Empowering our communities to procure sustainable energy strategies and transform their electricity situation after Hurricane María

Evelyn Báez Colón, MPH,BS; Elvia Meléndez- Ackerman, PhD, University of Puerto Rico- Río Piedras Campus

Energy System in Puerto Rico

Puerto Rico has renewable resources from wind, rivers, the sun and a great geographic position to use this sources available. Yet, only around 2% of PREPA's electricity came from renewable energy sources . [1]

Sustainable Development has been defined as "Satisfying the needs of present generations without compromising the possibilities of future generations to meet their own needs" [2]. An island-wide blackout following Hurricane Maria that lasted up to a year for many, uncovered the social and ecological consequences and vulnerabilities that come from depending solely on fossil fuels and the need to transition to renewable energy sources to achieve energy sustainability. Workshops on the use of sustainable systems and related technologies following the 2017 hurricane and the Hurricane Maria disaster was a strategy used by many groups to provide energy relief to individuals and communities and to create awareness about alternative energy source. Here we present one example from a local farm located in Carolina, Puerto Rico.

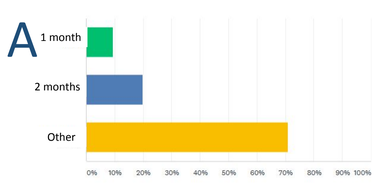
Hacienda Agroecológica Renacer (HAR)

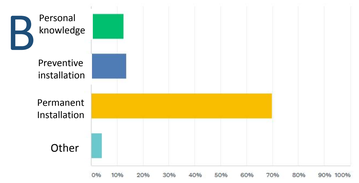
The organization has a vision of sustainability with a goal of expanding this model in Puerto Rico through diverse community activities based on education on sustainability, self-management and the use of alternative methods for good resources management as (land, water, energy). This farm, developed over the last 6 years in the Canovanillas sector of Carolina, HAR promotes sustainability, organic farming, self-resilience and functions entirely off the grid for power and water (Figure 1).

Figure 1. Sustainable family farm, facilities located in Carolina, PR. A model of self-management, community support and social transformation.

*Website Organization: Facebook & Instagram as "Hacienda Agroecologica Renacer"

A. How long have you being without electricity?
B. Why do you want to attend the workshop?





OPCIONES DE RESPUESTA		RESPUESTAS
1 mes		9,38%
2 meses		19,79%
Other (please specify)	Respuestas	70,83%
TOTAL		

OPCIONES DE RESPUESTA		RESPUESTAS
Conocimiento personal		12,50%
Deseo instalar el sistema de manera preventiva		13,54%
Deseo instalar el sistema de manera permanente		69,79%
Other (please specify)	Respuestas	4,17%
TOTAL		

Figure 2. Survey responses from workshop participants related to: A) their electricity situation on the island after Hurricane Maria and B) their motivations to attend the solar system workshop.

Community Workshops after Hurricane Maria

HAR coordinated workshops and conferences in the farm, inviting communities from around the island through their Facebook page and via word of mouth to learn about "***How to install your solar emergency system by yourself***". The majority of attendees had spent more than 2 months without electricity and were evaluating the possibility of installing permanent systems (Figure 2A & 2B). Workshops too place either at HAR facilities or at target locations around the island of Puerto Rico as requested by other organizations. (Figure 3). Demonstrations and information delivery were adapted to fit the workshop setting. Some workshops were recorded to transmit the information to other communities through social networks.

Figure 3. A. First workshop to empower the Canovanillas community about how to build and install a low-cost residential solar energy system. B. Demonstration of structure housing to ensembled components and batteries. C-E. Different workshop groups around the island (Ciales, Manati, Carolina respectively).

Workshop Objectives

*Show alternatives of how to perform a cost-benefit renewable system, efficient, effective and are presented with options for an emergency system and a permanent system models.
*Learn about the different types of systems (grid tie, off-grid and hybrid options)
*Become familiarize with system components: solar panels, charge controller, batteries, inverter (DC to AC) and other elements.
*Learn how to connect and install each component of the solar-power electrical system.
*Disseminate information about cost effective options.
*Free consulting to acquire information about the installation and / or acquire components.

Communities Impacted with workshops

There were inquiries about the workshop from at least 40 municipalities (Figure 4) and hundreds of families around the island benefited from the workshops and installed solar panels system in their houses with the knowledge acquired in the workshops. Successful participants who installed their own system participated as resources in subsequent workshops helping others by providing accounts of their own experiences.

Figure 4. Municipalities where requests were received for information on workshops on how to install solar energy systems.

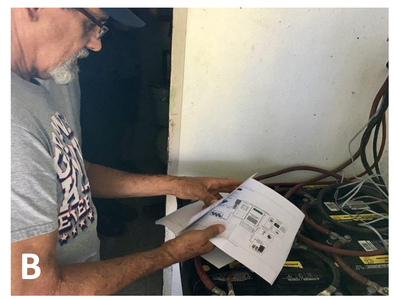


Figure 5. A. Carmen and Miguel, farmers located in Humacao installed their solar system in the house with the knowledge acquired in the workshop. B. "Tito" a neighbor in Carolina, P.R. and farmer had an AEE-Combined System, but went "Off-grid" following the Hurricane.

REFERENCES

1. U.S.EIA, *Puerto Rico Territory Energy Profile,* July 19, 2018, "Renewable energy" tab.

2. ***Our Common Future***, also known as the **Brundtland Report**, from the United Nations World Commission on Environment and Development (WCED) was published in 1987.

Evelyn Báez Colón, MPH, BS / 3rd Year PhD Graduate Student
Environmental Sciences Program UPR-RP