GOVERNMENT OF PUERTO RICO
Puerto Rico Electric Power Authority

Integrated Resource Plan of 2018
Stakeholder Engagement Workshops Summary

Prepared by Siemens PTI and Smart Electric Power Alliance (SEPA)

June 2018

Introduction and Background

Faced with massive destruction following Hurricanes Irma and María, Puerto Rico has an unprecedented challenge in redeveloping their electric power system. While there are many aspects to that process, one fundamental element is to update Puerto Rico's electrical system Integrated Resource Plan (IRP). The Puerto Rico Electric Power Authority (PREPA) has hired Siemens Industry, Inc. (Siemens), selected through a competitive process, to perform the IRP in an accelerated time frame from June to October of 2018, and at the same time gather deep levels of stakeholder inputs and provide high levels of transparency and engagement.

This document and attached appendices are meant to share stakeholder inputs in a transparent fashion, and serve as preparatory material for the additional planned stakeholder engagement.

The stakeholder inputs throughout the IRP process are an integral part of the IRP modeling and analysis that PREPA together with its advisor Siemens (the IRP team) are conducting in preparation for PREPA's 2018 IRP, which will be ultimately submitted to the Puerto Rico Energy Commission (PREC), and to be considered by PREC through a formal proceeding, at which the preferred resource portfolio strategy will be recommended.

For the preparation of this summary and during the stakeholder's meetings the IRP Team counted with the support of the Smart Electric Power Alliance (SEPA).

What is an IRP?

An Integrated Resource Plan or "IRP" is a utility plan for meeting forecasted annual energy demand (including reserve margins) over a specific planning horizon, subject to a number of objectives and constraints including being least cost, resulting in a reliable system, meeting all environmental and public policy regulations and in this case resulting on a resilient system.

An IRP focuses on medium- and long-term planning, but not implementation. Instead, it identifies potential resource options to meet future energy demands, and determine an optimal mix of resources based on a combination of supply-side and demand-side resources[1]. These resources typically include central-station (or bulk power system) power generation, but may and in this case will, also include distributed generation, transmission assets, and distribution system assets.

The output from the IRP will consist primarily of a set of potential resource portfolios, scored across the evaluation criteria deemed important by the jurisdiction for which it is being performed (Puerto Rico in our case), for a number of potential future scenarios. A "preferred" or recommended portfolio is often designated by the utility based on the direction provided by the participating stakeholders, policymakers, and the utility experts themselves, for consideration by the governing regulatory body.

The IRP does not address asset deployment, procurement, interconnection, or ownership; it does not set rate structures, nor will it directly cover issues associated with PREPA's debt or privatization plans. All these other – albeit important – details are externalities to the IRP and will need to be addressed in other processes and venues, and later combined with the IRP to develop a complete roadmap for Puerto Rico's power system.

Given Puerto Rico's unique challenges and needs, the IRP must meet the needs of all Puerto Ricans, not simply the needs of PREPA. To achieve this the input from all stakeholders - including residential consumers, business and industrial leaders, academics, technology solutions providers, the consumer advocate, environmental groups, critical infrastructure providers, and others - is vital for success of the IRP development, evaluation by PREC, and implementation.

[1] Wilson, Rachel, and Bruce Biewald. 2013. "Best Practices in Electric Utility Integrated Resource Planning: Examples of State Regulations and Recent Utility Plans" Regulatory Assistance Project.https://www.raponline.org/wpcontent/uploads/2016/05/rapsynapse-wilsonbiewald-bestpracticesinirp-2013-jun-21.pdf

Input for IRP Completion

While the IRP is not a complete answer, it must be developed to align with the broader vision of the power system. In this case, the PREPA Governing Board provided five key pillars in their "Vision for the Future of Power in Puerto Rico", which frames the general priorities that must be considered. As articulated by the board, these pillars are:

1. Customer-centric,
2. Financial Viability,
3. Reliable and Resilient,
4. Model of Sustainability, and
5. Economic Growth Engine.

While articulating these pillars is an important start, stakeholder input is required to interpret this direction effective in the IRP process. In addition, it is important to understand the relative importance of system cost, resilience, and sustainability, as well as agility in mitigating risks.

In order to best capture the needs and desires of Puerto Rico as a whole, PREPA and Siemens have identified five critical areas for input from stakeholders:

1. Objectives (such as cost, sustainability, resilience)
2. Constraints (a term of art referring to external conditions that are non-negotiable, such as compliance with legal and environmental requirements)
3. Scenarios (forecasts for independent input variables, such as future fuel prices, load forecasts, interest rates, labor rates, and the like)
4. Strategies (centralized vs. distributed solutions)
5. Options (primarily but not necessarily limited to supply-side and demand-side generation resources; these are the aspects over which PREPA has control and are the building blocks of the IRP)

More details on this approach are provided in the first round workshop presentation deck, available on PREPA website here.

This framework formed the basis of the stakeholder engagement in June 2018, conducted by the IRP Team and guide the detailed model development by Siemens as portfolios for consideration are developed, modeled, and evaluated as the process continues. Additional opportunities for stakeholder input are outlined below in "Next Steps".

Summary of Stakeholder Engagement Workshop #1

The 2018 IRP Stakeholder Engagement Workshop series began with the first round, including the extensive and in-depth discussions carried out in the following seven sessions with various stakeholders. There are other stakeholders that we will reach out to in the next few weeks and as input is gathered it will be incorporated to this document including large industrials in Puerto Rico, the lenders and PREC.

Session	Time	Location	Stakeholder Group
1	June 4, 2018 AM	San Juan	Customer Associations and Academia
2	June 4, 2018 PM	San Juan	Non-governmental Organizations (NGOs) and Environmental Organizations
3	June 6, 2018	San Juan	Suppliers and Developers
4	June 6, 2018	San Juan	General Public
5	June 8, 2018	San Juan	Rand Corporation
6	June 13, 2018	Conference call	U.S. Environmental Protection Agency (EPA), Junta de Calidad Ambiental de Puerto Rico (JAC), and Puerto Rico Public-Private Partnerships Authority (P3)
7	June 20, 2018	Conference call	Department of Energy National Labs

The sessions were organized in partnership between PREPA and the Siemens (the IRP Team). All workshops are led by the Siemens team responsible for developing the IRP, with PREPA staff addressing questions and concerns. Discussions are structured to solicit stakeholders' feedback regarding key considerations (objectives, constraints, strategies, scenarios, and options) of the IRP.

Areas of Consensus

Participants universally agreed on the need for significant transformation of Puerto Rico's electricity system given the system breakdown precipitated by Hurricanes Irma and María in September 2017. Participants were in agreement that Puerto Rico needed to transform in order to increase its overall "resiliency". Stakeholders advised developing a specific definition of the term for Puerto Rico's IRP process, detailed below under *Areas of Concern*.

