Cybersecurity Best Practices
Preparation and Incident Response

Energy Bar Association Webinar – March 2019

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The Cybersecurity and Privacy Team at Hunton Andrews Kurth

- Over **35 cybersecurity and privacy professionals** in the US, EU and Asia
- Energy Sector Security Team brings together **14 practice groups** to provide comprehensive cybersecurity and privacy assistance
- Our clients have included **6 of the Fortune 10**, and many major energy companies
- Represent clients across multiple industry sectors, including energy, utility, technology, financial services, transportation, retail, consumer products, health care, publishing and advertising
- Centre for Information Policy Leadership

Thought Leadership
Our team regularly provides insights on current privacy and cybersecurity issues and trends.

www.HuntonPrivacyBlog.com  @hunton_privacy
The Energy and Infrastructure Team

• Nationally recognized, comprehensive practice with over 300 professionals dedicated to representing energy sector clients.

• Represent broad range of clients, including investor-owned utilities, ISOs and RTOs, stand-alone transmission companies, electricity suppliers, natural gas companies, interstate and intrastate pipelines, and local distribution companies.

• Attorneys are regularly active before FERC, NERC, and regional reliability entities.

• Federal and state legislative and regulatory advocacy on energy policy.

Thought Leadership
Our EIT team contributes regularly to leading publications in the industry.

The Insurance Coverage Team

• Nationally recognized, with over 16 professionals with experience in handling insurance issues across the country.
• Part of the firm’s Cyber and Physical Security Task Force, advising clients on cyber and other relevant insurance issues relating to cybersecurity and privacy (among other exposures).
• The group has extensive experience advising policyholders of all sizes in the energy, pipeline, and other industries.
• The group has successfully litigated and arbitrated coverage disputes across the country and abroad, obtaining judgements and settlements totaling in the billions of dollars.

Thought Leadership
Our team regularly posts updates, analysis, and breaking news for commercial policyholders.

www.HuntonInsuranceRecoveryBlog.com  @HuntonInsurance
The Cyber Threat Landscape
Cyber Threats to the Energy Sector

2012
- Destructive malware attacks on Saudi Aramco and Qatar RasGas

2013
- Iranian cyber attacks on control systems of oil and gas companies
- PRC cyber espionage targets 23 natural gas pipeline companies

2014
- Black Energy, Havex and Sandworm malware attacks on energy ICS

2015
- Cyber attack on Ukraine power grid

2016
- Ransomware attacks on midwest utility company

2017
- Cyber attacks on Wolf Creek Nuclear and other energy companies

2018
- DHS/FBI report on Russian cyber attacks on energy and other companies
- Cyber attack on Energy Transfer Partners electronic data interchange
Cyber Threats

**Threat Actors**
- **Terrorists**
- **Nation States**
- **Hacktivists**
- **Organized Crime**
- **Insiders**

**Cyber Attacks**
- Unauthorized Access
  - Theft of Data
- Destruction of Data
  - Misappropriation or Misuse
- Unauthorized Disclosure, Disposal, Transmission
- Unauthorized Encryption of Data for Ransom
- Denial of Service
- Integrity Loss (Unauthorized Changes)
- Privilege/Access Escalation
  - Impersonation

**What’s at risk?**
- Service Delivery
- Infrastructure
- Sensitive Company Information
- Customer Service
- Personal Information
### US Cybersecurity Regulatory Landscape

<table>
<thead>
<tr>
<th>Federal Law</th>
<th>State Requirements</th>
<th>Industry Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHMSA &amp; MTSA</td>
<td>NYDFS Regulations</td>
<td>PCI DSS</td>
</tr>
<tr>
<td>CFATS</td>
<td>MA, NV, CA and progeny</td>
<td>ISO</td>
</tr>
<tr>
<td>NERC CIP</td>
<td>Breach notification laws</td>
<td>NIST</td>
</tr>
<tr>
<td>HIPAA/HITECH</td>
<td>Mini-FTC Acts</td>
<td>COBIT</td>
</tr>
<tr>
<td>FTC &amp; GLB Acts</td>
<td>Disposal Laws</td>
<td>ISA/IEC</td>
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<tr>
<td>SEC Reporting</td>
<td>Surveillance Laws</td>
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<tr>
<td>ECPA/CFAA</td>
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<tr>
<td>SOX</td>
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<tr>
<td>CISA</td>
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MA, NV, CA and progeny

© Hunton Andrews Kurth LLP
• Mandatory and Enforceable Cyber Security Standards
  • (CIP-002 through CIP-011)
• Compliance is subject to intensive review by NERC, NPCC, and FERC
• Have been in place for a decade and evolved substantially in recent years
  • Recent developments
• Enforcement was traditionally aggressive. Has moderated but risks are still considerable.
• Supply Chain Risk Management
  • (CIP-013)
## Global Cybersecurity Legal Developments

<table>
<thead>
<tr>
<th>US breach notification regime</th>
<th>Mature framework</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU General Data Protection Regulation (GDPR)</td>
<td>Harmonization of legislation, Widened scope, Increased enforcement, fines and liability</td>
</tr>
<tr>
<td>EU Directive on Security of Network and Information Systems</td>
<td>First set of pan-EU rules governing cybersecurity, Applies to “operators of essential services” and “digital service providers”, Requires managing cyber risks and reporting major security incidents</td>
</tr>
<tr>
<td>China Cybersecurity Law</td>
<td>Establishes robust data security requirements for “network operators” and “operators of critical information infrastructure” in China, Law went into effect in June 2017 but several requirements have yet to be finalized</td>
</tr>
<tr>
<td>Breach notification requirements and guidance emerging across the world</td>
<td>EU breach notification requirements (GDPR and NIS Directive), Australia, Canada (Alberta), China, Mexico, Philippines, Russia, South Korea, Taiwan</td>
</tr>
</tbody>
</table>
Harsh Realities at the Top

"There are only two types of companies: those that have been hacked, and those that will be. Even that is merging into one category: those that have been hacked and will be again."

– FBI Director Robert Mueller, March 2012

2013
CEO, CIO Resign
Board inquiries

2014
Anthem
Calls to remove CEO

2015
Director resigns

2016
CEO resigns
CIO resigns

2017
CIO, CSO, CEO retire

2 Shareholder Derivative Suits Filed

WYNDHAM Dismissed

WYNDHAM Shareholder Derivative Suit Filed

Shareholder Derivative Suit Filed
NERC CIP Requirements

- Mandatory and Enforceable Cyber Security Standards
  - (CIP-002 through CIP-011)
- Compliance is subject to intensive review by NERC, NPCC, and FERC
- Have been in place for a decade and evolved substantially in recent years
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- Supply Chain Risk Management
  - (CIP-013)
Data Breach Response Timeline

1. Event
2. Mobilize
3. Legal Posture
4. Law Enforcement
5. Stabilize
6. Investigate
7. Legal Analysis
8. Notify
9. Regulatory Response
10. Lawsuits
11. Review & Improve
Identify incident internally, including reports of intrusions and compromised computers or networks, anomalous network activity, aberrant behavior.

Pay attention to notifications from law enforcement, intel reports from DHS or FBI, information from security vendors.

Don’t ignore white or gray hat hackers, Brian Krebs, or other interested third parties.

Mobilize incident response team.

