

PREPA's electrical system

Current condition and a look towards transformation

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Vision y Mission

Vision

Transform Puerto Rico's public energy infrastructure in an efficient and sustainable manner, focused on world-class standards, maximizing the operational expertise and capital of the industry's leading private sector.

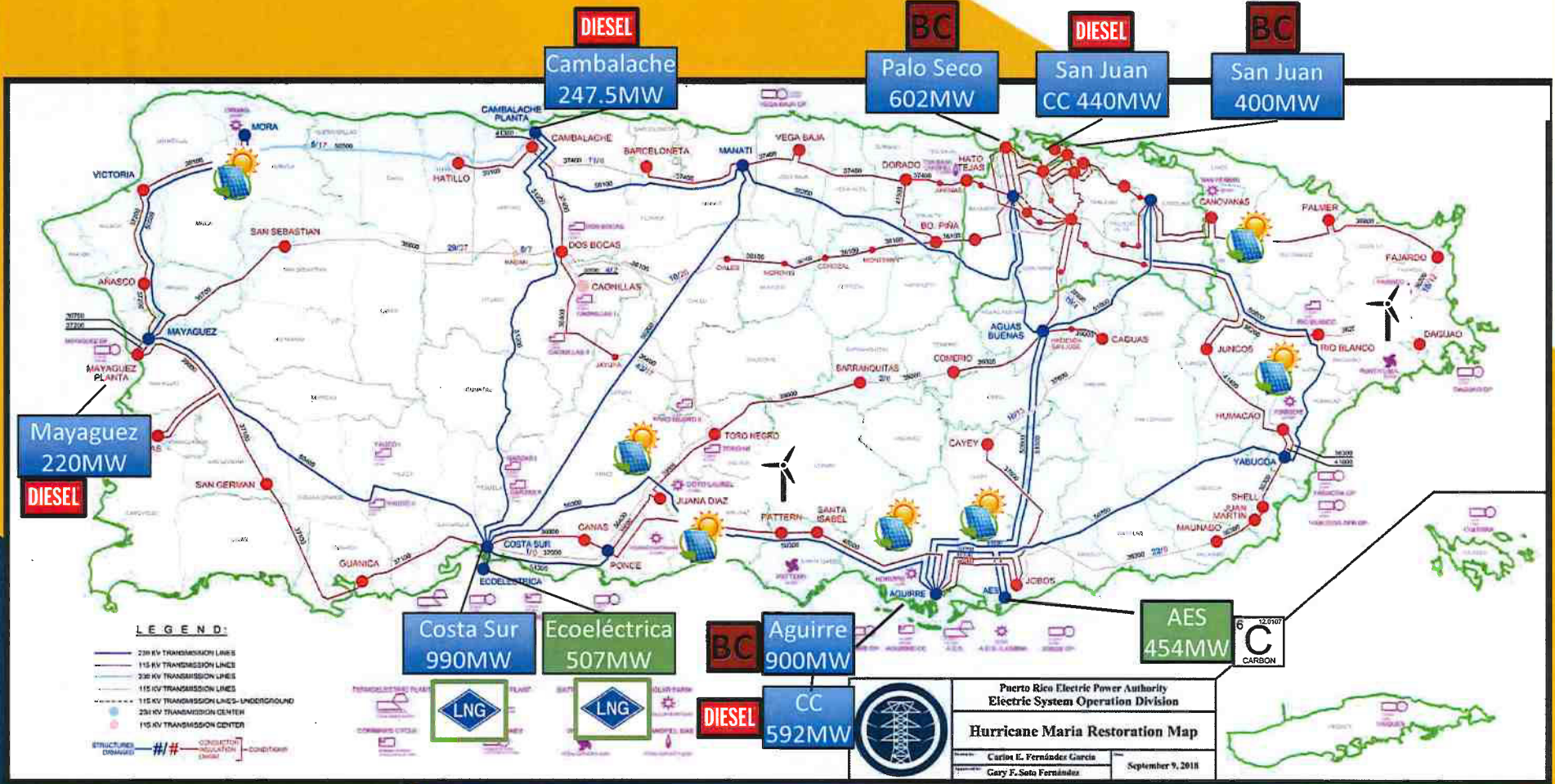
Mission

Improve and provide profitable and world-class energy services, by optimizing existing operations and at the same time supporting the planning, reconstruction and new construction of generation and transmission / distribution infrastructure with federal funds, to meet or exceed reliability and resilience objectives, in support of the execution of the transformation plan.