Stakeholders identified that resiliency should be addressed from supply side (all fuels / resources) as well as demand side.

During the workshop, participants were asked to consider three specific power generation strategies developed by Siemens, including:

- *Strategy 1: Classical Strategy using mostly centralized generation.*
- *Strategy 2: Distributed, flexible generation*
- *Strategy 3: Hybrid Strategy of Centralized (#1) and Distributed (#2)*

Participants agreed that a distributed strategy is more appropriate to Puerto Rico's situation than a centralized strategy because it provides a more resilient grid. Generally, participants viewed a "hybrid strategy" of centralized and distributed generation as a short- or medium-term transition to a long-term mix of distributed and flexible generation in Puerto Rico where supply is located closer to load. Stakeholders in general did not consider that the centralized strategy should be pursued, except possibly as a reference point.

With respect of the generation fuel mix, stakeholders favored options that reduced the dependence on imported fuel and provided price stability.

Participants agreed that community and consumer empowerment should be central to tactical and deployment decision making. This aligns with interest in more decentralized generation.

Participants agreed that environmental performance is important, though stakeholder groups had different definitions for this metric.

Considering the above, the IRP team in the development of the IRP will focus more on the two strategies identified as most relevant (the hybrid and the distributed). Also in the formulation of the portfolios the role of distributed customer-owned generation will have a predominant role. Metrics to assess impact of fuel dependency and environmental stewardship will be developed for assessing performance and inform the selection of preferred Portfolios.

Areas of Disagreement

During the workshop, participants were asked to share their views on the role of natural gas. Participants most strongly disagreed with each other on the future role of natural gas in Puerto Rico. Concerns included fuel cost and the corresponding infrastructure costs and environmental considerations.

During the workshop, participants were asked to rank the following objectives in order of importance: Resiliency, Low-cost, and Sustainability. Generally, stakeholder groups disagreed on the relative prioritization of cost, resilience, and environmental considerations. Stakeholders also qualified the term "Low-Cost" as "Reasonable-Costs".

Considering the above, Siemens and PREPA in the formulation of Scenarios will consider a wide range of outcomes with respect of the role of natural gas ranging from a Scenario where it is highly limited, no new gas to Puerto Rico to another where there are new sources in the north and south of the main island. This will allow forming a clear view regarding the impacts of natural gas on important IRP metrics. With respect of the objectives, our main "take away" is that all objectives are important and performance according to each should be presented without potential "bias" introduced by weighting.

Areas of Concern

During the workshops, participants voiced a number of concerns.

Major stakeholder concerns generally included issues of governance/political leadership, regulatory frameworks, PROMESA Title III, PREPA privatization, the Governor's Fiscal Plan and vision, and the IRP process and timeline.

Stakeholders were concerned about the extremely short IRP timeline, and the limited advance notice for the first round of stakeholder workshops, likely leading to less stakeholder representation.

Participants were concerned that a lack of clarity about decision-making authority between PREPA, PREC, and Puerto Rico's political leadership would limit whether and how the IRP will be accepted or implemented. They were also concerned that PREPA's historical approach to customers or the PREC would not change. Stakeholders were also concerned how the IRP will comply with current and future regulatory frameworks, and that PREC might not approve the IRP.

There were stakeholder misperceptions that the IRP would not be submitted to PREC for approval. This was clarified not to be the case and that PREPA will follow PREC's procedure for the IRP approval, which could include official public hearings and an Intervenors process, as this is ordered by the PREC.

Concerns were expressed among all stakeholders about PREPA's financial situation and the impact of privatization on the IRP.

In one case, a concern was expressed about Siemens as the consultant running the IRP, based on perceptions about the vendor selection process, Siemens involvement with the previous IRP from 2015, and potential bias for technological solutions from other Siemens business lines.

Finally, stakeholders requested definitions of various terms, including "resiliency" and "sustainability".

With respect of the above, Siemens and PREPA recognize that while many of the factors of concern are very important - including PREPA's financial conditions, privatization and fiscal plan - these are factors outside of the IRP process, that is currently focused on identifying the best plan for the development of the electric supply in Puerto Rico. However, once these plans are identified and implementation is considered, the impact of these factors must be taken into consideration in identifying the implementation strategy and associated timeline.

Siemens and PREPA agree that the timeline for the development of the IRP is aggressive and can only be achieved with intensive participation and commitment of all parties.

With respect of the term Resiliency there are a number of definitions that apply to the IRP, in general we agree with the following general definition:

Resiliency: The ability to withstand or reduce the magnitude and/or duration of disruptive events, which includes the capability to identify vulnerabilities and threats, and plan for, prepare for, mitigate, absorb, adapt to, and/or timely recover from such an event.

We make an important differentiation between Reliability, which applies to High Probability and Low Consequence events, and Resiliency, that applies to Low Probability and High Consequence events.

Thus a resilient IRP will have elements to prepare, for example, for a major hurricane, manage the effects of the hurricane ensuring the supply of critical loads, and have the means for timely recovering the supply to all loads.

Sustainability: While centered on an on-going commitment to the development of renewable resources and demand side initiatives, like energy efficiency, but may consider transitional solutions like the environmentally conscious use of fossil fuels.

Finally it must be clearly understood that Siemens has a firm commitment to Puerto Rico and we always have and will continue to provide services that are unbiased and independent of the interest of any other Siemens business.

Areas of Collaboration

Siemens IRP team has reached out to a wide range of impacted customers/prosumers and industrial associations to best understand the different ways that they will participate in the electric energy supply of Puerto Rico as both producers and consumers of energy. In parallel to these outreach effort, Siemens IRP team has broadly communicated with various agencies who are undertaking different and separate work streams in Puerto Rico, including, but not limited to, NY Smart Grid Consortium, ProsumerGrid, Rand Corporation, Argonne National Laboratory, National Renewable Energy Laboratory, Oak Ridge National Laboratory, Pacific Northwest National Laboratory, Sandia National Laboratories, and McKinsey & Company. These communications and collaborations will continue to play a critical role in leveraging and sharing tools and models, incorporating different perspectives, and crystalize a consistent set of assumptions for the IRP technical models.

Next Steps

Gathering Additional Early Stage Input

Following the conclusion of the first round of stakeholder meetings, PREPA, the Siemens and SEPA teams will be conducting personal follow-up outreach to key stakeholders, experts, and decision makers who could not participate in the June 4th and 6th workshops.

For any interested parties not able to participate in scheduled workshops or follow on conversations, input, including additional comments and questions may be submitted by email to **IntegratedResource.Planning-RFP@prepa.com**

SEPA in collaboration with Siemens and PREPA will update this summary report as additional input is received, and will look to disseminate this report and derivative presentations to interested parties through public and private events, workshops, and conferences as possible.