Protect legal posture
- Preserve privilege when retaining experts
- Legal hold
- Insurance
- Possible initial reporting obligations under PHMSA, MTSA, NERC CIP
Information sharing

Determine the most appropriate agency
- Depends on the nature of the compromise
- Local, federal and international law enforcement may be necessary

Law enforcement often has a broader view into cyber threats

Establish an early line of communication

Coordinate with FBI, DHS, Intel Community
Conduct an Investigation

- Stabilize affected systems and investigate scope
- Contain the attack
- Forensic imaging
- Restore the integrity of the system
- Retain third-party forensic experts?
- Understand:
  - Nature of the compromise
  - Data and systems at issue
  - Whether communications systems are secure
  - Whether insiders are involved
Legal Considerations

Analyze legal requirements

- State, federal, international law
- Industry standards
- Contractual obligations
- SEC reporting

Satisfy your legal obligations arising from the cyber event

- Individual and business notices
- Reports to regulators
- Public disclosure
Prepare for notification and public disclosure
- Retain identity protection service
- Consider PR experts
- Assemble call center

Craft formal notification and reporting documents
- Do this carefully and quickly
- Develop FAQs and train call center agents

Issue notices and manage responses
- Address questions from individuals
- Manage media response
Manage regulatory onslaught and defend against lawsuits

Regulatory enforcement: State, federal and international

Class action litigation

Disputes with business partners and other third parties

Insurance claims
Conduct root cause analysis
• Document as appropriate

Ensure remedial actions have been taken, including disciplinary actions/invoking contractual remedies

Communicate status and outcome to senior leadership

Review and improve data security processes, policies and training
Focus on cybersecurity must come from the top

- Cybersecurity is a fundamental governance issue

Cybersecurity program maturity should be continually assessed

Preparation **will** mitigate harm
Cybersecurity Preparedness Measures

• Establish the appropriate governance structure
• Ensure written information security policies are state-of-the-art
• Identify and classify sensitive data
• Maintain incident response plan
• Prepare Incident Response Team though tabletop exercises
• Prepare data breach toolkit
• Improve access to cyber threat information
• Continually assess status of technical and physical protections
• Manage vendor risks
• Manage employee risks
• Train employees and increase awareness
• Assess cyber insurance, SAFETY Act
**Update Incident Response Plan and Conduct Table Top Exercises**

<table>
<thead>
<tr>
<th>Incident Response Plan</th>
<th>Tabletop Exercises</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Work with cybersecurity team to update incident response plan</td>
<td>• Prepare a detailed scenario that includes multiple incidents</td>
</tr>
<tr>
<td>• Define triggers for mobilizing the response team</td>
<td>• Identify participants</td>
</tr>
<tr>
<td>• Set out key roles and responsibilities</td>
<td>• Conduct a tabletop exercise on-site, with discussion to follow</td>
</tr>
<tr>
<td>• Provide a clear roadmap for company to follow when an incident occurs</td>
<td>• Prepare a summary of issues identified during the exercise</td>
</tr>
</tbody>
</table>
Manage Vendor Risk

- Information security program
- Information security standards
- Data breach obligations
- Third party audits and certifications
- Inspection rights
- Indemnification
- Liability caps, liability carve-outs, warranties, force majeure clauses, insurance, termination and other remedies
Strengthen Insider Threat Program

**Human Resources**
- Background checks, training, rules and requirements
- Accurate and timely reporting of potential problems, incidents, red flags

**Management**
- Identify critical assets and implement a plan for protecting them
- Build a culture of awareness about insider threats
- Establish a central hub for data fusion, analysis and response

**Information Security**
- Login banners
- Segregation of duties and least access privileges
- Network logging and monitoring
- Security alerts

**Risk Indicators**

**Personal, loyalty, technology, performance, foreign influence**
Cyber Governance: The Role of the Board

The board sets cybersecurity tone and direction

- Target was a wake-up call
- SEC warning

Cybersecurity is a fundamental risk issue for the company

- Case law provides scant direction regarding cybersecurity management

Boards typically delegate oversight responsibilities to committees but full board retains overall responsibility

Communication with management is critical for effective cybersecurity governance

Key recent actions

- Yahoo, Home Depot, Wyndham
Managing the Risks from Cyber and Data Breach Exposures

Cyber Insurance, Indemnification, and Other Concerns
Cyber Breaches – The Current Climate*

$3.86 Million
Average cost per incident in 2018 (up more than 30% since 2013)

$148/stolen record

27.9% chance of recurring breach over next 2 years
Up about 3% from 2016

* Ponemon Institute IBM, 2018 Cost of Data Breach Study: Global Overview (July 2018)
Information control systems are no longer isolated

Increasing use of the Internet of Things (IoT) introduces new security vulnerabilities

Increased regulatory attention

Vendor/business associate risks

Insider threats

Exclusions in standard coverages (e.g., CGL, D&O, property and crime insurance)

Cyber-criminal ingenuity, perseverance, and greed

Evolving Technology Issues

Accidents, negligence, people being people (losing and misplacing things, seeking work-arounds, etc.)
Proactive Measures

- Identify and classify sensitive data
- Maintain information that may be used for insurance application:
  - Incident Response Plan
  - Information on Incident Response Team, Tabletop Exercises
  - Information Security Policies
  - Training
- Continually assess status of technical and physical protections
- Manage risks
  - Vendors
  - Employees
- Assess cyber insurance
First-Party Insurance
- Property
- Business-Interruption Insurance
- Crime-Kidnap/Ransom

Third-Party Liability Insurance
- CGL and Other Crime/Social Engineering
- D&O and Other Liability Coverage

“Cyber Insurance”: Combination of First-Party and Third-Party Insurance, E.g.:
- Cyber
- Cyber Crime/Social Engineering

Other
- Legacy policies
- “Other Peoples’ Insurance” ("OPI")
### General Overview: First-Party Insurance

#### First Party/Breach Response Coverage

<table>
<thead>
<tr>
<th>Covered Claims</th>
<th>Covered Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data/Information Loss</td>
<td>Costs for Forensic Analysis/Investigation</td>
</tr>
<tr>
<td>Remediation</td>
<td>Legal and PR</td>
</tr>
<tr>
<td>Business Interruption</td>
<td>Data Restoration</td>
</tr>
<tr>
<td>Network Failure/ Interruption</td>
<td>Lost Income</td>
</tr>
<tr>
<td>Cyber-Extortion</td>
<td>Costs of Notice</td>
</tr>
<tr>
<td>Reputational Harm</td>
<td></td>
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</tbody>
</table>

#### Common Endorsements

- PCI-DSS
- Dependent Business Income
General Overview: First-Party Insurance

“Hybrid” First Party Coverage – Event Management/Breach Response Costs

**Covered Claims/Incidents**
- Security Event (e.g., breach, use of code or DDOS against 3rd party)
- Privacy Event (involving PII or Confidential Business Information)

**Covered Costs**
- Forensics to Determine Existence, Cause & Scope
- Legal and PR
- Mandated – and, sometimes, voluntary – Breach Notification
- Call Centers
- Credit/Identity Monitoring
- Data Restoration
Critical Partner: Crime Insurance

Why It Is Critical

• Financial loss due to social engineering threats

Common Elements

• Covers dishonest third-party acts, for example:
  – Employee theft
  – Forgery or alteration
  – Computer fraud and funds transfer fraud
  – Kidnap, ransom, or extortion protections ("ransomware")
  – On- and off-premises robbery, etc.
  – Counterfeit
General Overview: Third-Party Liability Insurance

Third-Party Coverages

What Third Parties?
Customers
Clients
Employees
Regulators
Vendors and Suppliers

Covered Liabilities
Security failures
Privacy failures
Professional services failures
Media (e.g., online data)