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Description of the Generation System



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Gas turbines
378 MW

18 Gas turbines

Hydroelectric
99.7 MW

10 hydroelectric power plants

Renewables
253.9 MW

7 Photovoltaic power stations (147.1 MW)

3 Wind farms (102 MW)

2 Landfill Gas (4.8MW)

Total Installed capacity

- PREPA - 4,877 MW
- AES & ECO – 961 MW
- RENEW – 253.9 MW
- Total - 6,091 MW

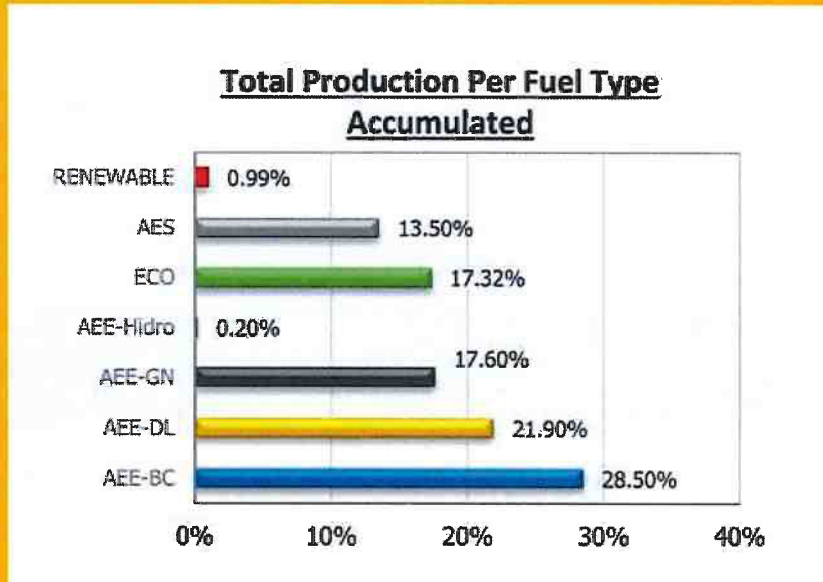
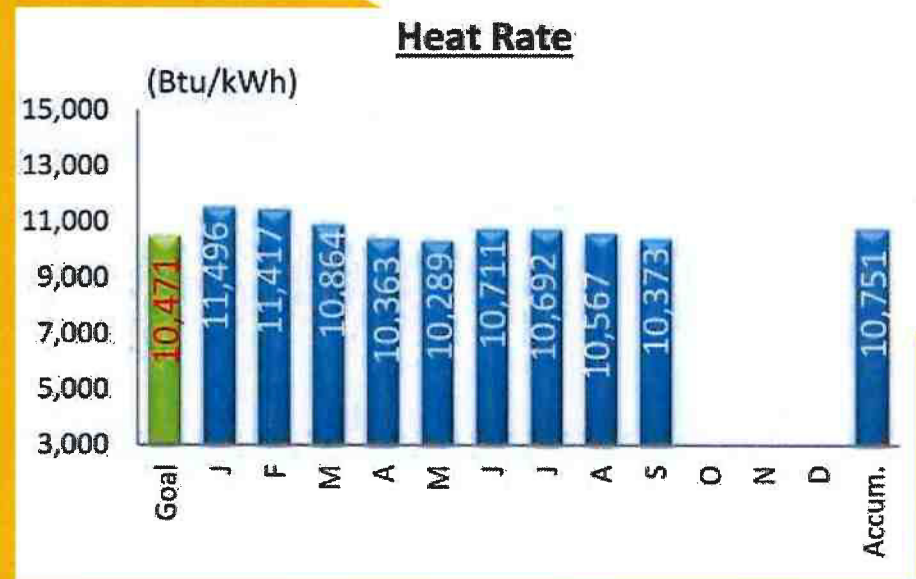
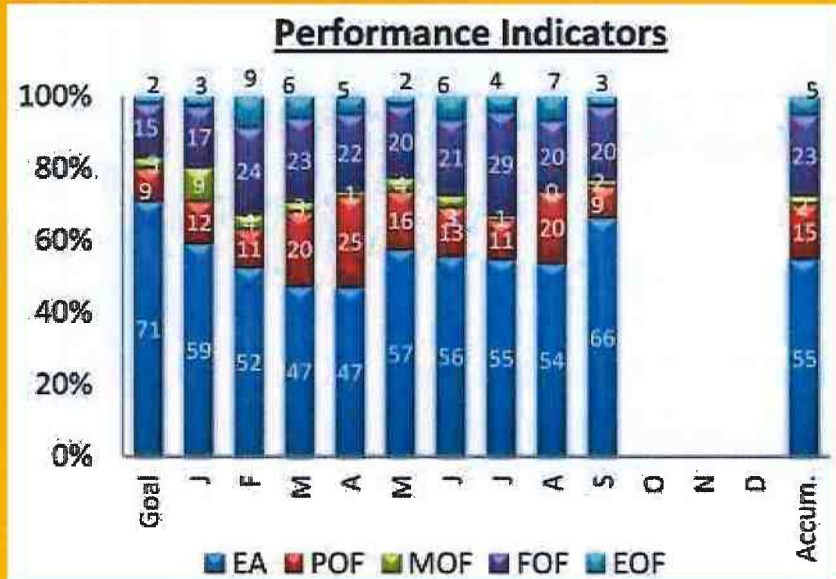
Description of the Generation System

