



University of Puerto Rico-Mayagüez (UPRM)
The Electrical and Computer Engineering Department
(www.ece.uprm.edu)

Resilient Microgrid Pilots

Profesor: Fabio Andrade, PhD



Universidad de Puerto Rico - Mayagüez



UPR founded in 1903,

Now: 11 campuses, 5,054 faculty, 61,967 students.

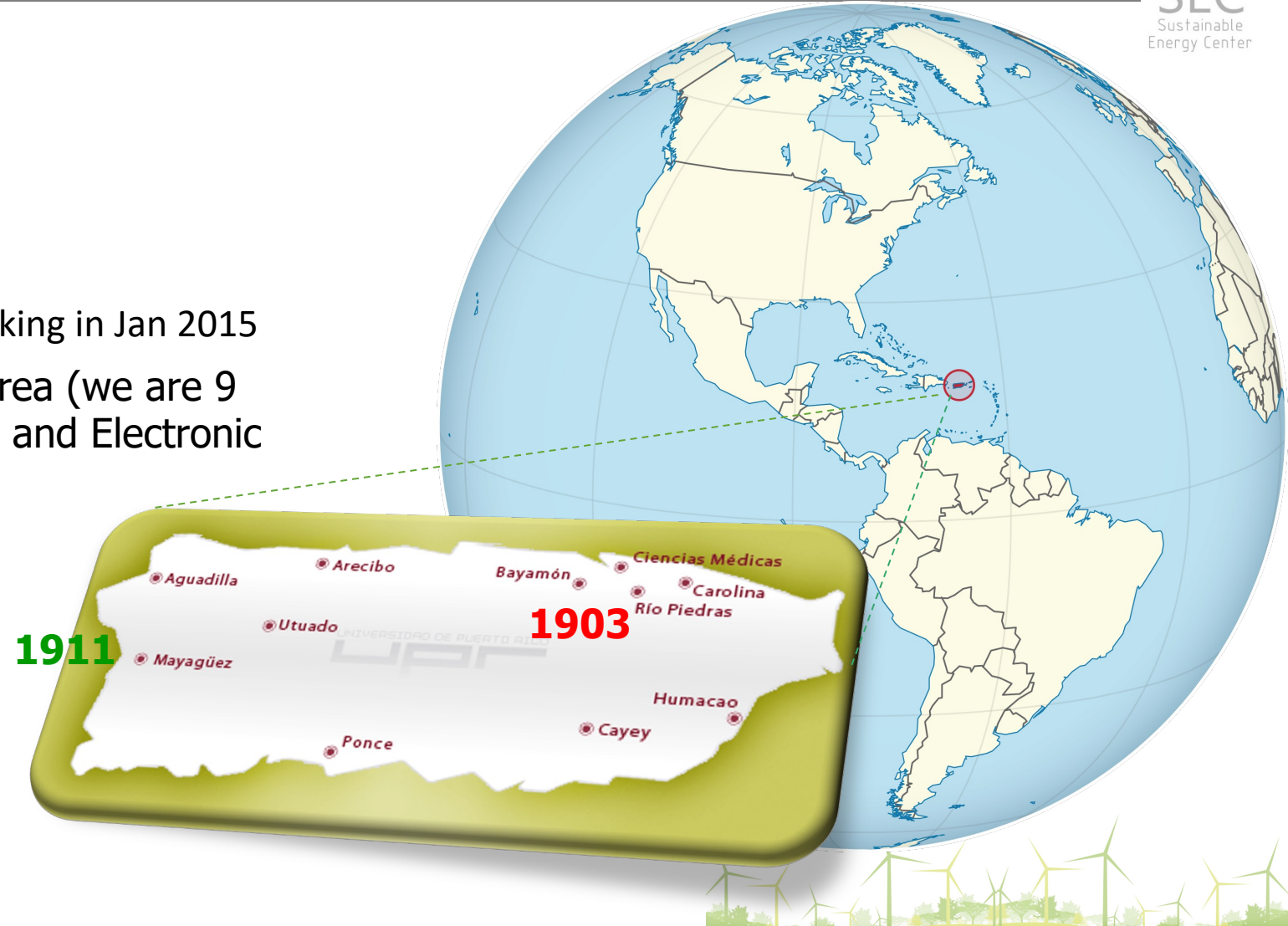
UPR Mayagüez

Electrical and Computer Eng. Dept.: Started working in Jan 2015

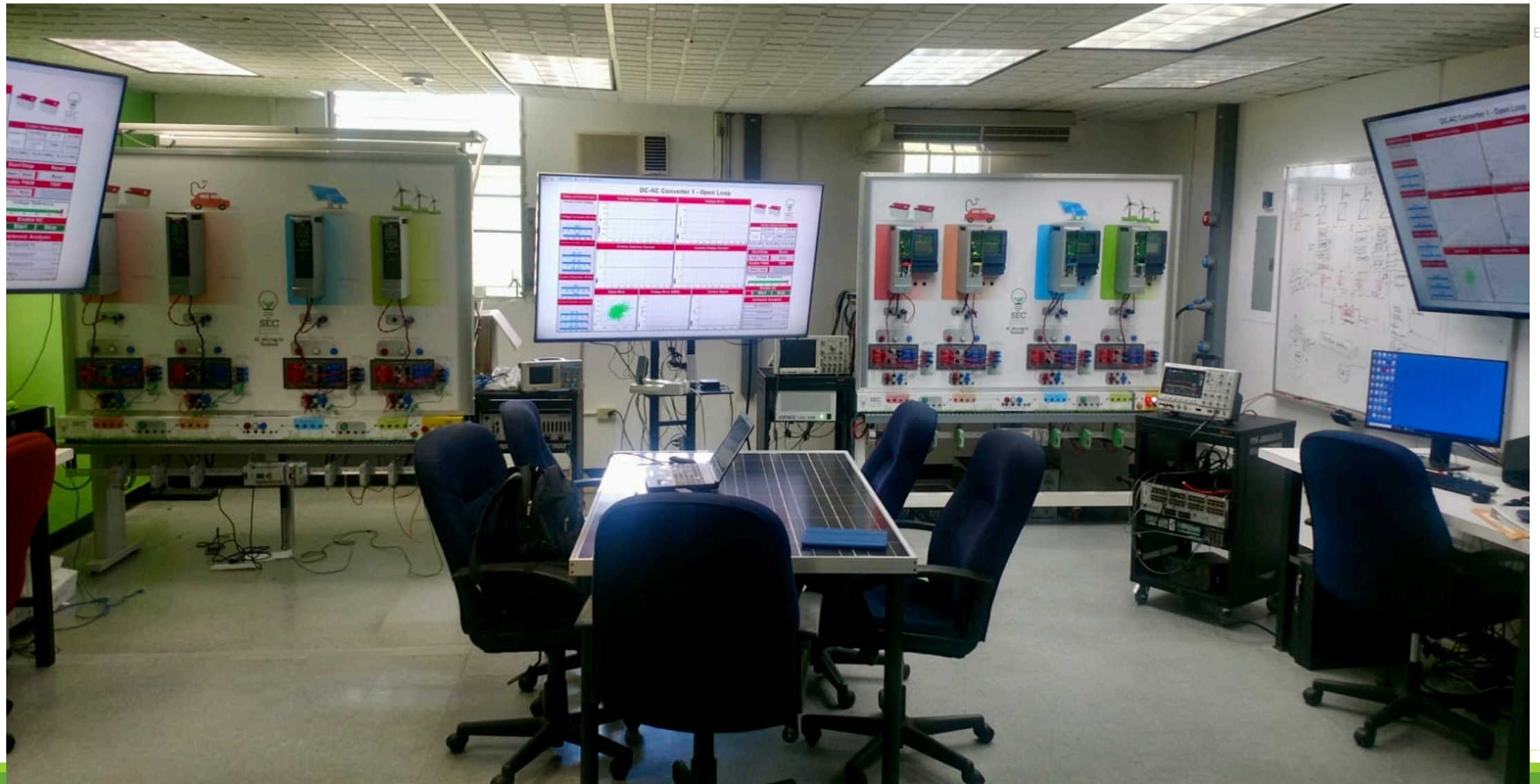
Currently I'm the coordinator of the Power Area (we are 9 Professors) and also collaborate with Control and Electronic areas

Teaching Experience includes:

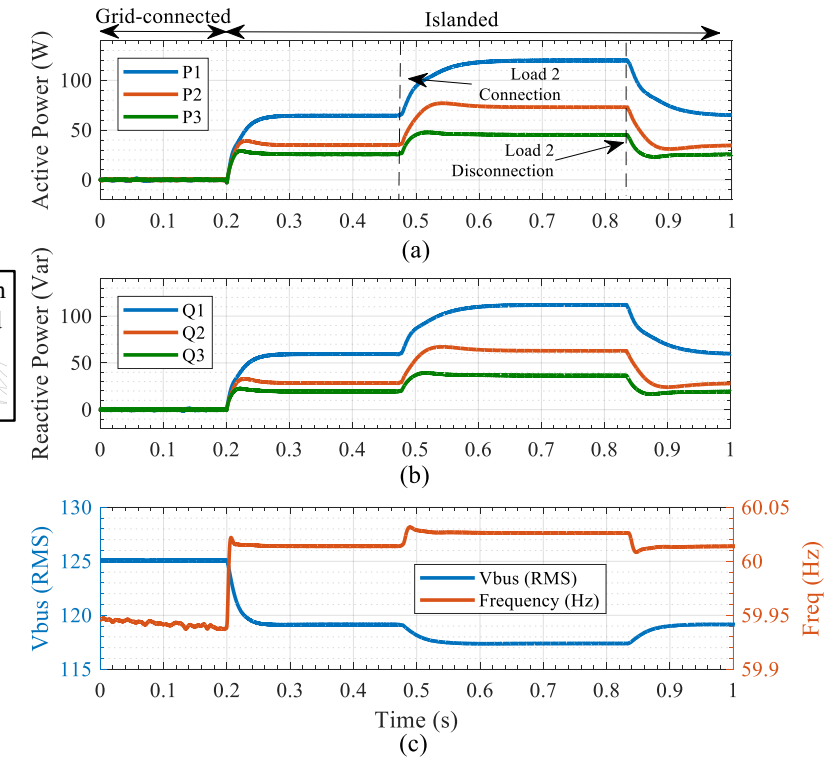
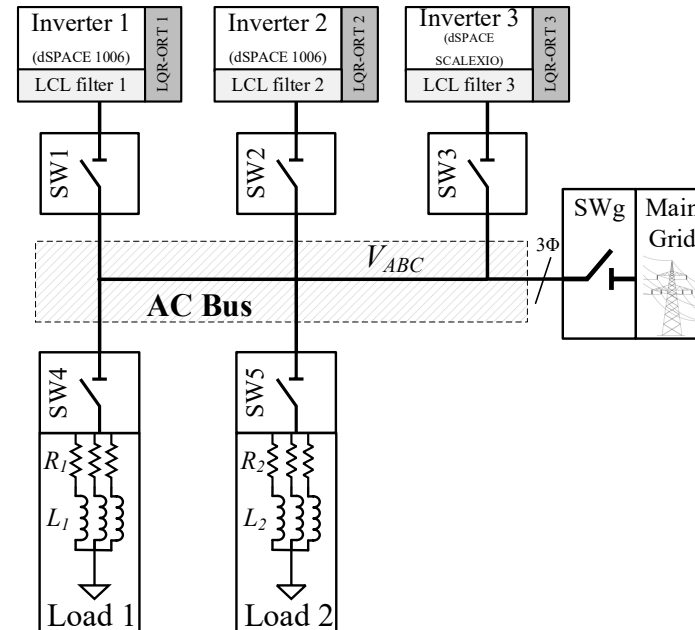
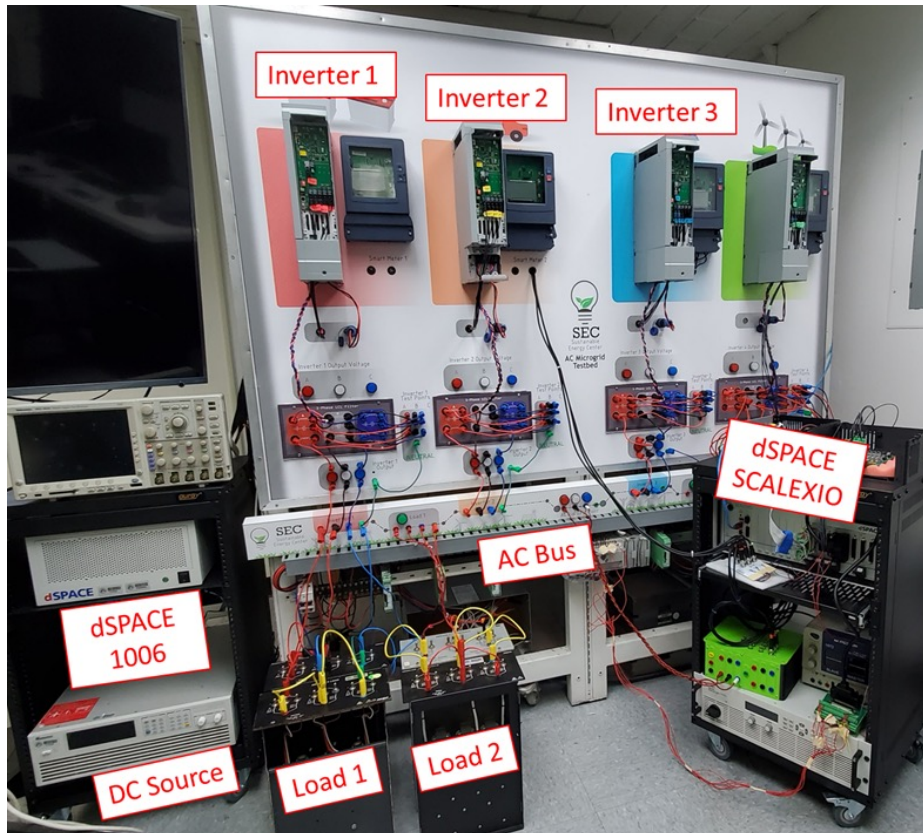
- INEL 5417: Power Electronics Applied to Renewable Energy Systems
- INEL 4416: Power Electronics
- INEL 6085: Advanced Power Electronics
- INEL 6058: High Frequency Power Converters
- INEL 8496: Distributed Energy Resources