Covered Costs
Defense Costs, to Conclusion
Judgments & Settlements
Some types of interest

Covered Costs (?)
Punitive damages
“Fines and Penalties”
Key Components

- **Errors and Omissions**
  - Claims arising from the performance of your services

- **Media Liability**
  - AI claims, like IP infringement; libel; slander

- **Network Security**
  - Consumer data breach; data loss/destruction; cyber extortion; virus transmission

- **Privacy**
  - Loss/transmission of personal data (electronic or physical)
Insurance Coverage for Cyber and Data Breach Exposures:
Gaps in Existing Coverage—Cyber Insurance

• Insuring Agreements:
  • Is there an actual breach?
  • Is there a “Failure of Security”
  • Timing of Intrusion (discovery vs. occurrence)
  • Was there a “Direct Cause of Loss” (also adverbs, “Directly,” “Solely”)

• Devices, Points of “Entry”: Personal Computers, Phones, Apps

• Social Engineering Fraud; Extortion

• Exclusions:
  • Fines, Penalties; Other Kinds of “Damages”
  • Breach of Contract
  • Bodily Injury

• Choice of counsel, vendors

• Limits, sublimits, co-insurance
“Event-Driven” Claims Against Ds & Os

• Cyber Events Increasingly Form the Basis for Claims for Breaches of Duty in the Aftermath of Cyber Breaches

• Increasing risk of derivative actions (where company cannot indemnify for liability of the Ds & Os)

• Considerations for D&O/Management Liability Insurance:
  – How to structure D&O program (Side A-B-C Coverages)
  – Broader coverage offered by Difference in Conditions (DIC) coverage
  – Consider Related Coverages
A
**Personal Asset Protection**
- **Claim Against Individuals**
- **Responds When**
  - Company is unable to financially or legally indemnify individual directors and officers
- **Retention**
  - No

B
**Balance Sheet Protection**
- **Claim Against Individuals**
- **Responds When**
  - Company has satisfied its policy retention for indemnifiable loss against individuals
- **Retention**
  - Yes

C
**Balance Sheet Protection**
- **Claim Against Company**
- **Responds When**
  - Company is named in a Securities Claim
- **Retention**
  - Yes
Lessons from Case Law Relevant to Cyber Insurance
Coverage Gaps in Legacy Policies

• *E.g.*, Business Interruption – “Physical Loss” Requirement

  • The “loss of the database, with its consequent economic loss, but with no loss of or damage to tangible property, was not a ‘direct physical loss of or damage to’ covered property...”

  • The court held that hacking losses which led to loss of use of the full capacity of its servers could qualify as a “loss” of property.
Cyber Crime Coverage Cases = Mixed Results

**Coverage**

**No Coverage**
- Apache v. Great Am. Ins. Co. (5th Cir. 2016)
Risk Management Considerations
Common Bases for Denial

• Notice
• “Application Defenses”
• Failure to Implement Policies and Procedures, or “Best Practices”

• “Wrong” Damages:
  – PCI/DSS
  – Contract damages
  – Forensic expenses
  – Legal expenses
Insurance Coverage for Cyber and Data Breach
Exposures: Potential Gaps in Coverage

- Personal computers and phones
- Timing of intrusion (discovery vs. occurrence)
- Do you have to have a “failure” of security?
- Do you have to have an actual breach?
- Social engineering fraud
- Extortion and kidnap/ransom (ransomware)
- PCI penalties
- Breach of contract
- Bodily Injury
- “Direct” / “indirect”
- “Directly” / “solely”
- Choice of vendors
- Choice of counsel
Post-Event Actions

Notice and other Submissions

To whom?
- Brick and mortar
- Cyber

When?
What?

Privilege concerns
Confidentiality
Contact Us

**Telephone**
(202) 955 1500  
(804) 788-8731

**Address**
2200 Pennsylvania Ave., NW
Washington, DC 20037

Riverfront Plaza, East Tower
951 E Byrd Street
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Strategizing an Electric Energy Policy and Regulatory Framework in Puerto Rico Project

Kenneth J. Nemeth, Secretary & Executive Director

March 26, 2019
1. About SSEB
2. A Brief History of Puerto Rico’s Energy Laws
3. An Overview of Puerto Rico’s Electric Sector
4. September 2017: Hurricanes Irma and Maria
5. Legislative Aftermath
7. A Path Forward: Ideas and Recommendations
8. Puerto Rico Energy Bureau
9. Integrated Resource Plan
About SSEB
SSEB Overview

- Established 1960 and expanded in 1978
- 16 U.S. States and Two Territories
- Each jurisdiction represented by the governor, a legislator from the House and Senate, and a governor’s alternate
- Federal Representative Appointed by U.S. President
Interstate Compact Organization, created by state law and consented to by Congress

Established as Southern Interstate Nuclear Board in 1960

Mission expanded in 1978 to include full spectrum of energy & environmental issues (Southern States Energy Board)

16 U.S. States and Two Territories

Each jurisdiction represented by the governor, a legislator from the House and Senate, and a governor’s alternate

Federal Representative appointed by U.S. President
SSEB has been actively involved in Puerto Rico since 1969. We have been fortunate to work with multiple Governors and elected officials on a variety of energy measures.
SSEB in Puerto Rico

Pictured are SSEB’s Federal Representative Eddie Jo William and Senator Eduardo Bhatia
Pictured left to right is SSEB’s Secretary to the Board, Ken Nemeth, SSEB Puerto Rico Economic Advisor Rafael Llampart, Governor Rosselló’s Chief Advisor on Finances Christian Sobrino, and SSEB Federal Representative Eddie Joe Williams
A Brief History of Puerto Rico’s Energy Laws
Puerto Rico’s Electric Energy Public Policy in Phases
(Courtesy of PR Law Professor Luis Anibal Aviles)

• Phase 1: Private un-centralized production of power (1893-1941)

• Phase 2: Nationalization of Private Electric Systems (1941-1989)
  • *Law 41-1941 Puerto Rico Electric Power Authority (PREPA) Organic Act*

  • *Independent Power Producers EcoEléctrica (Natural Gas) and AES (Coal)*
  • *Puerto Rico Energy Public Policy –Executive Order 1993-57*

• Phase 4: New “Mandate” to PREPA (2007- Present)
New “Mandate” spearheaded by the Energy Policy Act of 2005

- Act 114-2007 - Puerto Rico Electric Power Authority *Net Metering* Act
- Act 73-2008 - Mandates *Wheeling* as part of the Economic Incentive for Economic Development reauthorization Act
- Act 82-2010 - Public Policy on Energy Diversification by Means of Sustainable and *Alternative Renewable Energy* in Puerto Rico Act
- Act 83-2010 - *Green Energy Fund* Act
- Act 57-2014 - Puerto Rico Energy Transformation and RELIEF Act
  - *Creates an Electric Energy Regulator*;
  - *Removes the public policymaking powers from PREPA*;
  - *Creates the electric consumer advocate*
Act 4-2016 - Creates Hatch Act for PREPA; amends CILT
Act 22-2016 - Reforms plethora of subsidies in PREPA’s Organic Act
Act 120-2018 - Puerto Rico Electric Power System Transformation Act
  • **Term sheet for the fire sale of PREPA Assets**