Power Plants	Installed Capacity	
	MW	% Total
Steam		
San Juan	400	6.57
Palo Seco	602	9.88
Costa Sur	990	16.25
Aguirre	900	14.77
Total steam Units	2892	47.47
Other Power Plants		
SJ CC	440	7.22
Aguirre CC	592	9.72
Cambalache	247.5	4.06
Mayaguez	220	3.61
Gas Turbine (18 Peaking units)	378	6.20
Diesel units	7.9	0.13
Total other Units	1885.4	30.95
Hydroelectric power plants	99.7	1.64
PREPA's total	4877.1	80.05
Purchased energy		
ECO	507	8.32
AES	454.3	7.46
Total Co-Generation	961.3	15.78
Renewable energy		
Solar	147.1	2.41
Wind	102	1.67
Landfill	4.8	0.08
total	253.9	4.17
Total Generation Installed	6092.3	100



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Description of the Generation System - KPI



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Description of the Transmission and Distribution System

Transmission and sub-transmission voltage lines	Amount in miles
230kV – aerial	412.37
115kV - aerial	664.30
115kV- underground	36.68
Sub-total	700.98
38kV- aerial	1,077.17
38kV – branches	180.44
38kV – underground	63.24
38KV - submarine	54.73
Sub-total	1,375.58
Total	2,490
Distribution voltage lines	Amount in miles
Aerial	30,005
Underground	1,188
Total	31,893



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Substations and switchyards

Type of electrical installation	Amount
Transmission Centers	175
Transmission Centers located in Generating Power Plants	30
Public Substations (AEE)	341
Private Substations	822

Transformers

Power Transformers	Amount
Distribution Transformer	360
Transmission Transformer	92
Generator Transformer	107
Total	559



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Generation and T&D transformation overview



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Generation system Initiatives

Projects

- Conversion to Natural Gas (LNG) of San Juan 5 and 6 (440 MW)
- Conversion to Natural Gas (LNG) of Mayagüez (220MW)
- Generation for Culebra & Vieques
- Energy storage (BESS)
- Replacement of "Peaking Units" units (18 Units / 21MW ea)
- Improvements to hydroelectric systems
- Construction of large-scale renewable energy facilities

All projects may be reviewed according to the Integrated Resources Plan



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Long term generation plan

Generation Type	Projected Capacity (MW)
Utility Solar PV	2,040
Diesel Peakers	597
Large CCGT	1,107
Battery Storage	1,340
Total	5,084