Future Rounds of Stakeholder Input

Two additional sets of stakeholder workshops will be scheduled in mid-August and end of September (schedules pending). The second workshop (mid-August) will share IRP model assumptions, and preliminary analyses and results for stakeholder feedback and alignment. The third workshop (end of September) will present IRP preliminary recommendations and conclusions.

Finalization of the IRP for Submission

The final IRP will be submitted to PREPA upon completion in October 2018.

Appendix 1: PREPA 2018 IRP Workshop 1.1 (Customer Associations/Academics)

Time: 9:30 – 11:30 AM
Date: Monday, June 4, 2018
Location: Colegio de Ingenieros y Agrimensores de Puerto Rico, San Juan, Puerto Rico

Presenters

- Nelson J. Bacalao, Senior Manager, Consulting, Siemens Power Technologies International (PTI)
- Fengrong Li, Project Director, Consulting, Siemens Power Technologies International (PTI)/ Energy Business Advisory (EBA)
- Gary Vicinus, Managing Director, Consulting, Siemens Power Technologies International (PTI)/ Energy Business Advisory (EBA)
- Carlos Acevedo, Facilitator

Participants

Information on the list of participants has been redacted.

Observers

- Mary C. Zapata, Head, Planning and Research Division, PREPA
- Timothy Wang, Filsinger Energy Partners (consultant to PREPA)
- Tanuj Deora, Executive Vice President, Smart Electric Power Alliance (SEPA) (consultant to PREPA)
- Kate Strickland, Senior Associate, Smart Electric Power Alliance (SEPA) (consultant to PREPA)
- Luis R. Jimenez, PREPA
- Suheil M. Acevedo, PREPA

Areas of Agreement

- Importance of environmental performance (though not discussed in the same way between participants).
- Concerns about the PREPA financial condition.
- Concern that lack of clarity on decision making authority will limit whether and how the IRP will be useful or followed.

- Clear negative reaction to the "Central Generation Strategy' - all preferred either a "Distributed Generation" or a "Hybrid" Strategy.
- Favor smaller, distributed, customer owned resources over larger, central PREPA or IPP projects.

Areas of Disagreement

- Role of natural gas.

General Issues Raised

- What is the definition of "resilience".
- Lack of accurate stakeholder representation — who is not in the room?
- PREPA is not the only stakeholder. Assuming PREPA vision/board is aligned with country.
- Role of scenario cost: what's the price tag?
- Confusion over IRP scope and timeline
    - Does it cover Generation, Transmission, and Distribution?
    - What is the IRP timeline?
    - What is the IRP procedural process?
    - Concern over lack of focus on customer/distribution post-Maria
    - "Abrupt IRP process"
    - Concern if PREC doesn't approve PREPA vision

Question #1: Objectives

Group #1:

1. Are we missing a key objective?
    a. Missing emphasis on Distribution
2. What is more important to you? Resiliency, Low cost, or Sustainable?
    a. Sustainability–need to define
3. Can you rank the objectives:
    a. Sustainability, Customer-centric, Economic growth, Reliability, Financial viability, Resilience (can be an outcome of other objectives)

Group #2: PREPA staff observers, did not participate in discussion questions

Group #3:

1. Are we missing a key objective?
    a. Time, PREPA commitment to embrace change and how interact with private funding and capital
2. What is more important to you? Resiliency, Low cost, or Sustainable?
    a. Resiliency (need definition), Not Low cost but reasonable cost; Sustainable (needs robust definition)
3. Can you rank the objectives:
    a. #1: Economic growth; Reliability, Customer, Financial viability (should flow naturally), Sustainability

Group #4:

1. Are we missing a key objective?
    a. Energy security/justice; context of energy services in system; energy conservation/efficiency
2. What is more important to you? Resiliency, Low cost, or Sustainable?
    a. Sustainable; Resilient system (good/bad characteristics); Low cost (if serves well)
3. Can you rank the objectives:
    a. #1: Sustainable; Reliability & Resilient, Economic growth, Financial viability, Customer centric

Question #2: Constraints

Group #1:

1. Are we missing a key constraint?
    a. Land use, environmental justice
    b. It takes time to implement solutions; New knowledge about new technologies—willing to pay NOW. How does IRP line-up with new technology implementation? How to consider FOMB/PREPA financial condition? Who pays for resiliency?
2. What constraints are important to you?
    a. Fiscal condition, failed investments post-Maria
3. What are your views on future constraints (i.e. carbon rules)

a. New solutions available and how fast they can be adopted. Time and speed for new solutions (new technology such as energy storage)

Group #3:

1. Are we missing a key constraint?
    a. Title III PROMESA, PREPA financial condition; privatization, P3, distributed generation future
2. What constraints are important to you?
    a. Conflict between PREC and PREPA (pick your battles)
    b. Unclear public policy; lagging technology and flexibility to innovate
3. What are your views on future constraints (i.e. carbon rules)?
    a. Depend on privatization, Title III

Group #4:

1. Are we missing a key constraint?
    a. PREPA, privatization, Debt not solved
    b. Governance—who's in charge?
    c. "Abrupt timeline of IRP"
    d. Lack of internal/external PREPA coordination, ie. Don't have data points, need from PREC, and delay on rate case
        i. PREPA has minimum staff/resources to handle rate case & IRP. IRP priority is set by FOMB/Government request.
        ii. PREC has only one commissioner by end of June
2. What constraints are important to you?
    a. Compliance with law
3. What are your views on future constraints (i.e. carbon rules)
    a. Climate change, grid defection, cost of PREPA's transformation
    b. IRP goals for renewable should go beyond Renewable Portfolio Standards

Question #3: Strategies

- Strategy 1: Centralized
- Strategy 2: Distributed, flexible distributed generation ("closer to the customer")
- Strategy 3: Hybrid Strategy of Centralized (#1) and Distributed (#2)

Group #1:

1. How do you see the strategies align with the objectives?

a. Hybrid Strategy (#3, mix of Distributed and Centralized)

2. Any other strategies to be considered?
    a. N/A (need vision to drive IRP—for what?)
3. Of the strategies below how would you rank them?
    a. Use Hybrid Strategy (#3, mix of Distributed and Centralized) to get to Improved Distributed Strategy (#2). Discard Centralized Strategy (#1)

Group #3:

1. How do you see the strategies align with the objectives?
    a. Not aligned because right now, not enough info. Issue with starting premise—current laws/regulations are constraints.
2. Any other strategies to be considered?
    a. Geographic balance of infrastructure investments. Alignment of regulations to promote innovation/technology.
3. Of the strategies below how would you rank them?
    a. Discard Centralized Strategy (#1)
    b. Look at Improved Distributed Strategy (#2) and Hybrid Strategy (#3, mix of Distributed and Centralized)
    c. Centralized Strategy (#1) has been relied on too much as a benchmark. How do you balance discussion regarding strategy #1 while recognizing intrinsic value of resiliency?

