End-User Needs in Puerto Rico for Microreactors

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Background on Puerto Rico Energy Sector
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Ongoing efforts in Puerto Rico for Advanced Nuclear
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End-user needs in Puerto Rico
Background on Puerto Rico Energy Sector
Cambalache Diesel – 166 MW
Palo Seco Resid – 432 MW Diesel – 126 MW
San Juan Resid – 200 MW Diesel – 400 MW
Other Diesel 168 MW
Hydro 34 MW
Mayaguez Diesel – 200 MW
Costa Sur Gas – 820 MW Diesel – 42 MW
EcoElectrica Gas – 507 MW
Aguirre Resid – 900 MW Diesel – 562 MW
AES Coal – 454 MW

Source: PREPA, Siemens
Puerto Rico's Sources of Energy Generation

- Renewable: 2.0%
- Coal: 17.0%
- Natural Gas: 34.0%
- Petroleum: 47.0%

Source: EIA
✓ Retirement/Replacement of more than 4,000 MW of installed fossil fuel generation [source: PREPA]
Financial and Oversight Board

Financial Oversight and Management Board (H.R.5278-14th U.S. Congress) calls for energy projects with strong economic potential.
PREPAs Privatization

✓ All transmission and generation assets to be sold 2019-2020 timeframe.
Relevant trends in Puerto Rico:
Independence from PREPAs Central Grid

Small co-generation LNG units
Hospital Concepcion, Municipality of San German, Puerto Rico

Signing of Puerto Rico’s First Municipality Energy Consortium, Villalba, Puerto Rico
Background on Puerto Rico Energy Sector

Ongoing efforts in Puerto Rico for Advanced Nuclear
Early community and leadership engagement

THE NUCLEAR ALTERNATIVE PROJECT
CÁMARA DE REPRESENTANTES
R. DE LA C. 1189
INFORME POSITIVO
5 de noviembre de 2013

A LA CÁMARA DE REPRESENTANTES DE PUERTO RICO:

La Comisión de Asuntos Internos de la Cámara de Representantes de Puerto Rico, previo estudio y consideración de la ley de la C. 1189, de la autoría del representante Rodríguez Aguiló, tiene a bien someter su informe recomendando la aprobación de la medida, con las enmiendas incluidas en el enmienda electrónico que se acompaña, y cuyo título es:

"Para ordenar a la Comisión de Gobierno de la Cámara de Representantes de Puerto Rico, realizar una investigación sobre la conveniencia y necesidad de establecer en Puerto Rico plantas nucleares para producir energía, las nuevas tecnologías existentes para el diseño y operación de las mismas, sus características de seguridad; y para otros fines relacionados."

ALCANCE Y ANÁLISIS DE LA MEDIDA

La Resolución de la Cámara Núm. 1189, tiene el propósito de realizar una investigación sobre la conveniencia y necesidad de establecer en Puerto Rico plantas nucleares para producir energía, las nuevas tecnologías existentes para el diseño y operación de las mismas con características de seguridad; y para otros fines relacionados.
Proposal for Feasibility Study

Technical Advisory Board

Luis Reyes
Chair of the Board

THE NUCLEAR ALTERNATIVE PROJECT

Pacific Northwest
McConnell Valdés
ARUP
EXCEL

HITACHI
MEIC, LLC

NUSCALÉ
Westinghouse

X-energy
Overall plan moving forward

- Early community and leadership engagement
- Policy in Puerto Rico: Resolution 1189
- Proposal for Feasibility Study
Overall plan moving forward

- Early community and leadership engagement
- Policy in Puerto Rico: Resolution 1189
- Proposal for Feasibility Study
- Early customer engagement
Background on Puerto Rico Energy Sector

Insights into nuclear activity in Puerto Rico

What are the needs we are seeing first hand to deploy microreactors in Puerto Rico?

Ongoing efforts in Puerto Rico for Advanced Nuclear

End-user needs in Puerto Rico
Resilient by Design: Enhanced Reliability and Resiliency for Puerto Rico's Electric Grid

Siemens
Microgrid integration + Optimal City Resiliency Index
Pharmaceutical – Facility in Town of Fajardo, Puerto Rico

- 250,000 sqrt-ft facility

- It took 4 weeks to restart the Site, and another 4-5 months to reach normal operation levels (full PREPA supply).

- Losses due to facilities repairs and production loss in the range of $1.5-2.0 MM

- Connected to PREPA’s grid 7/24 through a 32kV distribution line

- Two (2) diesel fuel generators, 2.5MW each
Pharmaceutical – Facility in Town of Fajardo, Puerto Rico

• Looked at alternative of LPG-fed, modular micro-turbines for Site generation of power, without disconnecting from PREPA. The capital needed for the equipment installation and connection to our internal distribution system (coordination between PREPA, diesel generators, and micro-turbines supply streams) made the investment not feasible.

• Cost of electricity from PREPA ~0.21/kWH, with an expectation of a 10-15% increase in 2019.

• Diesel cost is approximately $2.6/gallon. During a typical year consumption around $950k in fuel; an emergency situation can add another $200-250k in costs
Hospitals – Puerto Rico

- $500,000 a year in electricity and diesel costs

- PREPA costs expected to increase this year and hospitals energy demand expected to increase with enhanced technologies for CTSCANs, Laboratory and emergency room.

- Lack of diesel in the aftermath of Maria – personnel had to use Diesel from ambulances to keep the generators running

- PREPA restored power 4 weeks after Maria

- $2 million in losses after Maria
In closing...

• The Market...
  Shared insights into the market in Puerto Rico

• Nuclear in Puerto Rico
  The Nuclear Alternative Project: Community & leadership, follow-up with Resolution 1189 and feasibility study.

• End user needs in Puerto Rico
  Needs focused on microgrid integration and energy demands/resiliency needs for pharmaceutical/hospitals applications
Thank You
For a Better Puerto Rico