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T&D Overview

T&D

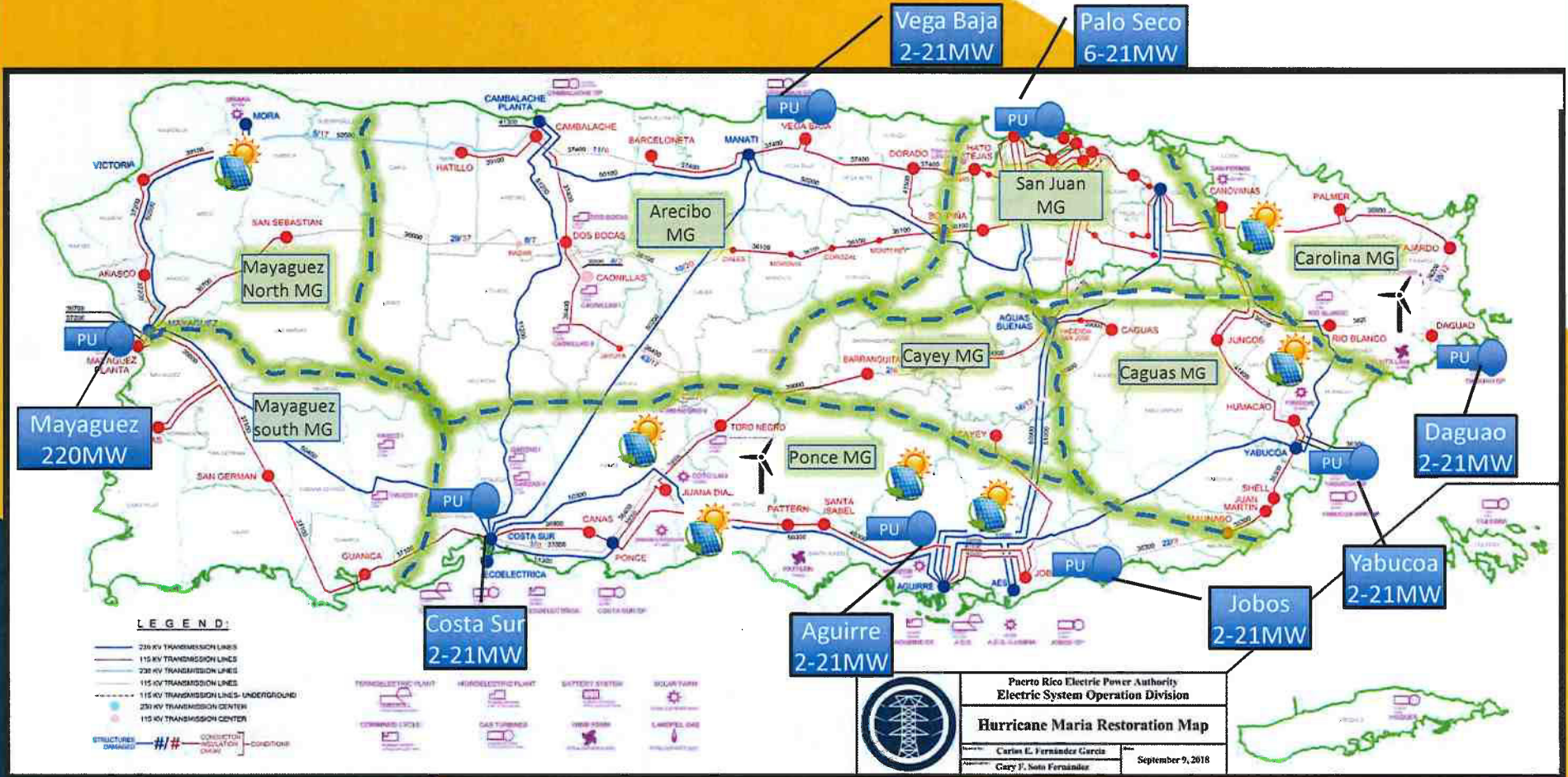
- Application of new codes and standards in the construction of power lines
- Automation of the electrical distribution system
- Underground transmission and distribution lines
- Construction of gas insulated substations (GIS-Gas Insulated Substations)
- Replacement of over 700 Oil Circuit Breakers (OCB)
- Replacement of all electromechanical protection relays by microprocessor-based relays
- Creation of Minigrids and microgrids

Resiliency Supported by Minigrids and Microgrids



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- Creation of Minigrids and microgrids