Group #4:

1. How do you see the strategies align with the objectives?
    a. Centralized Strategy (#1) not sustainable
2. Any other strategies to be considered?
    a. Constant emphasis on "Hows," not enough "For what/why?" (Policy imperative). To define the "for what," need more time
3. Of the strategies below how would you rank them?
    a. Strategy 3: Hybrid Strategy of Centralized (#1) and Distributed (#2)
    b. Strategy 2: Distributed, flexible distributed generation ("closer to the customer")
    c. Strategy 1: Centralized

Question #4: Scenarios

Group #1:

1. Are we missing a key future scenario?
    a. Federal funds (timing/amount), Policy from leg future actions
2. What are your views on the role of natural gas?
    a. Natural gas that permits the max amount of renewable (enabler)
3. What are your views on the role of renewable?
   Renewable + storage max amount + business model change. Customers want more renewable —build a system for the future that allows people of PR to achieve this goal.
    a. Need to be aligned with legislation and government requirements (new ruling coming?)

Group #3:

1. Are we missing a key future scenario?
    a. Prices/timing for disruptive technologies (storage, microgrids). Sudden load reduction (leave island/leave grid). Residential migration. Lack of energy business model for PREPA.
2. What are your views on the role of natural gas?
    a. [detailed under #3]
3. What are your views on the role of renewable?
    a. Both natural gas and renewable considered in equal terms for future strategies development

Group #4:

1. Are we missing a key future scenario?
    a. Local/community visions of energy futures (maverick mayors; org leaders); public/private scenarios.
2. What are your views on the role of natural gas?
    a. Natural gas is the substitution of one set of emissions for another (revaporization emissions, CO_2); no energy independence; price fluctuations, high infrastructure investment). “Natural gas transition is a myth.”
3. What are your views on the role of renewable?
    a. Sustainable integration would work. Not substitution of 1 technology for another, but transformation.

Question #5: Options/Toolbox

Group #1:

1. How would you like to participate in the Supply Options?
    a. Renewable, Combined Heat and Power, Energy Efficiency, Demand Response
2. Demand options?
    a. Energy Efficiency & Distributed Resources
3. Options to not consider or to favor?
    a. Not preferred: Large Combined Cycle units (350 MW)—agree regarding smaller units, but find right balance with cost and heat-rate performance. Need flexible Fossil fuels units for renewable penetration.
    b. Curious about trends? Arizona regulation allows no units larger than 150 MW; role of steel tariffs

Group #3:

1. How would you like to participate in the Supply Options?
    a. Depends on the PREPA business model. Smaller Combined Cycle, Customer initiated plans for Combined Heat and Power, minigrids/microgrids, renewable, all reasonable transmission and distribution hardening, storage required (not an alternative)
2. Demand options?
    a. Time of Use rate across all consumer classes (role of public policy being an enabler)
3. Options to not consider or to favor?
    a. Tech agnostic but don't modernize current fleet. No peaking combustion turbines
    b. Need more clarity regarding Combined Heat and Power integration

Group #4:

1. How would you like to participate in the Supply Options?
    a. PREPA as a platform for management (prosumers)
2. Demand options?
    a. Max renewable, demand management, Energy Efficiency, storage, public/private
3. Options to not consider or to favor?
    a. Elimination of Fossil fuels generation

Appendix 2: PREPA 2018 IRP Workshop 1.2 (NGOs and Environmental Groups)

Time: 2:00 – 4:30 PM
Date: Monday, June 4, 2018
Location: Colegio de Ingenieros y Agrimensores de Puerto Rico, San Juan, Puerto Rico
Presenters

- Nelson J. Bacalao, Senior Manager, Consulting, Siemens Power Technologies International (PTI)
- Fengrong Li, Project Director, Consulting, Siemens Power Technologies International (PTI)/ Energy Business Advisory (EBA)
- Gary Vicinus, Managing Director, Consulting, Siemens Power Technologies International (PTI)/ Energy Business Advisory (EBA)
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- Kate Strickland, Senior Associate, Smart Electric Power Alliance (SEPA) (consultant to PREPA)
- Luis R. Jimenez, PREPA
- Suheil M. Acevedo, PREPA
- Miguel F. Irizarry, PREPA
- Martha Merrill, Technical Analyst, RAND (Governor's Recovery Plan Team)

Background/Context

- Highlight the new style/elements of the IRP: discussion of resiliency, the role of stakeholder meetings
- Integrated Resource Plans are a planning tool, not focused on implementation

General Issues/Questions Raised

- Questions about the IRP modelling tool being used: Aurora model

- How will the Siemens team incorporate/use New York State Smart Grid Consortium (NYSSGC) + Prosumer data?
    - Answer: The Siemens IRP team will meet with them in a separate meeting.
- What is the role of the Puerto Rico Energy Commission (PREC) in the IRP process? Will the IRP comply with regulations? When will the IRP team meet/engage with PREC?
    - Answer: The Siemens IRP team will meet with them in a separate meeting, and the IRP will comply with all requirements.
- What is the full engagement plan for stakeholders?
    - Answer: The process includes all stakeholders in at least three stages.
- Will P3's RFPs be used in the IRP model?
    - Answer: We will provide details as they are available to us. A note that some data is withheld due to confidentiality reasons until RFPs is public.
- Is there a centralized source for stakeholders interested in updates on the IRP process?
    - Answer: PREPA's website.

Areas of Agreement

- Need for significant transformation to a more consumer/prosumers empowered environment (community / consumers being more central to tactical and deployment decision making).
- PREPA's historical approach to PREC and consumers needs to change.
- Environmental performance is important.
- Belief that a more distributed strategy is more promising than a centralized strategy.
- Time of use rates should be explored/ implemented.
- Need to assess remote generation plus transmission (including investment) against local generation plus distribution investment required

Areas of Disagreement

- Role of natural gas

Question #1: Objectives

- Do IRP objectives align with the Fiscal Plan?
- What is the definition of "sustainable"?

Group #1:

1. Are we missing a key objective?
    a. Environmental, community driven
2. What is more important to you? Resiliency, Low cost, or Sustainable?
3. Can you rank the objectives:
    a. Resilience/Sustainable; Community, Enviro, Low cost

Group #2:

1. Are we missing a key objective?
    a. Power quality (key to industrial clients), Implementation time
2. What is more important to you? Resiliency, Low cost, or Sustainable?
    a. Resiliency, Low cost, Sustainability
3. Can you rank the objectives:
    a. Prosumer centric (including renewable with storage, Combined Heat and Power)
    b. Power quality
    c. Reliability/resilience
    d. Implementation time
    e. Financial viability
    f. Sustainable
    g. Economic growth engine (as a result)—feedback loop/not linear
        i. Comment: "the highest rated ones will result in the lower rated ones"

Question #2: Constraints

- Issue of privatization and alignment between PREPA, FOMB, and the Governor's office.
- Role of Wheeling

Group #1:

1. Are we missing a key constraint?
    a. Population migration (exodus), PREPA debt (not sustainable/viable), grid defection, social expectations (generalized support of transformation/prosumers), and climate change.
2. What constraints are important to you?
    a. Order: PREPA debt first, Climate change, grid defection, population migration, social expectations.

