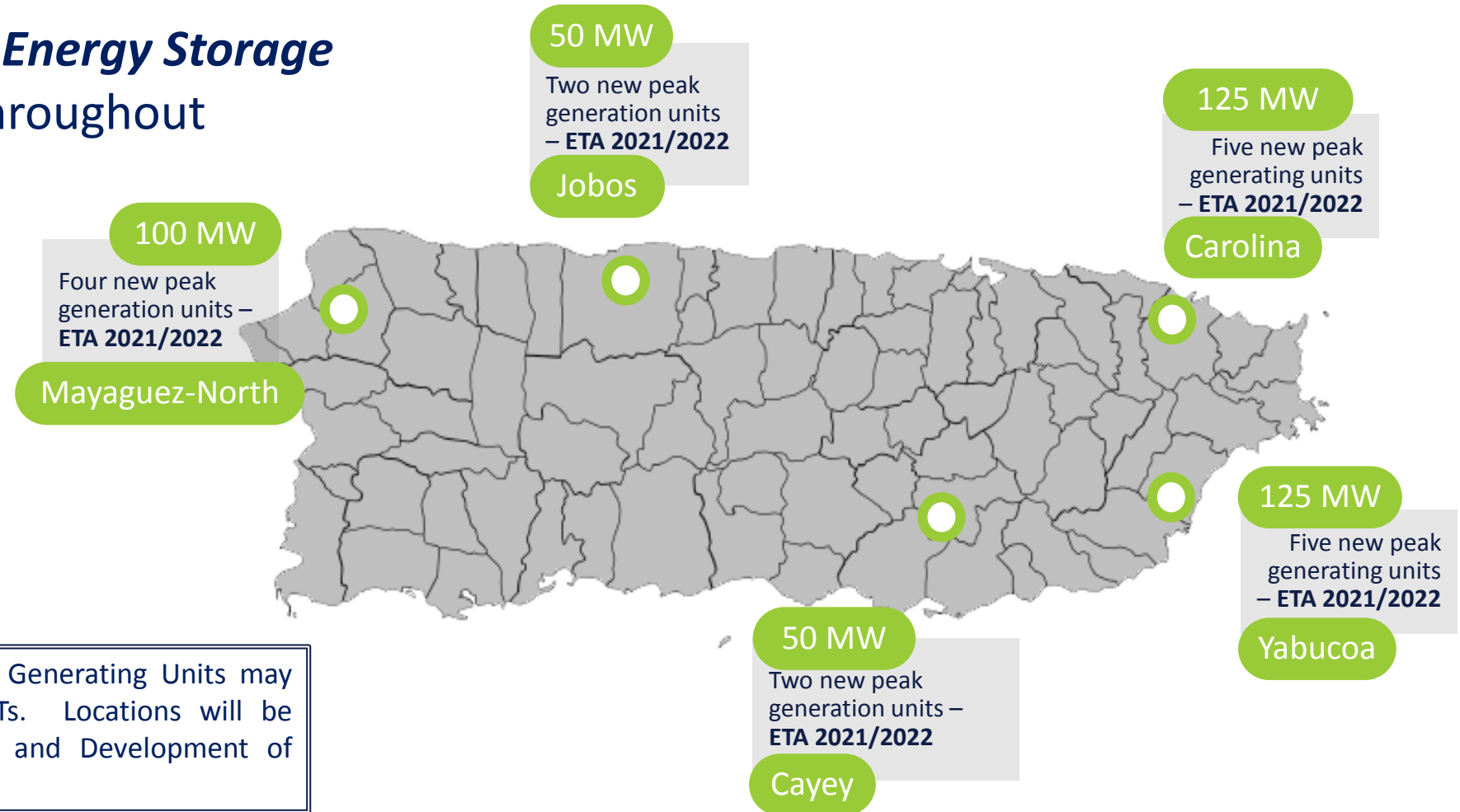
# Near-Term Resiliency Projects



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In addition to ***Solar and Energy Storage projects*** to be located throughout Puerto Rico, the IRP Action Plan calls for ***replacement of existing outdated Peaking Generation Units*** with modern Natural Gas Fired units

On an Interim Basis, Peaking Generating Units may Replace Existing Frame 5 GTs. Locations will be Optimized Pending Build-out and Development of MiniGrid Infrastructure



Source: Siemens Integrated Resource Plan June 7, 2019

# Long-Term Fuel Switching Projects



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Conventional High-Efficiency Gas-Fired Generation Will Provide a ***Robust, Greener and More Reliable*** Generation Backbone to Puerto Rico

200 MW

Conversion of peaking units (200MW) and Development of LNG Infrastructure creates significant improvements in fuel costs and emissions  
**ETA 2023 & 2025**

Mayaguez

300 MW

Construction of new, natural gas-fired, combined cycle unit on the existing Palo Seco Power Plant Site – **ETA 2025**

Palo Seco CCGT

400 MW

Conversion of San Juan Power Plant's combined-cycle units to burn natural gas creates significant improvements in fuel costs and emissions  
– **ETA 2019**

San Juan 5 & 6

300 MW

Development of new, natural gas-fired, combined cycle unit and LNG infrastructure in area hardest hit by hurricanes  
– **ETA 2025**

Yabucoa CCGT

300 MW

Construction of new, natural gas-fired, combined cycle unit unless existing EcoEléctrica PPOA is renegotiated – **ETA 2025**

Costa Sur CCGT

Several of these projects will require LNG importation, storage and regasification infrastructure:

1. San Juan 5 & 6 (underway)
2. Palo Seco (300 MW – Expandable)
3. Mayaguez (Existing Fast Response)
4. Yabucoa (Contingency resource)

Source: Siemens Integrated Resource Plan June 7, 2019

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# Closing



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- PREPA looks forward to a robust and collaborative process to obtain PREB and stakeholder acceptance of a final IRP
- PREPA has proposed an optimized Long-Term Capacity Expansion Plan that provides a cost-effective solution to resource planning while providing for grid and generation resiliency and hedges against resource development and deployment uncertainties
- PREPA's Planning, Project Management, and Generation Staff will now present the specific aspects of the IRP. They are supported by advisors from Siemens, Sargent & Lundy, Navigant, Filsinger Energy Partners, and King & Spalding