P.S. 1121 - Puerto Rico Energy Public Policy Act (3/14/19)
  • *Broad statement of public policy principles;*
  • *Amendments to existing laws;*
  • *Additional legal teeth and resources to Energy Bureau;*
  • *Demotes OEPPE to a Program under Dept. of Economic Development and Commerce umbrella*
PS 1121: *What’s Missing?* Two Examples:

I. Solar Easements Regime.
   - Potential 3,000 MW distributed installed capacity
   - *Amend Puerto Rico Civil Code to create and enhance Solar Easements Regime;*
   - *Amend the Puerto Rico Mortgage Law to legally separate the solar easements from the principal property;*
   - *Need an electronic registry for solar easements to facilitate financing*

II. Marine spatial planning for offshore wind.
   - Potential 2,500 MW installed capacity
   - *Puerto Rico’s exclusive marine zone is 9 miles, not 3 miles;*
   - *Follow the state-level marine spatial planning law passed by Rhode Island for the Block Island project*
PROGNOSIS:

1. LITTLE CHANGE AFTER THESE MANDATES
2. PUERTO RICO HAS THE LAWS, BUT LACKS THE POLITICAL WILL TO EFFECT REAL CHANGE TO PREPA
3. PREPA’S RESISTANCE AIDED BY RENT-SEEKING INTEREST GROUPS
4. UNDER-BUDGETED ENERGY REGULATOR
5. LUKEWARM COMMITMENT TO AGGRESSIVE DEPLOYMENT OF RENEWABLE ENERGIES
6. LACK OF INTEGRATION WITH TRANSPORTATION, LAND-USE PLANNING, CLIMATE CHANGE AND OTHER SECTORIAL ENERGY POLICIES
An Overview of Puerto Rico’s Electric Sector
Puerto Rico Electric Power Authority (PREPA)

- PREPA is a vertically integrated utility that supplies power to 1.57 million total customers in Puerto Rico and the smaller islands of Vieques and Culebra.
- The power system includes six fossil fuel and seven hydroelectric generation sites, owned and operated by PREPA.
- PREPA generates approximately two-thirds of its electricity and purchases the remaining from privately owned generation facilities consisting of two cogeneration plants, two windfarms, and five solar farms.
Some of the oldest power plants operating in Puerto Rico are hydroelectric plants, almost all of which were built before 1960.

All of the power plants built in Puerto Rico from 1960 through 2009 that are still operating are powered by fossil fuels, mainly petroleum. The territory’s first (and only) coal plant came online in 2001.

All new electricity generating capacity added in Puerto Rico since 2009 is powered by renewable energy technologies. A relatively small number of utility-scale batteries have been installed.

Puerto Rico went through an extended period when no new capacity was added. After several petroleum-powered plants, including Puerto Rico’s largest power plant, Aguirre, were built in the late 1970s, no new generators were added until the late 1990s.

https://www.eia.gov/todayinenergy/detail.php?id=36613
• Puerto Rico residential electricity customers paid 20 cents per kWh in 2017, nearly twice as much as the average U.S. residential customer rate of 13 cents per kWh.

• If Puerto Rico were a U.S. state, it would have the fourth-highest residential electricity price.

• Puerto Rico does not produce crude oil, natural gas, or coal. Nearly all of Puerto Rico’s natural gas is imported as liquefied natural gas, which is imported mainly from Trinidad and Tobago. Puerto Rico produces no coal and imports its coal from Colombia.

https://www.eia.gov/todayinenergy/detail.php?id=36613
• In the fiscal year ending June 30, 2017, 47% of Puerto Rico’s electricity came from petroleum, 34% from natural gas, 17% from coal, and 2% from renewable energy.

• Two wind farms supplied 41% of Puerto Rico's renewable generation; one of them, the 95 MW Santa Isabel facility, is the largest wind farm in the Caribbean.

• As of June 2017, Puerto Rico had 127 MW of utility-scale solar photovoltaic generating capacity and 88 MW of distributed generation.

• 961 MW of generation is provided by two power purchase agreements - EcoElectrica and AES-PR

Electricity System Assets

- 4,878 MW of Generation Owned by PREPA
  - >90% Capacity Uses Heavy Fuel Oil
- 2,416 Miles of Transmission
- 30,675 Miles of Distribution
- 334 Substations
- 961 MW of Independent Power Production
  - Natural Gas, Coal, Hydro, Wind, and Solar
• PREPA-owned generation is located along the northern and southern coasts.

• The north area of the island has two electric power generating facilities. However, two of the largest and most critical generating facilities—Aguirre and Costa Sur—are located in the south.

• These two electric power generation facilities are tied together using high voltage overhead transmission lines that run over mountainous terrain.

• Due to the physical location of these electrical connections, they are subjected to hurricane-force winds and are most likely to fail, as experienced during Hurricane Maria.

• When these major pathways are rendered unusable, the bulk of the electric generation in the south cannot be moved to the north side of the island, where the highest level of electric demand exists.
• Over the past 10 years, the demand for energy on the Island has decreased by 18%
• Industrial sector demand has a reduced demand of 48% in the same period
• Primary generation units are located in the south, while the highest energy demand is in the north
• PREPA has administrative challenges as a virtual monopoly on power generation
• Infrastructure maintenance - abandoned over the past decade
September 2017: Hurricanes Irma and Maria
Hurricanes Irma and Maria

- Hurricane Irma struck Puerto Rico's northern coastline on September 6-7, 2017. That weekend, PREPA restored service for approximately 70% of the affected customers.

- Two weeks later, on September 20, 2017, Hurricane Maria made its way up the Caribbean as a Category 4 hurricane, bringing winds of 150-plus mph and dumping 25 inches of rain on Puerto Rico.

- Hurricane Maria followed a northwesterly track as it reached Puerto Rico, with the southeast corner of the island being the first and one of the hardest hit areas.
Hurricanes Irma and Maria

The storm ultimately impacted most of the island with a combination of high winds and flooding.

The northern coast was severely impacted.

Transmission lines in the center of the island were severely impacted, as high winds were funneled through the changes in terrain and tore down large transmission lattice towers.

Electrical Outages following Hurricane Maria
Hurricanes Irma and Maria

• Electricity Sales data from Puerto Rico shows rate of recovery since hurricanes

• April and May of 2018, EIA data indicated that total electricity sales in Puerto Rico returned to pre-Hurricane Maria levels after the longest blackout in U.S. history.

• Hurricane Maria destroyed much of the territory’s already vulnerable and outdated transmission and distribution infrastructure, and as a result, outages lingered even as power plants resumed operation.

Source: U.S. Energy Information Administration, Electric Power Monthly

https://www.eia.gov/todayinenergy/detail.php?id=36832#
Hurricanes Irma and Maria

- On September 6, two weeks before Hurricane Maria made landfall on Puerto Rico, Hurricane Irma passed just north of the island. In the days following Hurricane Irma, nearly 900,000 customers in Puerto Rico were without power.
- All 1,570,000 electricity customers were without power after Hurricane Maria.
- More than one month after Hurricane Maria made landfall, electricity service had only been restored to few residents of Puerto Rico.

https://www.eia.gov/todayinenergy/detail.php?id=36832#
Hurricanes Irma and Maria caused extensive damage throughout Puerto Rico, destroying roads and buildings and cutting power and communication lines. Puerto Rico estimates that $132 billion will be needed to repair and reconstruct its infrastructure and services.