3. What are your views on future constraints (i.e., carbon rules)
    a. Gov't/political intervention; Perpetuation of fossil fuels, esp. new investors/owners of existing plants

Group #2:

1. Are we missing a key constraint?
    a. Wheeling, Privatization act, PREPA business model, load reduction, PR economic system, PR politics, lack of workforce to implement
2. What constraints are important to you?
    a. Failure to comply with Renewable Portfolio Standards, PREC regulation, load reduction (focus on margin vs volume), public policy: privatization act, shape of future PREPA
3. What are your views on future constraints (i.e., carbon rules)
    a. Failure to execute IRP (implementation—actually gets it done. "Say and actually do.")

Question #3: Strategies

- Strategy 1: Centralized
- Strategy 2: Distributed, flexible distributed generation ("closer to the customer")
- Strategy 3: Hybrid Strategy of Centralized (#1) and Distributed (#2)
- How address renewable integration; mini/microgrids etc. when not doing a Distribution IRP?
- How will the IPR model investment cost?

Group #1:

1. How do you see the strategies align with the objectives?
    a. Distributed Strategy (#2), and Hybrid Strategy (#3, mix of Distributed and Centralized)
2. Any other strategies to be considered?
    a. Improve Distributed Strategy (#2) to include demand management, efficiency, storage, Time of Use
3. Of the strategies below how would you rank them?
    a. Improved Distributed Strategy (#2)
    b. Hybrid Strategy (#3, mix of Distributed and Centralized)
    c. Centralized Strategy (#1)

Group #2:

1. How do you see the strategies align with the objectives?
    a. Distributed Strategy most aligned (including gas pipeline and small scale energy); Hybrid Strategy as transition to Distribution Strategy?
2. Any other strategies to be considered?
    a. Strategy to promote grid defection (i.e. remote clients—find another way to serve Non wires alternatives).
    b. Assume Gas pipeline network (Hospitals, cogeneration, Sandy example) to allow baseload DR
3. Of the strategies below how would you rank them?
    a. Improved Distributed Strategy (#2)
    b. Hybrid Strategy (#3, mix of Distributed and Centralized)

Question #4: Scenarios

Group #1:

1. Are we missing a key future scenario?
    a. Can't discuss future scenarios because nothing stated
2. What are your views on the role of natural gas?
    a. "Substitution of one set of fossil fuels for another"—need to look at whole island context; Foreign energy source to Puerto Rico;
3. What are your views on the role of renewable?
    a. Need to move swiftly to renewable.

Group #2:

1. Are we missing a key future scenario?
    a. EVs
    b. Short power for cruise ships
    c. Natural gas pipelines to critical infrastructure (microgrid anchor)
    d. Combined Heat and Power selling excess energy to utility @ marginal cost + O&M plus ancillary services.
2. What are your views on the role of natural gas?
    a. Necessary long-term transition fuel to larger renewable assets.
    b. New fuel based generation should still be multi-fueled (natural gas, LPG, diesel)

c. Natural gas is not only relevant to PREPA but also to the industrial base (role of employment)/critical infrastructure currently burns diesel). View of natural gas as domestic because U.S. capacity.

3. What are your views on the role of renewable?
    a. Support environmental compliance, clean energy, sustainability
    b. Challenges: variability, reliability, cost/capacity of storage

Question #5: Options/Toolbox

Group #1:

1. How would you like to participate in the Supply Options?
    a. Align behind the Meter, Prosumer, generation + storage (grids). Minigrids, microgrids, solar communities (rooftop)
2. Demand options?
    a. Demand management, Time of Use, smart grid technology
3. Options to not consider or to favor?
    a. Against: Large Combined Cycle units, coal, large investment in fuel infrastructure
        i. Aguirre gas port—PREC says PREPA can refile—sensitivity/option

Group #2:

1. How would you like to participate in the Supply Options?
    a. 1st: Maximize renewable with storage (5 hour) (Residential and utility-scale) & curtailment
    b. Hydro asset renewal
    c. Analyze pump storage (cascade series opportunity)
    d. Baseload generation in North
    e. No bigger power plants bigger than 350 MW (2 on 1 combined cycle)
    f. Maximize existing transmission and distribution assets
        i. Issue of pipelines vs large/small
    g. Reciprocating engines for Southern Power Plants, Vieques + Culebras, or other potential microgrid with gas availability (20-200 MW)
    h. Power plants multi fuel (future flexibility)
    i. Geography constraints: North vs South load consistency/behavior
        i. Information/opacity (PREPA data—public?)

2. Demand options?
    a. Time of Use, special rates for demand side management, Energy Efficiency key performance indicators related to special rates
    b. Opportunity: Assess cost of smart meters vs increased Generation cost
3. Options to not consider or to favor?
    a. Don't consider large power plants (>400 MW)
    b. Current fleet not part of end solution (boilers, heavy fuel oil)
    c. Maintain elements of current fleet.
    d. Opportunity: Cost of south-to-north transmission hardening vs North not depending on hardened south-to-north transmission line

Appendix 3: PREPA 2018 IRP Workshop 1.3 (Suppliers and Developers)

Time: 9:30 - 11:30 AM
Date: Wednesday, June 6, 2018
Location: Colegio de Ingenieros y Agrimensores de Puerto Rico, San Juan, Puerto Rico

Presenters

- Nelson J. Bacalao, Senior Manager, Consulting, Siemens Power Technologies International (PTI)
- Fengrong Li, Project Director, Consulting, Siemens Power Technologies International (PTI)/ Energy Business Advisory (EBA)
- Gary Vicinus, Managing Director, Consulting, Siemens Power Technologies International (PTI)/ Energy Business Advisory (EBA)
- Carlos Acevedo, Facilitator

Participants

Information on the list of participants has been redacted.