PU — Gas turbines
378 MW

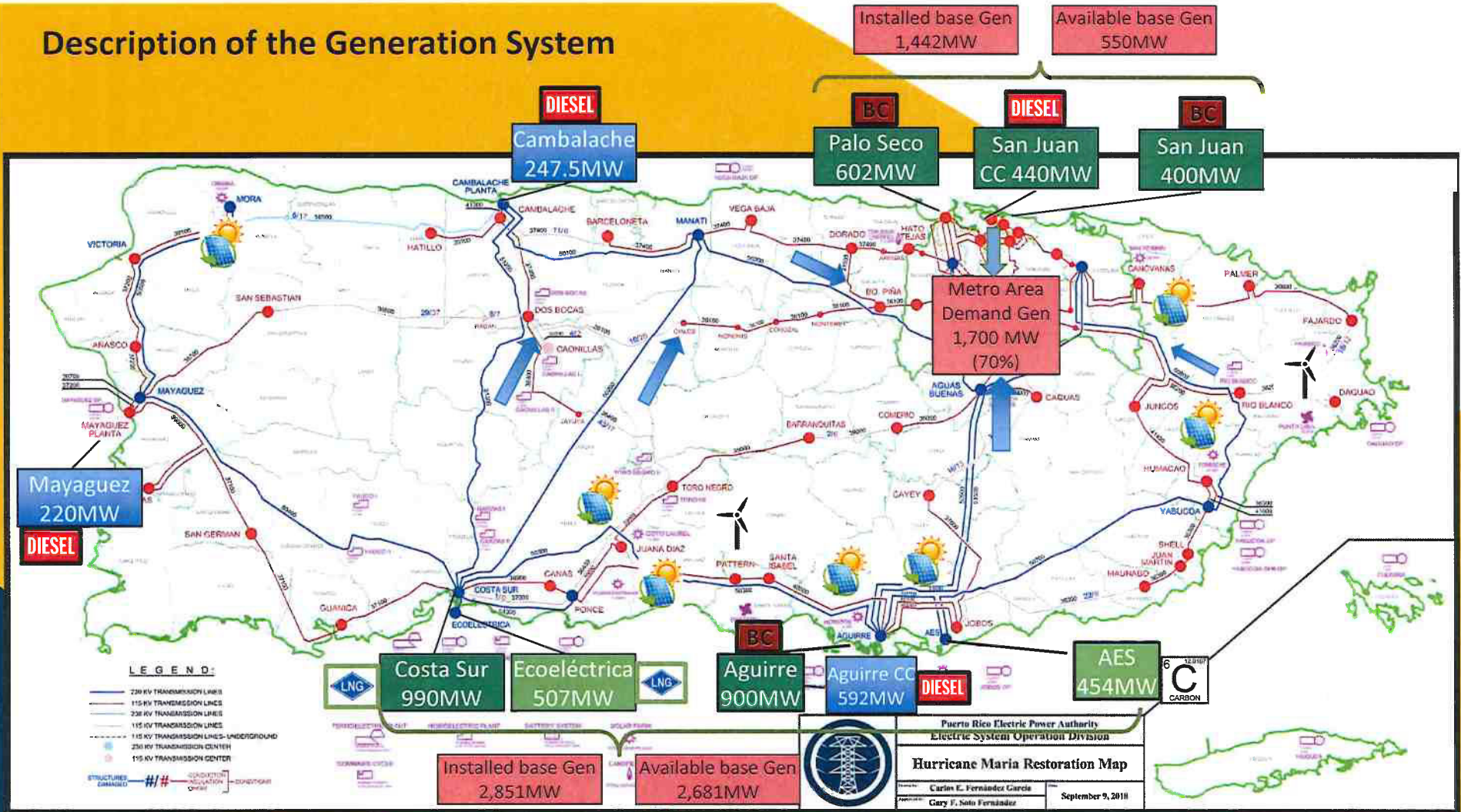


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Description of the Generation System