FEMA has provided nearly $4 billion in public assistance grant funding to Puerto Rico as of September 2018, mostly for emergency work like debris removal.
Federal Aid to Puerto Rico

- Public Assistance - $5.4 billion total approved
  - $620 million funding for Debris Removal
  - $4.2 billion funding for Emergency Protective Measures
  - $1.9 billion Puerto Rico Electric Power Authority
- Hazard Mitigation Grant Program - $8.7 million obligated
- Community Disaster Loans - $294 million total approved
  - Number of Municipalities - 75
- USACE Mission Assignments - $3.7 billion
  - Grid Restoration - $2.1 billion
  - Temporary Power Generators - $824 million
  - Generator Maintenance to Critical Infrastructure - $136 million
  - Debris Removal Mission Assignments - $231 million
- HUD Community Development Disaster Recovery - $20 billion awarded
- Department of Education - nearly $600 million (as of May 29, 2018)
Legislative Aftermath
PREPA Goes Private

• Governor Ricardo Roselló announces on January 22, 2018, “a transformation of PREPA to achieve private participation and modernization of the energy sector in Puerto Rico.”
  – Christian Sobrino, Governor’s Rosello’s Chief Finance Advisor

• “PREPA will cease to exist as it deficiently operates today” through a three phase process for the transformation or sell of assets:
  – Define a legal framework through legislation and release RFQ
  – Receive and evaluate prospective offers from respondents
  – Award and hire selected companies to operate generation assets

• (Governor’s press release)
On June 20, 2018 Gov. Roselló signed Act 120 into law, with the stated goal of transforming Puerto Rico’s energy system into a modern, sustainable, reliable, efficient, cost-effective and resilient system. Act 120 provides the legal framework through which the Authority will determine the PREPA services and facilities that will be subject to the Authority and the PREPA generation assets that may be sold, transferred, or assigned to PPPs.


Act 120 states, “With the legal framework herein adopted, we move on to the next step: assessing the market and requesting proposals from companies interested in participating in the transformation of Puerto Rico’s electric power system.”
The “Blue-Ribbon Task Force on the Formulation of Energy Public Policy and the Regulatory Framework”, also known as the Advisory Committee, was created through Act 120.

As stated in the legislation, “a (Southern States Energy Board) Task Force shall be created to be in charge of working and making recommendations on the energy public policy and the regulatory framework.” In this capacity, SSEB offers advice and recommendations for approval by the Governor and Legislature.

Another crucial piece of Act 120, related to SSEB and the Advisory Committee, is the Legislatively established deadline for approval of the Puerto Rico Energy Policy and Regulatory Framework.

Act 120-2018 states that the Legislature must approve any recommendations within 180 days of approval, or no later than December 17, 2018.
A Qualified Proponent for T&D

- The Authority submitted a RFQ for the management and operation of the transmission and distribution system on October 31, 2018.

- Requested statements of qualifications from companies interested in “managing and operating PR’s electric power T&D system, including the administration of federal disaster recovery funding, pursuant to a long-term contract.”

• In response to the RFQ, the Public-Private Partnership Authority announced on January 17, 2019 the qualified proponents that responded to the RFQ.

• Duke Energy, Exelon Corp., PSEG Services, and a consortium composed of ATCO Ltd., IEM and Quanta Services Inc.

• Final selection of the qualified proponent expected in September 2019.
Proposed Timeline of T&D Process

Puerto Rico Electric Power Authority Transitioning from Recovery to Revitalization. Fernando M. Padilla. November 28, 2018
Establishing Electric Cooperatives

- On December 14, 2018, Senate Bill 984, the “Puerto Rico Energy Cooperatives Act,” was approved.
- “Electric or Energy Cooperatives shall be empowered to generate, transmit, distribute, and sell electric power”
- PREB shall prescribe minimum technical requirements for establishment of electric cooperatives
- PREB has full regulatory authority over electric cooperatives, including limited involvement in administrative matters
The Puerto Rico Energy Public Policy Act, Senate Bill 1121, was introduced on October 17, 2018.

SB 1121 passed the Senate on November 6 but stalled as the legislative session ended.

January 14, 2019 the regular legislative session saw the House approve the bill which then directed it back to a conference committee

Senate finally approved the bill on March 5, 2019.

However, remember that Act 120-2018 states that the Legislature must approve any recommendations within 180 days, or no later than December 17, 2018.

180 day deadline was not met and bill was carried over without any consequences.
The Blue Ribbon Task Force Comments on Senate Bill 1121

- The BRTF submitted recommendations to the PR Legislature in January of 2019 while S.B. 1121 was still in conference committee.

- BRTF members suggested specific language changes in certain instances as well as general questioning of some approaches.

- Examples:
  - The BRTF suggests changing language stating how many specific fuel sources and insert language reflective of a diverse electric grid and generators.
  - 1121 does not fully articulate the relationship between the Energy Policy Program and PREB.
  - Expand PREB regulatory power to explicitly cover natural gas
• As of yesterday afternoon (03/25/19), SB1121 has passed both chambers of the PR Legislature and is waiting on the Governor’s signature.

• Key Provisions:
  – 100% Renewable Goal
    • 40% by 2025
    • 60% by 2040
    • 100% by 2050
  • Bans all solar production taxes
  • 30% energy efficiency requirement
PR Legislature Passes SB1121

• Eliminates the utility to refuse to interconnect due to “right of way” or “full feeder” issues
• Eliminates 5 year recertification requirement for systems

• Bans coal plants starting in 2028
• Automatic interconnection and 30-day net metering for solar under 25kW
• 90 day for 25 kW to 5MW
Strategizing an Electric Energy Policy and Regulatory Framework in Puerto Rico Project
THEREFORE BE IT RESOLVED, that the Southern States Energy Board will offer support to the Governors of Puerto Rico and the U.S. Virgin Islands and the utilities to restore and rebuild their critical energy infrastructure and coordinate cooperative assistance with its Associate Members, the nation’s energy sector, and the federal government to provide necessary technical support and resources.

Governor Asa Hutchinson, Arkansas
SSEB Chairman 2015-2017
57th Annual Meeting
September 26, 2017
“I sponsored a resolution urging our states and utilities to assist Puerto Rico in her time of need and pledging strategic assistance from SSEB’s member governors, legislators, and Associate Members in the hardening and revitalization of the Island’s energy system. The resolution was passed unanimously by our members.”

~ Gov. Asa Hutchinson, Arkansas

“We are fortunate to be able to work with Gov. Rosselló and his legislative leaders on the key components that will bring a sustainable energy grid system and regulatory program to Puerto Rico. Our efforts will focus on developing well-informed, unbiased, and innovative regulatory framework models for the Puerto Rican government. SSEB and its partners possess unique, multidisciplinary capabilities and experiences working with the governments, utilities, businesses, industries, and universities of its member states and territories.”

~ Governor Phil Bryant, Mississippi

“I would like to express my sincere gratitude for the support that SSEB has extended to me and the American citizens who live in Puerto Rico as we work toward a complete transformation of our electrical system. I am dedicated to working collaboratively with DOE, SSEB, and the project team.”