Observers

- Mary C. Zapata, Head, Planning and Research Division, PREPA
- Timothy Wang, Filsinger Energy Partners (consultant to PREPA)
- Tanuj Deora, Executive Vice President, Smart Electric Power Alliance (SEPA) (consultant to PREPA)
- Kate Strickland, Senior Associate, Smart Electric Power Alliance (SEPA) (consultant to PREPA)
- Luis R. Jimenez, PREPA
- Suheil M. Acevedo, PREPA
- Miguel F. Irizarry, PREPA
- Caroline Rivera, PREPA
- Brenda L. Pérez, PREPA
- Joseline Estrada, PREPA
- Lourdes Lugo, PREPA
- Alfonso Baretty, PREPA
- Roberto Acosta, PREPA
- Martha Merrill, Technical Analyst, RAND (Governor's Recovery Plan Team)

Background/Context

- Highlight the new style/elements of the IRP: discussion of resiliency, the role of stakeholder meetings
- Integrated Resource Plans are a planning tool, not focused on implementation

General Issues/Questions Raised

- Are all IRP requirements created equal or prioritized?
    - Answer: The performance of the various expansion alternatives will be assessed against a number of metrics. No prior weighting is envisioned
- Is the IRP considering resiliency from supply side of all fuels and components in order to see if the system is resilient?
    - Answer: Both supply side (all fuel and resources) and demand side options to be considered
- Will the IRP factor in marginal cost of supply studies in order to determine financial viability?
    - Answer: Economic assessment is an important performance metric to be considered, but not the only one.
- How will Title III be integrated into IRP?
    - Answer: The IRP is a planning tool rather than a financing tool.
- Are stakeholders who are responsible for IRP implementation involved in process? How transition from plan to action?
    - Answer: This is the process for stakeholder involvement. The IRP will have a recommended action plan that will chart the path to action.

Question #1: Objectives

Group #1

1. Are we missing a key objective?
    a. Leadership (Who's in charge?)
    b. Defined schedule
        i. Short, medium, long-term goals and how tie-into current generation
    c. Uncertainty of privatization and its impact on the existing generations
2. What is more important to you? Resiliency, Low cost, or Sustainable?
3. Can you rank the objectives:

a. Resiliency - highest
b. Low-cost - medium
c. Sustainability – lowest

Group #2

1. Are we missing a key objective?
    a. Technical viability and uncertainty
    b. Implementation certainty and confidence
    c. Fuel diversity/ energy independence
    d. De-linking of PREPA political ties
    e. Short-, medium-, long- term energy policy
    f. Financial investment diversity (public/private)

2. What is more important to you? Resiliency, Low cost, or Sustainable?
    a. Economic/Low-cost (but cheapest solution) – No. 1
    b. Resilient – No. 2
    c. Sustainability – No. 3
3. Can you rank the objectives:
    a. Economic growth – No. 1
    b. Consumer centric – No. 2
    c. Financial viability – No. 3
    d. Reliability/ resilient – No. 4
    e. Sustainable – No. 5

Group #3

1. Are we missing a key objective?
    a. Safety for people
    b. Consider future technologies
2. What is more important to you? Resiliency, Low cost, or Sustainable? (most important = 1, least important = 3)
    a. Resiliency – 1
    b. Sustainability - 2
    c. Low cost - 3
3. Can you rank the objectives: (objectives as byproducts of other metrics}
    a. Reliability and resiliency
    b. Sustainable
    c. Customer centric

d. Financial viability
e. Economic growth

Group #4

1. Are we missing a key objective?
    a. Definition of customer centric
    b. Focus on timeline
2. What is more important to you? Resiliency, Low cost, or Sustainable?
    a. Resiliency and sustainability
3. Can you rank the objectives: (objectives as byproducts of other metrics}
    a. Resiliency, cost effective and sustainability leading to economic growth

Remote participants:

1. Are we missing a key objective?
    a. Grid efficiency
2. What is more important to you? Resiliency, Low cost, or Sustainable?
    a. Low cost
    b. Resiliency
    c. Sustainability

Question #2: Constraints

Group #1

1. Are we missing a key constraint?
    a. Capital availability
    b. Land availability (land use plan)
    c. Regulatory constraints
    d. Timing
    e. Process (local vs federal)
2. What constraints are important to you?
    a. Access to capital
    b. All of the above
3. What are your views on future constraints (i.e., carbon rules)
    a. Infrastructure – Liquefied Natural Gas (LNG) for Mercury and Air Toxics Standards (MATS) compliance, need conversion, no infrastructure.
    b. Distribution network (LNG from South to North)

Group #2

1. Are we missing a key constraint?
    a. Fiscal policy: the Puerto Rico Oversight, Management, and Economic Stability Act (PROMESA)
    b. FEMA and other federal funding
    c. How to properly sequence new generation and updates to system
    d. Privatization law/ P3 contracting
    e. Credit worthiness
    f. How minimize future curtailment of renewable resources (principally solar), which will require upgrading conventional generation on the island to be fast ramping and quick start
    g. Geography -- locating new generation in North close to load centers
2. What constraints are important to you?
    a. No response
3. What are your views on future constraints (i.e., carbon rules)
    a. No response

Group #3

1. Are we missing a key constraint? [Question of how we implement each in IRP]
    a. Potential changes in Puerto Rico regulatory framework
    b. Uncertainty/changes on public policy (including Renewable Portfolio Standards)
    c. Timeline for execution (permitting process)
    d. Federal laws (including tax incentives)
    e. Clarity on decision making
    f. Public opinion
2. What constraints are important to you?
    a. Uncertainty + implementation timeline
    b. Decision-making clarity
3. What are your views on future constraints (i.e. carbon rules)
    a. PREPA's privatization process

Group #4

1. Are we missing a key constraint?
    a. Near term fiscal/bankruptcy uncertainty
        i. Legal framework
        ii. Privatization impact in Generation vs Transmission vs Distribution

b. Decision-making (Who decides? FEMA, U.S. Army Corps of Engineers, Fiscal Board, Senate, Governors)
c. Infrastructure vulnerability
d. Accountability to policies/targets on island (including compliance)

2. What constraints are important to you?
3. What are your views on future constraints (i.e. carbon rules)

Remote participants

1. Are we missing a key constraint?
    a. Operating constraint
    b. Reserve margins, variable resources and additional reserves plus contingencies
    c. Learning curve with new technologies and how current systems works/reacts

Question #3: Strategies

- Strategy 1: Centralized
- Strategy 2: Distributed, flexible distributed generation ("closer to the customer")
- Strategy 3: Hybrid Strategy of Centralized (#1) and Distributed (#2)

Group #1

1. How do you see the strategies align with the objectives?
    a. Strategy 3 which is the hybrid strategy of Centralized (#1) and Distributed (#2) best aligns with the objectives
2. Any other strategies to be considered?
    a. Virtual Power Purchase Agreements (PPAs) (Pharmaceuticals)
        i. Need reasonable wheeling charge, which requires work with PREPA to find a solution that is beneficial to both sides.
3. Of the strategies below how would you rank them?
    a. Strategy 3: Hybrid Strategy of Centralized (#1) and Distributed (#2) – No. 1
    b. Strategy 2: Distributed, flexible distributed generation ("closer to the customer") – No. 2
    c. Strategy 1: Centralized – No. 3

Group #2

1. How do you see the strategies align with the objectives?
    a. Strategy 1 which is the centralized solution has shortfalls and is more difficult to move forward

b. Strategy 2 which offers economic growth, customer centric and low cost. This limits achievement of goal for largest group.
c. Strategy 3 is preferred. It should build on existing base to achieve economy of scale.