2018 Max Demand Gen
2,705 MW



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18 Gas turbines

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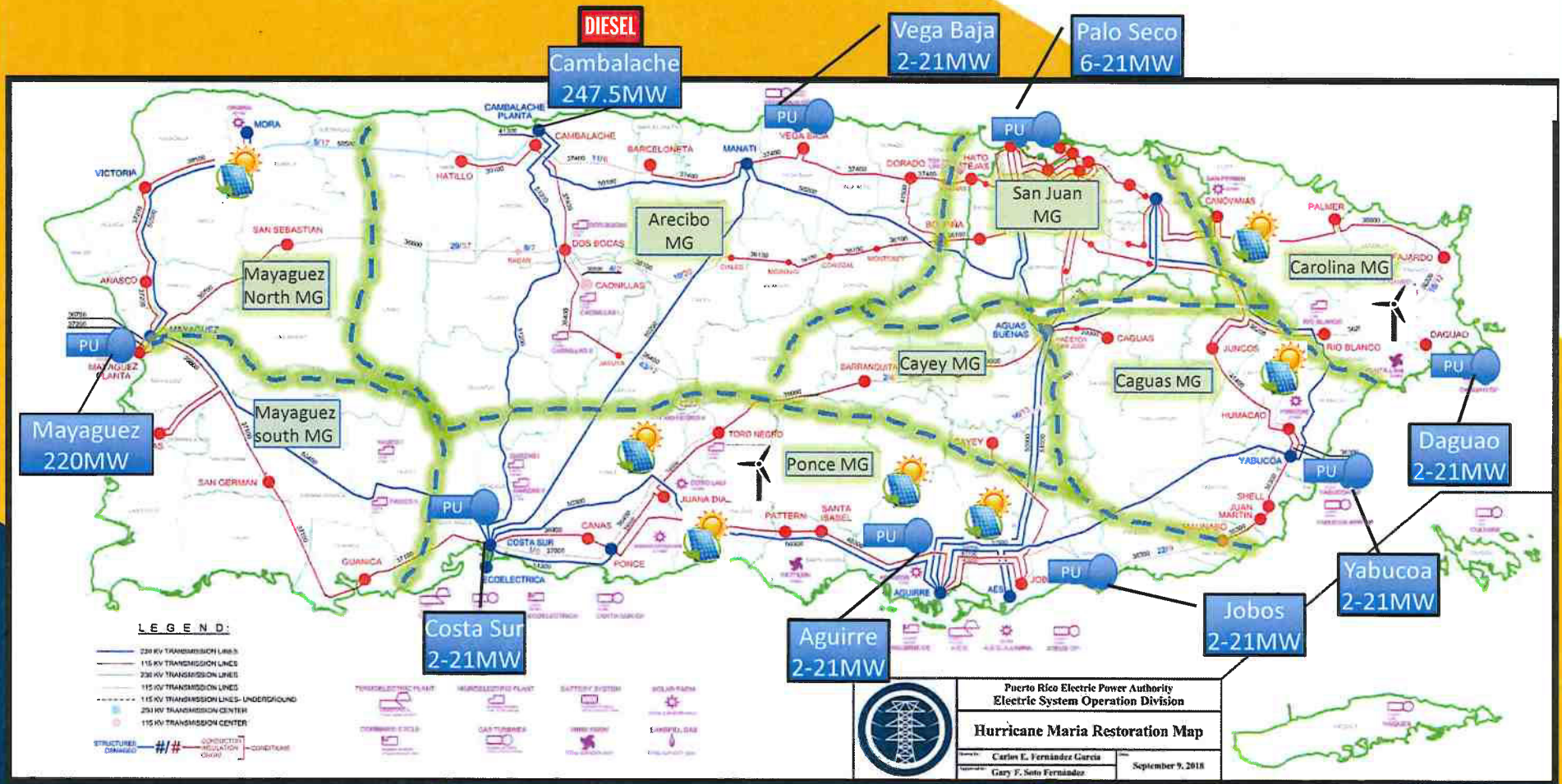
Renewables
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Total Installed capacity

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- Creation of Minigrids and microgrids