~ Governor Ricardo Rosselló, Puerto Rico
Goals & Objectives

Goals

• Work with the Governor and Legislature of Puerto Rico (PR) to establish a reliable, affordable, and sustainable electric energy grid system for the Island
• Develop a policy and legal framework to provide a regulatory regime for a privatized electric energy grid system in Puerto Rico

Objectives

• Build a stakeholder participation network;
• Create potential legislative options for an electric energy grid system;
• Define the long-term goals and objectives of policies and a regulatory framework; and
• Review risks associated with privatization of the Puerto Rico Electric Power Authority (PREPA).

http://www.sseb.org/strategizing-pr/
Tasks and Subtasks

• Administer Project Management & Planning
• Facilitate Outreach
  – Prepare a Stakeholder Engagement Strategy and Outreach Materials
  – Host a Puerto Rico Energy Summit
• Assess the Economic, Financial, and Insurance Impacts of PREPA’s Privatization
• Develop a Regulatory Framework
  – Assess Existing United States Regulatory Agencies and Existing Legal Framework
  – Create and Solicit Input from a Blue Ribbon Task Force
  – Prepare a Regulatory Blueprint
  – Final Report
Establishment of the Blue Ribbon Task Force

- **Governor Ricardo Rosselló Nevares Appointees**
  - Nisha Desai
  - Dr. Cris Eugster
  - Edison Avilés Deliz
  - Julia Hamm
  - Dr. Mark A. Jamison
  - Malu Blázquez

- **Senate President Thomas Rivera Schatz Appointees**
  - Mike Henchen
  - Roy Torbert
  - Tomás Torres
  - Pablo Vázquez

- **Speaker of the House Carlos J. "Johnny" Méndez Núñez Appointees**
  - Marc G. Roumain Prieto
  - Erasto Rodriguez Molina
  - Andres Rodriguez Figueroa
  - Alejandro J. Uriarte

- **Southern States Energy Board Appointees**
  - Dr. Carl Pechman
  - Julie Imanuel Brown
  - Janet L. Sena
  - Martha Duggan
  - Sergio Marxuach
  - José Ortiz
  - Dr. Mary Beth Tung
  - Scott I. Aaronson
  - Francisco Rullán
Both the Executive and the Legislature are working to promote an effective public policy to transform the energy grid in #PuertoRico.
• The BRTF held its first meeting in October 2018 in San Juan.

• It was decided that the group would make specific consensus-based recommendations in three areas:
  – Markets
  – Permitting
  – Regulatory Framework
• On November 27, the BRTF held the second meeting to review consensus based recommendations and the draft report.

• On November 28, leaders, students, and the general public were all invited to attend and voice their input for the future of the electric grid in Puerto Rico.
The BRTF’s preliminary report and recommendations were released during this second meeting and PR Energy Summit.

Available online at: www.sseb.org/publications
I. Abstract
   • Brief synopsis of the project background and goals

II. Executive Summary
   • High level summary of most of the report
     – Project goals and objectives
     – SSEB Partners
     – Establishment of BRTF and recommendations from the October meeting
     – Impacts of PREPA’s privatization
     – Planning for fuel diversity and operability of the grid under the 100% renewables by 2050 target

III. Introduction
   • About SSEB and history of PR’s participation
   • Introduction to the project
IV. Stakeholder Engagement

• Improved communication with broad group of stakeholders
• Access to critical information from past experiences
• Consider the implications of policy initiatives/proposals to inform strategy development
V. Existing Policy and Regulatory Framework in Puerto Rico

• Existing Policy
  – Act 83-1941: Established PREPA
  – Act 57-2014: PR Energy Transformation and RELIEF Act (Created Energy Commission, now known as the Energy Bureau)
  – January 2018: Governor Rosselló announced privatization of PREPA
  – Act 120-2018: PR Electric System Transformation Act
  – Senate Bill 1121: PR Energy Public Policy Act

• Regulatory Agency Structure
  – Assessment of U.S. states & territories’ existing regulatory agency structure and function
PREPA

PREPA

original established as the Puerto Rico Water Resources Authority through Act 83-1941, due to an early reliance on hydrogeneration. As fuels for electricity generation shifted toward petroleum,

the name was changed through Act 57 in 1979 to PREPA, reflecting the new status of the utility on the Island.

Countless Legislative measures have been enacted since that time (as discussed) enabling PREPA, whether through its own generation or power purchase agreements, to become the sole provider of electricity in Puerto Rico.

In May of 2014, Act 57-2014 established the Puerto Rico Energy Transformation and RELIEF Act. While this act seeks to reshape PREPA, as other measures have done previously, one of the major milestones resulting from Act 57’s passage is the establishment of the Energy Commission (now the Energy Bureau), the Energy Administration, and the Independent Consumer Protection Office.
Reorganizing the Public Service Regulatory Board

• Act 122-2017, the “New Government of Puerto Rico Act,” first laid the foundation for the reorganization of the Public Service Regulatory Board (PSRB).

• The reorganization and consolidation of multiple agencies was soon implemented by the passage of Act 211-2018 in August 2018.

• The result is a Public Service Regulatory Board that now encompasses the Public Service Commission, the Telecommunications Regulatory Board, Office of the Consumer Advocate, and the Energy Bureau.
The Puerto Rico Oversight, Management, and Economic Stability Act (PROMESA) is a 2016 federal law that established the Financial Oversight and Management Board due to the government bankruptcy.

- The Financial Oversight and Management Board (FOMB)
  - 7 Presidential appointees
  - PR Governor has 1 Ex Officio (Christian Sobrino)
- FOMB has **broad** powers to negotiate with creditors on PR debt
  - Can also modify/approve budgets
  - Extremely important body as restructuring occurs
- As of August 2018, FOMB claims PR has total of $74B in bond debt and $49B in unfunded pension liabilities
  - PREPA’s portion - $9B
<table>
<thead>
<tr>
<th>Action</th>
<th>Oversight Board</th>
<th>PREB</th>
</tr>
</thead>
<tbody>
<tr>
<td>IRP</td>
<td>The Oversight Board approves revenue requirements and expenditures, including a capital plan, in the New Fiscal Plan for PREPA.</td>
<td>After submittal by PREPA, PREB will test then approve the IRP. PREB should ensure that the process is open and transparent.</td>
</tr>
<tr>
<td>Budget and Ratemaking</td>
<td>The Oversight Board approves a yearly budget that aligns with the New Fiscal Plan.</td>
<td>PREB shall authorize rates (either formulaic or on an expedited manner) which align with the budget as certified by the Oversight Board.</td>
</tr>
<tr>
<td>Utility Debt</td>
<td>The Oversight Board approves restructuring of existing debt through the Plan of Adjustment.</td>
<td>By law, PREB implements PREPA’s approved restructured debt in the consumers rates.</td>
</tr>
<tr>
<td>Transformation</td>
<td>The Oversight Board has the exclusive right to file a plan of adjustment, which will contain the transformation agreements.</td>
<td>According to Act 120-2018, PREB has the responsibility of certifying any transaction complies with the existing legal framework.</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td>PREB will continue to exercise its duties and responsibilities as outlined in its enabling laws except when doing so is inconsistent with the powers and authorities delegated to the Oversight Board under PROMESA.</td>
</tr>
</tbody>
</table>
U.S. Regulatory Agency Structure

- Most common: 3 seats, though some have 7
- Appointed in 41 states/territories
  - All but VA give power of appointment to the Governor
  - VA – Both Senate and House vote
- Elected in 11 states/territories
VI. Establishing a Strong Puerto Rico Energy Bureau

• The Objective of Regulation
• The Importance of Transparency
• Shared Responsibilities
• Performance Based Regulation
• PREB’s Scope
• Regulatory Agenda
VII. Markets

- The Role of the Market
- Increasing Efficiency of System by Increasing Service Options
- PREB Oversight Role
VIII. The Blue Ribbon Task Force

- Blue Ribbon Task Force Members
- Blue Ribbon Task Force Meeting

- **Subgroup Recommendations**
  - Markets
  - Permitting
  - Regulatory Frameworks