2. Any other strategies to be considered?
    a. Limited by size of market
3. Of the strategies below how would you rank them?
    a. Strategy 3: Hybrid Strategy of Centralized (#1) and Distributed (#2) – No. 1
    b. Strategy 2: Distributed, flexible distributed generation ("closer to the customer") – No. 2
    c. Strategy 1: Centralized – No. 3

Group #3

1. How do you see the strategies align with the objectives?
    a. Strategy 2 should be the long term goal and will strategy No. 3 to get there in an economic and reliable way. Focus on renewable.
2. Any other strategies to be considered?
    a. Government to promote, facilitate, and support the financing of rooftop solar projects on all residential and commercial buildings
3. Of the strategies below how would you rank them?
    a. Strategy 2 – No. 1
    b. Strategy 3 – No. 2
    c. Strategy 1 – No. 3

Group #4

1. How do you see the strategies align with the objectives?
    a. Strategy 3: Hybrid Strategy of Centralized (#1) and Distributed (#2)
    b. Strategy 2: Distributed, flexible distributed generation ("closer to the customer")
    c. Strategy 1: Centralized
2. Any other strategies to be considered?
    a. Timeline very important
    b. Fuel diversity
    c. Transformation of the grid
    d. Resiliency for critical services – Microgrid, storage
3. Of the strategies below how would you rank them?
    a. Strategy 3: Hybrid Strategy of Centralized (#1) and Distributed (#2) – No. 1

b. Strategy 2: Distributed, flexible distributed generation ("closer to the customer") – No. 2
c. Strategy 1: Centralized – No. 3

Remote participants:

1. Any other strategies to be considered?
    a. New customer engagement strategy/end users
        i. For example, can drive to energy conservation via tariffs

Question #4: Scenarios

Group #1

1. Are we missing a key future scenario?
    a. Current fuel mix + future technologies
        i. LNG as driving source of island baseload
    b. Island geography + current infrastructure
    c. Migration (people and industry) and the impact on demand for electricity /power
2. What are your views on the role of natural gas?
    a. Natural gas will play a critical role in the long term
    b. Short term natural gas options are available today, though currently there is no large-scale LNG in North
    c. LPG is available now
3. What are your views on the role of renewable?
    a. Renewable will play an integral role in the short, mid and long term
    b. Emphasis on distributed generation and microgrids (consider existing grid constraints)

Group #2

1. Are we missing a key future scenario?
    a. Optimization of brownfields, existing easements and right of ways (reuse what we have).
    b. Limited space/geography
    c. Infrastructure must be diverse, reliable, and resilient
2. What are your views on the role of natural gas?
    a. LNG is important for big loads
    b. LPG could be a transitional option for some loads (need fuel diversity)

3. What are your views on the role of renewable?
    a. Opportunity to have stable, predictable prices and costs
    b. Can be used as small or large scale
    c. Good for environment and achievement of the Renewable Portfolio Standards

Group #3

1. Are we missing a key future scenario?
    a. Management of waste as an energy resource and environmental compliance
2. What are your views on the role of natural gas?
    a. Find ways to have gas available to the North of island
    b. LPG as transition fuel
    c. In the future, natural gas could become another oil - unpredictable, expensive.
    d. Need to increase storage because of this uncertainty
3. What are your views on the role of renewable?
    a. Key to decreasing dependence on fossil fuels
    b. Renewable role is not to address grid stability (revisit Minimum Technical Requirements for renewable projects)
    c. Consider more collaborative energy storage
    d. Use excess installed capacity as buffer

Group #4

1. Are we missing a key future scenario?
    a. Natural gas and renewable are critical
    b. Created new scenarios:
        i. Low energy demand scenario driven by high distributed generation, population/industry decline, energy efficiency
        ii. Natural gas as important base load, expensive
        iii. High “low carbon” scenario
        iv. High resiliency scenario (storm survivability, very expensive solution)
    c. Overall question: What’s the retirement schedule you need? Or want? Consider both the economics and environmental attributes
2. What are your views on the role of natural gas?
3. What are your views on the role of renewable?

Remote participants:

1. Economic growth for peak load and energy peak for diff capacity depending on growth. How to meet requirements

2. Natural Gas: don't ignore infrastructure costs; including the cost of de-gasification, storage for utilities and direct cost to end users for pipeline/infrastructure cost
3. Renewable: Need to capture operations constraints listed before; additional reserves, contingency changes, impact of system inertia and other ancillary services
4. Impact of scenarios/solutions on Distribution and Transmission systems

Question #5: Options/Toolbox?

Group #1

1. How would you like to participate in the Supply Options?
    a. Technology providers
    b. Fuel suppliers
    c. Engineering, Procurement & Construction contractors
    d. Most importantly, as resident of Puerto Rico able to build a better and more resilient power grid.
2. Demand options?
    a. Day to night peaks - Load response/ demand options
    b. Peak generation supported/supplied with energy storage
    c. Peak generators on a utility-scale to help with frequency response, voltage fluctuation, as well as demand/load fluctuation.
3. Options to not consider or to favor?
    a. Favor: Renewable
    b. Not consider: No coal, no HFP (bunker oil)

Group #2

1. How would you like to participate in the Supply Options?
    a. Providing large Combined Cycle + solar (utility scale)
    b. Waste-to-energy
    c. Fast track mobile power
    d. Supplying fuel solutions
    e. Grid management
    f. Distributed generation renewable solutions
    g. Utility-scale solar and wind
2. Demand options?
    a. Energy Efficiency opportunities for Transmission & Distribution
        i. Huge current technical losses need to be managed

ii. Large 10-12% non-technical losses (theft)

3. Options to not consider or to favor?
    a. Favor: Distributed generation for short-term deployable solutions
        i. Economic driver on the short term
        ii. Private capital
    b. Favor: Prioritize mature, "shovel ready" generation projects
        i. Examples: Renewable, waste-to-energy Power Purchase and Operating Agreements.

Group #3

1. How would you like to participate in the Supply Options?
    a. Investment in generation assets
        i. Gas, Combined Heat and Power
        ii. Solar (utility scale)
        iii. Wind (utility scale)
        iv. distributed generation/ microgrid
2. Demand options?
    a. Provide Demand Response, Time of Use price incentives
3. Options to not consider or to favor?