PU — Gas turbines 378 MW

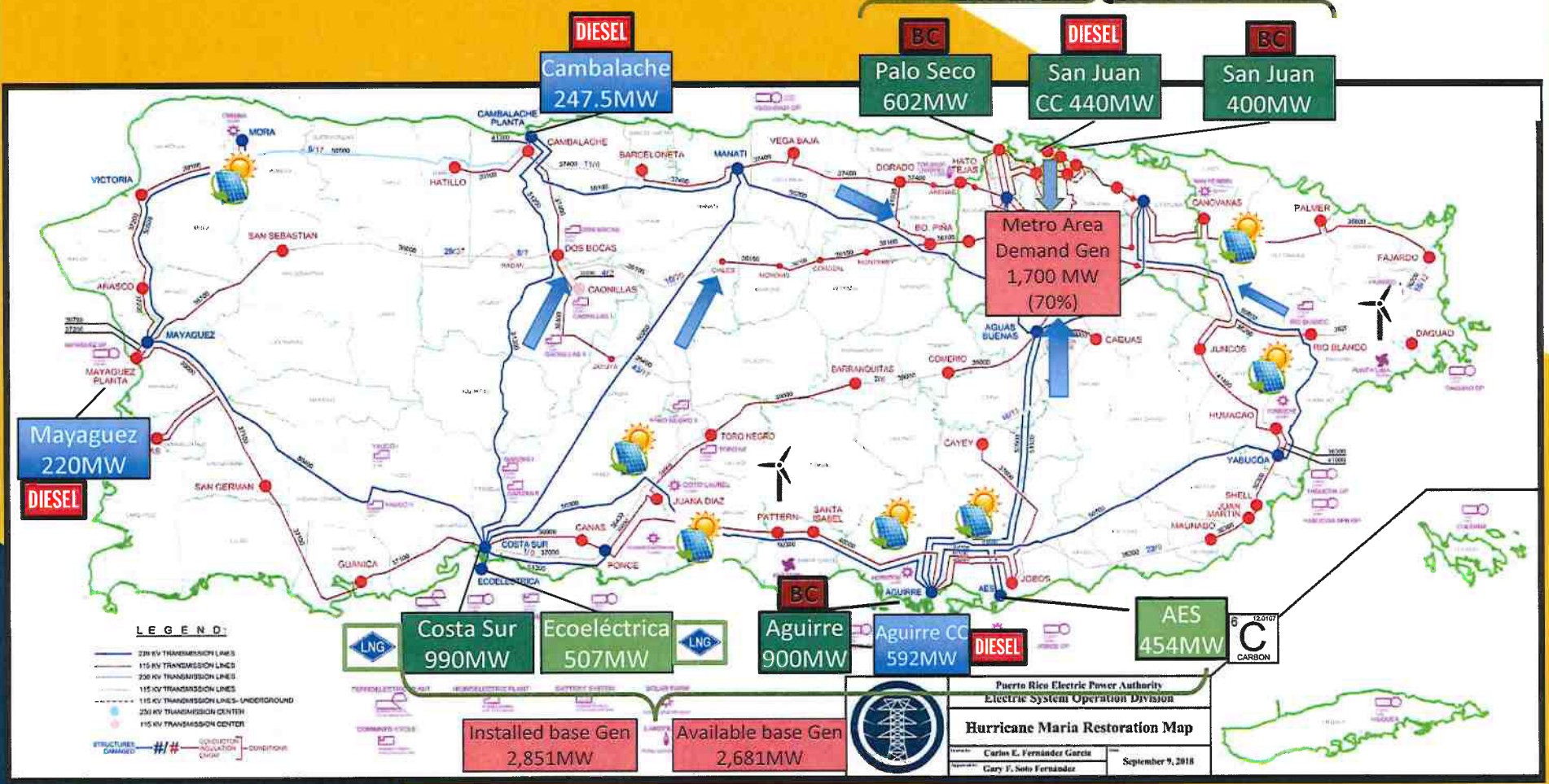


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Description of the Generation System

Installed base Gen 1,442MW
Available base Gen 550MW



2018 Max Demand Gen 2,705 MW



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Total Installed capacity

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PREPA

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In summary, electric generation optimizations, funded in-part with Federal support, and including dual fuel/LNG conversions, new efficient units, and renewables such as wind, solar, and battery-storage will yield a resilient, sustainable, and economic grid for Puerto Rico.