**Work Product**

- Establishing a Blue Ribbon Task Force and soliciting input from its members on the possible regulatory framework models that provide Puerto Rico with a transparent and robust regulatory regime;
- Developing a blueprint of regulatory framework models, incorporating recommendations from the Blue Ribbon Task Force;
- Coordinating and convening a Puerto Rico Energy Summit during which preliminary BRTF findings and recommendations will be presented and stakeholder input will be encouraged and documented; and
- Coordinating and convening subsequent Puerto Rico energy workshops or briefings related to specific stakeholder objectives and goals.
Markets Subgroup
Recommendations

• The regulator should evaluate allocation of legacy costs.
• The regulator is encouraged to evaluate the price of energy injected into the grid from distributed generation.
• The regulator is encouraged to review interconnection requirements to determine whether they are reasonable and consistent with industry norms.
• The regulator is encouraged to consider requiring PREPA and its successor(s) to provide statistics on reliability and system operation.
• The regulator is encouraged to work with North American Electric Reliability Corporation and other appropriate authorities to develop Puerto Rico-specific reliability standards and procedures.
• The regulator is encouraged to monitor and report on the efficiency and fairness of the dispatch of generating units on a regular basis.
• The regulator is encouraged to monitor and report on a regular basis the curtailment, and the reason for curtailment, of renewable generation.
• The regulator should be cognizant of different storage ownership and dispatch approaches.
• To inform potential market participants, the regulator is encouraged to require that a locational, real-time market price (cost) be developed and communicated based upon the power control dispatch algorithm.
• The regulator is encouraged to evaluate the benefits of demand response and develop rules for its incorporation into system operation.
Permitting Subgroup
Recommendations

• The permitting process should be independent from PREPA.
• Any statutory permit conditions, including expedited permitting processes, should be enforced to ensure the permitting agency is following legal requirements.
• The permitting agency should ensure that all sources of generation comply with a uniform permitting and approval process.
• A review of the net metering recertification process, required every five years, is needed to standardize requirements and determine overall need of the recertification process.
• The permitting agency should establish a mandatory certification or licensing process for solar installers,
• The permitting agency should work with all branches of government and other relevant agencies to establish an incentive program that provides clear and expedited permitting requirements.
• The permitting agency should review processes currently in place for current and future major transmission lines and base load generation.
The regulatory framework should be performance-based and designed to strengthen utility performance.

The regulatory framework should be designed to provide the PREB complete authority without political intervention.

Electric cooperatives should be part of the Puerto Rico energy system.

The regulatory framework structure should be based on applicable aspects of the Florida and Texas Public Service Commission models.

Legislation should authorize the PREB to designate the service territories of energy providers.

The PREB should develop regulations and standards for utility scale and residential solar systems, including Community Solar.

The PREB should develop regulations that addresses cost recovery for energy providers.

The regulatory framework should be transparent and decision-making authority should be exercised in a collaborative manner.

The PREB should be provided resources to recruit and hire competent, professional staff.

The PREB should have the authority to access documentation from regulated energy providers and possess the necessary enforcement authority.

The PREB should consist of three to five Commissioners appointed by the Governor with the consent of the Senate and with staggered appointments.

The PREB Executive Director should be bipartisan and independently appointed by the Commissioners.

The regulatory framework should allow for Consumer Advocates and related organizations to provide information.

The regulatory framework should consider the role of energy efficiency, demand side management, energy storage, distributed energy resources, and electric vehicles (EV).

A regulatory framework needs stakeholder buy-in which considers reliability and economic impact to all customers.

The regulatory framework needs an appeal mechanism when regulated organizations disagree with the PREB decisions.
IX. Impacts of PREPA’s Privatization

- Financial Situation
- Bankruptcy Proceedings
- Reduction in Energy
- Anticipated Regulatory Environment
- Restoration Funding
- Condition of Existing Infrastructure
- Fuel Sources
- Existing Power Purchase Agreements
- Labor Relations
- Pension Funding
Sections at a Glance

X. Fuel Diversity and Grid Operability with Renewable Energy Goals
XI. Conclusion, future Activities, and Analyses
XII. Acronyms
XIII. Bibliography

Available online at:
www.sseb.org/publications
A Path Forward: Ideas and Recommendations
Recommendations: Immediate Goals

• Passage of SB1121 is essential to the Island’s people, regulatory agencies, utilities, and investors by creating a pathway for the future
• Conduct reliability systems analysis and modeling based on SB1121 to review any future needs for new, large generation sources.
• Continue developing electric cooperatives where applicable on the Island
• Create regulatory framework for the system operator chosen by the P3 Authority
• Implement a functional national emergency response plan on the Island for resilient energy and telecommunication infrastructure
• Review and resolve current permitting and siting issues associated with new energy installations
• Determine whether the IRP is sufficient to guide the sustainable development of a resilient and reliable electric sector that supports a robust economy
• Unbundle PREPA’s costs to support equitable and efficient rate design
• Fully fund PREB to enable its technical capabilities
• Empower PREB to regulate natural gas delivery and supply
• Establish punch list of information required for PREB to contract with a system operator in the public interest
Recommendations: Short-term Goals

- Transfer responsibility for preparation of the IRP to the System Operator (wheeling order) then to PREB for approval
- Design rates based on actual cost
- Determine an energy market required to support a robust electric system
- Build small natural gas-fired generating units, where required for system reliability, and to promote the deployment of distributed renewable generation
- Evaluate land use planning for developing energy infrastructure and how it affects the physical and economic health of the island
- Determine Puerto Rico’s biofuel potential and associated employment demand
- Evaluate the efficacy of fueling microgrids with biofuel
- Ensure PREB has jurisdiction as the electric grid evolves
Recommendations: Long-Term Goals

- Establish requisite electricity markets for residential, commercial, and industrial ratepayers.
- Create an affordable, reliable, resilient, and cost-effective electric system that fosters sustained economic development and growth.
- Develop an energy management system that includes microgrids and distributed energy sources.
- Develop Puerto Rico’s economic biofuel potential and create a biofuel academic center of excellence.
- Examine opportunities to utilize renewable natural gas from landfills.
- Continue to balance the rights of Puerto Rico with creditor obligations while negotiating debt structures with PREPA bondholders.
- Zero carbon emissions.
Energy Resilience Solutions for the PR Grid

• Based on PREPA’s pre-storm projected sales in 2026, as few as 3 of PREPA’s current power plants may satisfy estimated load in ten years, when combined with purchased power.

• Any hardening efforts should focus on those plants, including the Costa Sur power plant.
Investments in grid improvements should be based on detailed modeling, to identify the optimal resiliency and hardening benefits for the transmission system.

All replaced poles and towers should survive 150 mph sustained winds.

Implement a comprehensive vegetation management program to protect the integrity of grid assets.

Strategic, judicious undergrounding of distribution lines should be considered in appropriate circumstances.

Evaluate the siting of generation facilities so they are co-located with load centers to aid in system recovery in the future.

Interdependencies between electric power and other key sectors, specifically water, waste water, waste, telecommunications, transportation, and public health and safety, should be assessed and considered when infrastructure decisions are made.

The remnants of a 40-megawatt solar farm in the aftermath of Hurricane Maria in Humacao, Puerto Rico.