Group #4

1. How would you like to participate in the Supply Options?
    a. Separate renewable from storage, i.e., storage should be part of the big system, instead of tied to individual renewable projects
    b. Existing fleet modernization: opportunities exist, but need to be selective
    c. Large Combined Cycle: be fuel specific
    d. Group of Fuel suppliers, infrastructure development, smart grid management
2. Demand options?
    a. Lots of opportunity around Energy Efficiency
3. Options to not consider or to favor?

Remote participants:

- Waste to energy
- Distributed resources with specific configurations and feasibility studies
- Direct load control programs to reduce peak, enabled by AMI, pre-paid meters
- Non/technical losses addressed through advanced metering technology

Appendix 4: PREPA 2018 IRP Workshop 1.4 (General Public)

Time: 2:00 - 4:30 PM
Date: Wednesday, June 6, 2018
Location: Colegio de Ingenieros y Agrimensores de Puerto Rico, San Juan, Puerto Rico

Presenters

- Nelson J. Bacalao, Senior Manager, Consulting, Siemens Power Technologies International (PTI)
- Fengrong Li, Project Director, Consulting, Siemens Power Technologies International (PTI)/ Energy Business Advisory (EBA)
- Carlos Acevedo, Facilitator

Participants

Information on the list of participants has been redacted.

Observers

- Mary C. Zapata, Head, Planning and Research Division, PREPA
- Timothy Wang, Filsinger Energy Partners (consultant to PREPA)
- Tanuj Deora, Executive Vice President, Smart Electric Power Alliance (SEPA) (consultant to PREPA)
- Miguel F. Irizarry, PREPA

General Issues and Questions:

- Participants questioned the role of Siemens in the IRP process and were concerned about perceived conflict of interests, for example because the company also manufactures equipment that it may then recommend as part of the study. Regarding the allegations of conflicts of interest, Mr. Bacalao clarified that Siemens always have and will continue to provide services that are unbiased and independent of the interest of any other Siemens business.
- Participants also were concerned that the IRP process was not following Puerto Rico Energy Commission (PREC) due process. Mr. Bacalao clarified that the IRP process had not formally started, but that these meetings were being done before the official IRP filing, to collect useful feedback from stakeholders in order to better prepare the IRP study.

- Participants also raised concerns regarding the way that the IRP stakeholder meetings were notified to the general public. Recommendations were made and both PREPA and Siemens agreed to consider them for future occasions.

Question #1: Objectives

The participants decided to discuss the questions as a single group.

1. Are we missing a key objective?
    a. Sustainability- clean, renewable energy, not just as an option, but as a guide or principle
    b. Generation Independence
    c. Distributed generation at customer level, diversification
    d. Utility as manager, not a supplier
    e. New objective proposal: "Energy sector based on distributed, endogenous, clean renewable energy that is affordable, promotes efficiency, ensures equity, ample public engagement, capacity building, and governance, and creates local wealth while maximizing on-island ownership."
    f. Facilitate the creation of energy cooperatives
2. What is more important to you? Resiliency, Low cost, or Sustainable?
3. Can you rank the objectives: Resiliency, Low-cost, and Sustainability?

Several questions were raised by the participants, including concerns regarding the imminent privatization of PREPA, and how the objectives of a private entity would clash with consumers' benefits/gains. Specially, a concern was raised regarding the possible increase in the cost of energy to be supplied by a private entity versus a public agency, this, in light of the privatization of PREPA's generation assets. Additionally, how would an evaluation of financial viability be carried out given the challenges faced by PREPA, including: Title III, Fiscal Control board, the restructuring process, and privatization.

Question #2: Constraints

The group argued that the term "constraints" has a negative connotation and requested to substitute it by "externalities".

1. Are we missing a key constraint (externality)?

a. Reconstruction of the electric system taking into consideration environmental/climate change; identify sensitive areas (example: karst region)
b. Protect environmental reserves
c. "The Oil Cartel"
d. Do not use natural gas as substitute for oil
e. Externalities to be treated internally – environmental issues are traditionally treated as externalities
f. Puerto Rico Constitution – provisions regarding health, social welfare, etc. must be considered – "Constitutional Mandate"
g. Subsidies

2. [Discussed under question #1] What constraints are important to you?
3. What are your views on future constraints (i.e., carbon rules)
    a. Congressional interests/pressure
    b. Credit Rating Agencies – will incorporate resilience into future evaluations
    c. Particular interests
    d. Carbon rules/fees

Question #3: Strategies

- Strategy 1: Centralized
- Strategy 2: Distributed, flexible distributed generation ("closer to the customer")
- Strategy 3: Hybrid Strategy of Centralized (#1) and Distributed (#2)

1. How do you see the strategies align with the objectives?
    a. It was suggested that each geographical area has a different energy component, so every microgrid must take this into consideration while at the same time be environmentally friendly.
2. Any other strategies to be considered?
    a. Strategy #2 (distributed, flexible distributed generation) prioritizing clean renewable energy and customer-owned generation; example: rooftop solar. Should also include incentives for shifting nighttime peak to daytime hours to reduce the need for storage, and include demand reduction and energy efficiency – introduce construction codes that improve energy efficiency.

b. Recommend that the term distributed energy equals clean renewable energy, not waste to energy or other contaminating technologies.
c. Clarify "flexible generation" – reliable renewable

3. Of the strategies below how would you rank them?
    a. #2 as improved above
    b. #3
    c. Do not consider #1

Question #4: Scenarios

1. Are we missing a key future scenario?
    a. Public Health – affected by emissions. Against waste to energy and natural gas.
    b. Environmental Justice - communities around generation/infrastructure
    c. Climate Change – rise in sea levels and natural disasters
    d. Economic Impact on Public Health System
    e. Use or Limitation of Available Resources – examples: water, agricultural lands
    f. Population Reduction/Decrease in Industrial Load
    g. Byproducts Generated
2. What are your views on the role of natural gas?
    a. Opposition to natural gas – viewed as substituting oil as a fossil fuel; increase in emissions due to regasification (note: a discussion on the alleged effects of natural gas ensued)
    b. Important to consider the emissions and how it affects public health.
3. What are your views on the role of renewable?
    a. Transition to renewable energy as fast as possible (100% before 2050)
    b. Necessary option for Puerto Rico
    c. Clean renewable energy, not in agricultural or environmentally sensitive land.

Question #5: Options/Toolbox

1. How would you like to participate in the Supply Options?
    a. Diversified, distributed generation (rooftop solar)

2. Demand options?
    a. Demand reduction/ energy efficiency programs
3. Options to not consider or to favor?
    a. No waste to energy, no large fossil fuel plants
    b. Participation in energy efficiency programs
    c. Priority should be clean renewable energy
    d. Evaluate Combined Heat and Power carefully
    e. Aggressively move towards renewable - current possibility to have large penetration of renewable
    f. Incentives to shift peak demand/ Time of Use rates
    g. Combination of alternatives that respond to reduction in demand, capacity factor and energy efficiency