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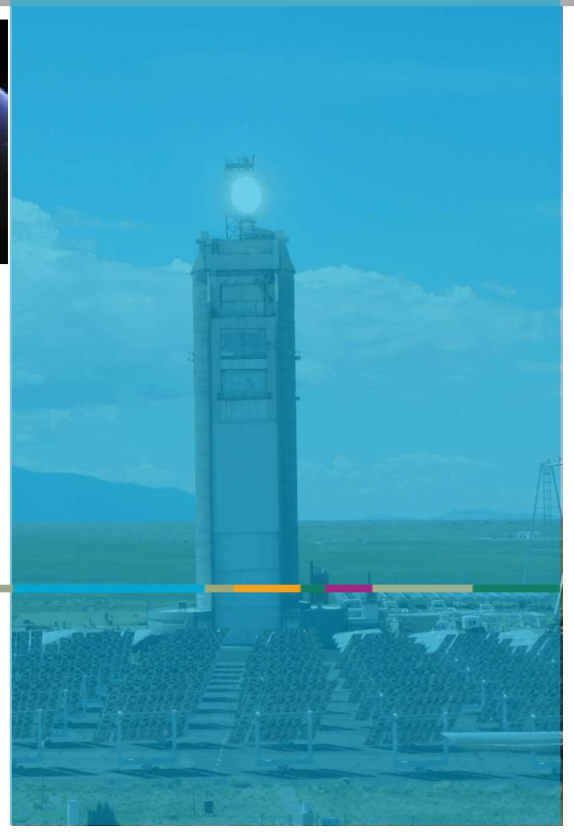
SAND2020-5260PE

PTS: Strategic Planning for Safe and Secure Energy and Environment for Resiliency and Reliability



PRESENTED BY

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UPRM/Sandia Webinar on Research Synergies

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Renewable Energy & Distributed Systems Integration

Our 35 years of work in renewable energy includes a growing focus on cost competitiveness and higher deployment of distributed energy resources while enhancing overall grid resilience and reliability.

- Advanced Modeling and Simulation
- Power Electronics and Controls
- Distributed Energy Technology Validation and Demonstration
- Integrated energy systems optimization, distributed controls, communications, interoperability, and cybersecurity
- Standardization
- Distributed Energy Technologies Laboratory

PTS Summary

- Strategic planning project regarding Safe and Secure Energy and Environment for Resiliency and Reliability issues that are unique to Puerto Rico, Tropical and Sub Tropical regions.
- Identify the current state, challenges, gaps and barriers in areas related to energy and environment, as well as reliability and resiliency issues.
- Provide information and analysis to support programs and projects for improved energy security and safety.
- Planning and identification of long-term research directions for Tropical and Sub-tropical energy and environmental issues.
- Evaluate resiliency and reliability using Puerto Rico as a case study to draw conclusions and suggest future adaptations to other islanded or remote areas with similar weather.
- Consider the link among electric infrastructure, natural resources, and socio-economic development when considering alternatives to improve resiliency and reliability in the region.

PTS tasks (January to December 2020)

Task No.	Task Title	Duration (Month)	Responsible Parties
1	Perform literature analysis of resiliency and reliability issues	1-3	NTESS/UPRM
2	Identify and evaluate challenges, gaps and barriers	4-8	NTESS/UPRM
3	Develop and recommend strategic research	8-12	NTESS/UPRM
4	Prepare and disseminate final report	12-12	NTESS

Key Personnel

- Technical point of contacts
  - Summer Ferreira (Sandia)
  - Dr. Bienvenido Velez, Dean of Engineering (UPRM)
- Sandia researcher
  - Efrain O’Neill
- UPRM researchers
  - Erick Aponte, Eduardo Ortiz
  - Student collaborators

Task 1: Perform literature analysis of resiliency and reliability issues

- Conduct comprehensive literature research to identify the main resiliency and reliability issues relevant to energy and environment in Tropical and Sub-tropical regions. Special focus will be on the Caribbean and Puerto Rico to establish the scope of the work in subsequent tasks.
  - Sources could include previous work at UPRM and NTESS, IEEE publications, DOE publications, reports and publicly available resources from the National Laboratories among other potential sources.
- Jointly produced publication on key resiliency and reliability issues for energy and environment in Tropical and Sub-tropical regions.

Task 2: Identify and evaluate challenges, gaps and barriers

- Identify challenges, gaps and barriers related to energy and environmental resiliency and reliability using as starting point and guidance the deliverable from Task 1.
- Puerto Rico as a case study.
- Link among electric infrastructure, natural resources, and socio-economic development will be considered.
- Jointly produced publication on opportunities for new or expanded research in energy and environment in Tropical and Sub-tropical regions, focused on resiliency and reliability.

Task 3: Develop and recommend strategic research directions

- Strategic plan that describes and recommends the main research directions for energy and environment resiliency/reliability based on the opportunities identified in Task 2.
  - Establish the preliminary methodology, tools, personnel, collaborations and other resources that would be needed to pursue each research track.
  - This strategic plan for resiliency and reliability research will use Puerto Rico as a case study to draw conclusions and suggest future adaptations to other islanded or remote areas with similar weather or environmental contexts.
- Draft final report which will include an overview of relevant previous work; key challenges, gaps and barriers related to energy and environment resiliency and reliability; and a strategic plan to pursue opportunities that contribute the most to improve resiliency and reliability in Tropical and Sub-tropical regions. Furthermore, the draft report must include an appendix that lists potential joint and collaborative research funding opportunities. The authors will focus on identifying funding opportunities where the significant strengths brought upon by the collaborative agreement increase the likelihood of being funded.

Task 4: Prepare and disseminate final report

- Prepare and write the project's final report using the reviewed draft by NTESS.
- Disseminate the project's final report.

Q & A

Back up slides

Resilience and Reliability Issues for Energy and Environment in Tropical and Subtropical Regions

- Researchers: E. O'Neill-Carrillo, E. Ortiz, E. Aponte
- Student Collaborators: Barkley O. Cabrera, José Carlos Rivera, Nelson E. Saavedra, Reiner Simshauser
- Key Definitions: Reliability and Resilience
- Overview of Renewable Energy Resources in the Caribbean and Puerto Rico
- Resilience in Tropical Regions through DERs
  - *Distribution system challenges*
  - *Transmission level issues*

Resilience and Reliability Issues for Energy and Environment in Tropical and Subtropical Regions

- Low Inertia Power Systems
- Integration of Maximum Level of DERs
- Resilient Communities
- Reliability Issues
- Cross Disciplinary Issues