• Puerto Rico has traditional biomass resources, and could explore the feasibility of importing biomass pellets from the Southeastern U.S.
• Another alternative fuel source available locally is Municipal Solid Waste (MSW). Most of the active 29 landfills in Puerto Rico could include a recycling program, creating the feedstock that can facilitate Waste-to-Energy (W2E). W2E can reduce the amount of waste headed to a landfill and generate electricity.
• Estimated remaining landfill use – 2-4 years
Energy Assurance Planning

• Energy infrastructure and delivery systems are increasingly vulnerable to severe weather, system, and infrastructure failures, and deliberate physical or cyber-attacks. Energy assurance planning can help to achieve a robust, secure and reliable energy infrastructure that is also able to restore services rapidly in the event of any disaster.

• Energy providers can respond quickly to limited disruptions. Emergencies often require intervention by government emergency responders and a more collaborative public-private response to ensure public health and safety.

• Government officials can coordinate across governments, agencies and with utilities and other energy providers, businesses, and the public to reduce consequences and provide for rapid recovery.

• Nearly all state and territory governments and select local governments have an energy assurance plan, which serves as a foundation for action when an energy disruption threatens public welfare or when the energy industry requests help.

• DOE has provided support for states and local governments to develop and refine energy assurance plans.

• The energy assurance plan that DOE has on file for Puerto Rico is from 2011.
Further DOE Recommendations

• Expanding natural gas generation in the San Juan metroplex provides a foundation for increased renewable energy deployment, reliability, and lowered costs.

• Flexible power generation in San Juan supports system stability as Puerto Rico integrates new solar capacity.

• DOE National Labs found that new generation capacity near San Juan is critical to survive the loss of North/South transmission lines during a storm.

• An investment of $1.5B is needed for up to 1000 MW of new natural gas generation and LNG fueling infrastructure in the San Juan metroplex.

• This investment could lower generation costs by $700M per year.

• Energy Efficiency savings would reduce electricity rates by 15%.
Puerto Rico Energy Bureau
• Commissioners – 1 Chairman, 4 Associates

• **Chairman**
  • Edison Avilés-Deliz

• **Associate Commissioners**
  • Lillian Mateo-Santos
  • Ángel R. Rivera de la Cruz
  • Ferdinand Ramos-Soegaard
  • Jose Palou Morales

• In 2018, the PREB was placed under the umbrella of the Public Service Regulatory Board along with the following:
  – Public Service Commission;
  – Puerto Rico Energy Bureau,
  – Telecommunications Regulatory Board
  – Energy Administration
  – Independent Consumer Protection Office (OIPC),
Electric/Energy Cooperatives

- The Puerto Rico Energy Bureau proposes to adopt regulations for Electric Cooperatives.
- The purpose of this Regulation is to establish the requirements for the formation of Electric Cooperatives, their certification as electric power service companies, the rates for services provided by such cooperatives and the jurisdiction of the Energy Bureau over the Electric Cooperatives.
- Public hearing scheduled for April 22, 2019
The Puerto Rico Energy Bureau proposes to adopt the Regulation for Wheeling. The purpose of this Regulation is:

- to facilitate the introduction of competitive pressures into the generation sector,
- ensure that competitive generators have open and non-discriminatory access to the transmission and distribution infrastructure, and
- enhance transparency of prices.

Furthermore, through the implementation of a wheeling mechanism, benefits such as a potential reduction on energy costs, the maximization of energy efficiency, as well as fostering the investment in renewable resources at competitive costs may be achieved by wheeling participants.

Public hearing on April 15, 2019
Wheeling

- “Implementing wheeling requires appropriate pricing for the use of transmission and/or distribution systems”
- “The T&D Concessionaire is expected in September of 2019. The T&D Concessionaire may petition the Energy Bureau to submit revised proposals for its protocols or implementation plans.”
- “In the future there will be many owners of electric generation competing to provide electricity to Puerto Rico’s customers and transmit this power...”
Integrated Resource Plan
PREPA’s IRP

• PREPA required to file IRP under Act 57-2014, known as the Puerto Rico Energy Transformation and RELIEF Act.
• Required PREB to adopt the necessary rules for approval of PREPA’s first IRP.
• The IRP, is a 20-year plan developed by PREPA comprising a specific period of time, focused on ensuring the development of the electric power system in Puerto Rico, as well as reliability improvement, efficiency and transparency of the system. 
  
PREPA’s IRP

- PREPA filed their most recent IRP with the PREB on February 13.
- Highlights:
  - Foresees 24% renewables by 2038
  - Calls for large build-out of solar and storage
    - 440 MW storage, US installed 545 MW from 14-17
  - A system of 8 distributed minigrids are envisioned on the Island
  - Natural gas investment needed around 2025
- On March 20, the PREB determined the IRP did not meet specific standards and required clarification on multiple analysis.

https://www.elnuevodia.com/noticias/locales/nota/negociadodeenergiadevuelveelplanalaee-2483069/
PREPA’s IRP

• According to an article in the Caribbean Business Journal, some experts foresee $1B construction of natural gas terminals and infrastructure. However, DOE is now suggesting natural gas investment would lower pricing over time.

• “The impact of the scenarios selected by the government would result in energy rates of 24 cents per kWh in 2019 and an increase to 25 cents per kWh for the next.” -Tomás Torres Placa, executive director of the Institute of Competitiveness & Economic Sustainability

• “The construction of the gas port terminals and infrastructure for natural gas is about $1 billion.”

PR’s Renewable Portfolio Standard

- Puerto Rico's RPS was enacted in 2010. Compliance for this standard began in 2015. The RPS requirements apply to all retail electric providers of 50,000 MWh or more per year; however, PREPA is the only retail electric provider in Puerto Rico that currently meets that definition.

- Current RPS requirements
  - 12% by 2015
  - 15% by 2020
  - 20% by 2035
  - Current level of renewables = 3%

- S.B. 1121 would drastically accelerate this:
  - 40% by 2025
  - 60% by 2040
  - 100% by 2050

• In January 2019, SSEB was able to host PREB Commissioners for regulatory training with the California Energy Commission, California ISO, the California PUC, and the Hawaii PUC.
• This training was designed and administered by Dr. Carl Pechman with the National Regulatory Research Institute with a focus on the issues facing Hawaii and California, and possibly Puerto Rico.
• This regulatory training allowed the three newest appointed Commissioners to be fully immersed in the world of utility regulations and leave with a solid basis for their decision making.
Overview of Regulatory Training

• Day 1
  – Why do we regulate?
  – Concept of a just price
  – Judicial Basis for Regulation
  – Consumer Protection
  – Revenue Requirements

• Day 2
  – Net Energy Metering (NEM)
  – Status of NEM in states
  – Early aspects of rate design
  – The test year
Overview of Regulatory Training

• Day 3
  – Energy Efficiency programs
  – Cost allocation
  – Cost studies
  – Assigning function of costs

• Day 4
  – Decoupling/Unbundling
  – Restructuring Electric Markets
  – Securitization
Other Activities

Vieques & Culebra Connected

• On March 20, an undersea (submarine) cable linking the two PR islands of Vieques and Culebra was put into operation.
• Since the hurricanes, the power on Culebra has been powered by generators from FEMA and Corps of Engineers.
• 3 emergency generators, 38kW, with a capacity of 6 MW will also be installed.
• This will be utilized in the event of a failure in the electrical system.
As part of the Volkswagen emissions settlement, PR is to receive $8.125M toward approved programs to reduce NOx emissions.

Up to 15% of these funds can be used for electric vehicle charging infrastructure.

Other examples of approved spending include: natural gas/hybrid fleet vehicles and efficient/electric school buses.

https://vwclearinghouse.org/#settlement_info
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