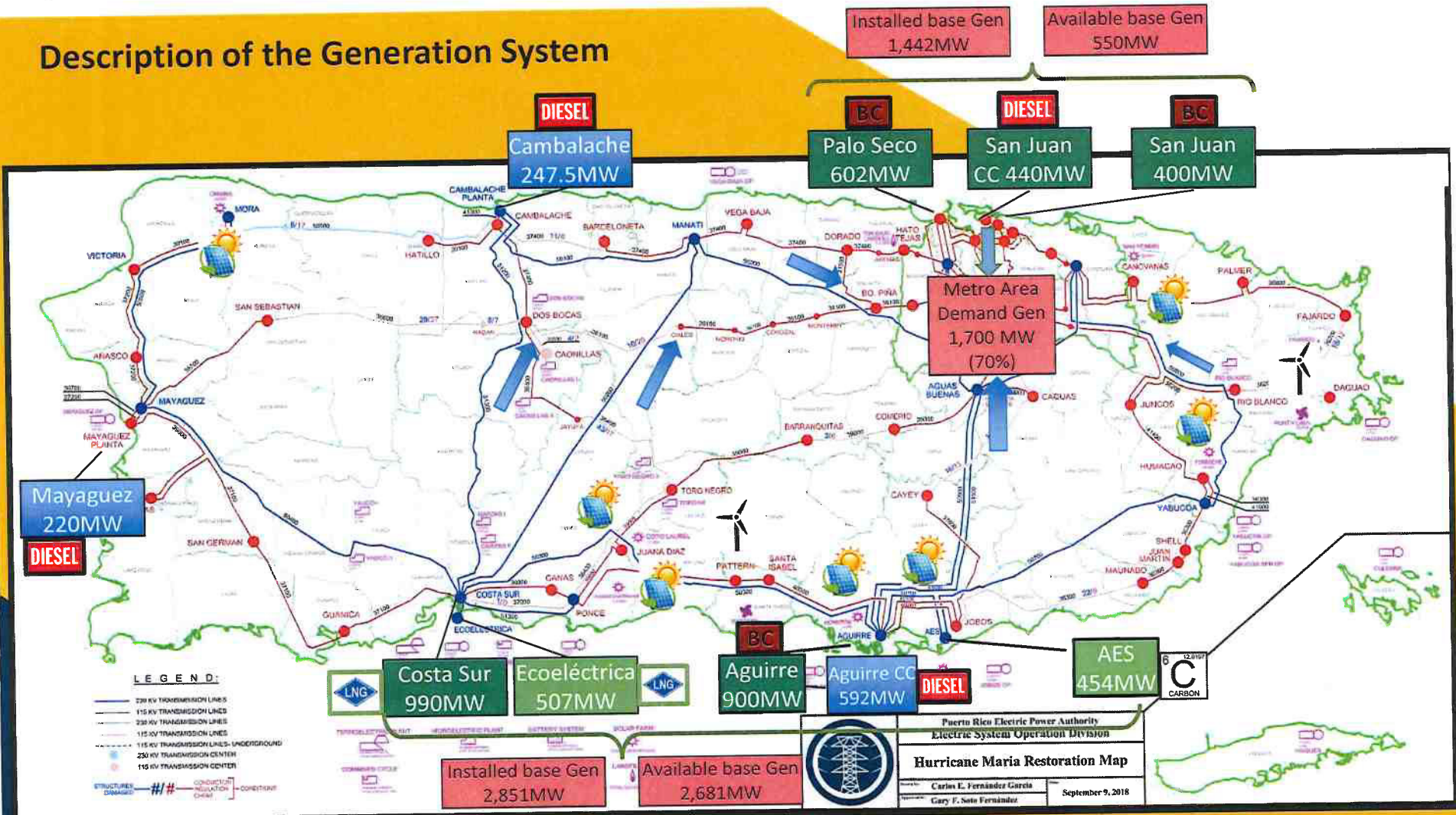
\$981M

Cumulative Annual Savings

	Current Rate	Retail Rate
		22.7¢
San Juan LNG		0.9
Costa Sur Reliability		0.3
PPOA Renegotiation		0.8
Mayaguez LNG		0.2
Smartmeter		1.4
Peaker Generation		0.0
Palo Seco CC		0.7
Aguirre LNG		0.2
South East CC		0.1
Renewables		1.1
Jones Act		0.6
Total		6.3¢
Potential Rate		16.4¢

Initiatives presented are potential projects under current consideration. Inclusion herein should not be viewed as a guarantee of execution. Impacts of Initiatives are indicative and intended for discussion purposes only. Values expressed are dependent on multiple factors – actual impacts may vary materially.

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2018 Max Demand Gen
2,705 MW



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Retail Rate 22.7¢
Current Rate

Initiative	Current Rate	Potential Rate
San Juan LNG	0.9	16.4¢
Costa Sur Reliability	0.3	
PPOA Renegotiation	0.8	
Mayaguez LNG	0.2	
Smartmeter	1.4	
Peaker Generation	0.0	
Palo Seco CC	0.7	
Aguirre LNG	0.2	
South East CC	0.1	
Renewables	1.1	
Jones Act	0.6	
Total	6.3¢	16.4¢



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MW / MWh

Initiative	MW	MWh
San Juan LNG	440	7.7
Costa Sur Reliability	820	9.7
PPOA Renegotiation	850	10.5
Mayaguez LNG	200	10.5
Smartmeter	300	8.0
Peaker Generation	300	8.0
Palo Seco CC	480	7.3
Aguirre LNG	900	9.7
South East CC	480	7.3
Renewables	1000	7.3



Draft 10/13/2018

5.5 GW

Of Generation Projects including 2.5 GW of New Generation

In summary, electric generation optimizations, funded in-part with Federal support, and including dual fuel/LNG conversions, new efficient units, and renewables such as wind, solar, and battery-storage will yield a resilient, sustainable, and economic grid for Puerto Rico.

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