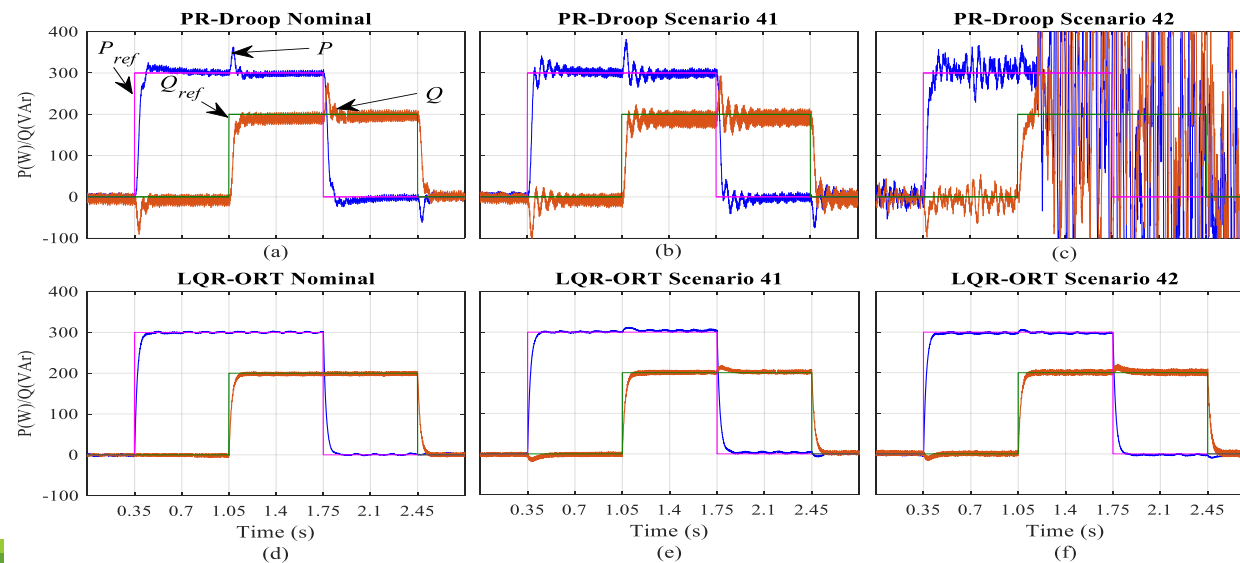
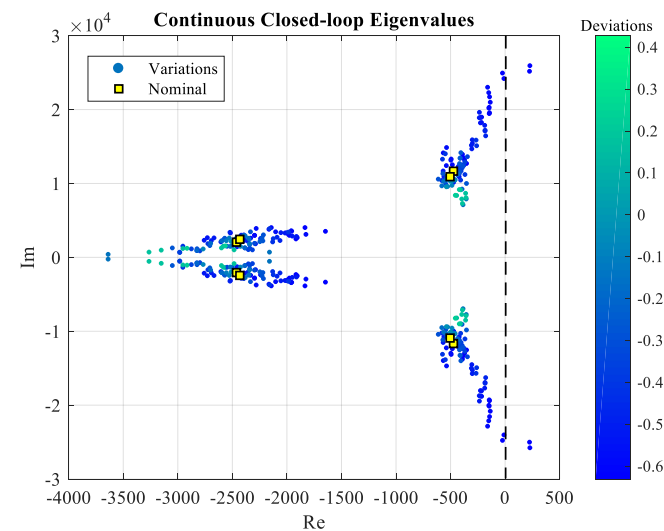
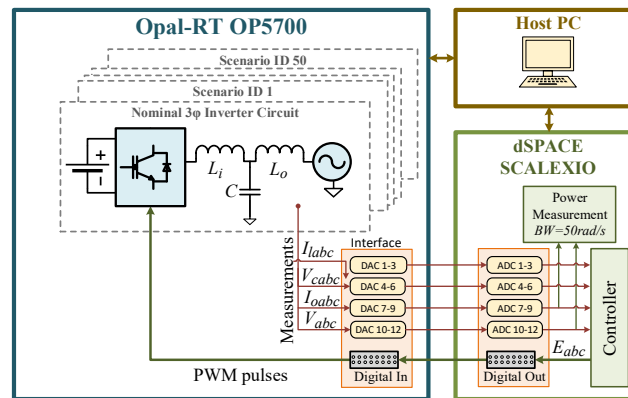
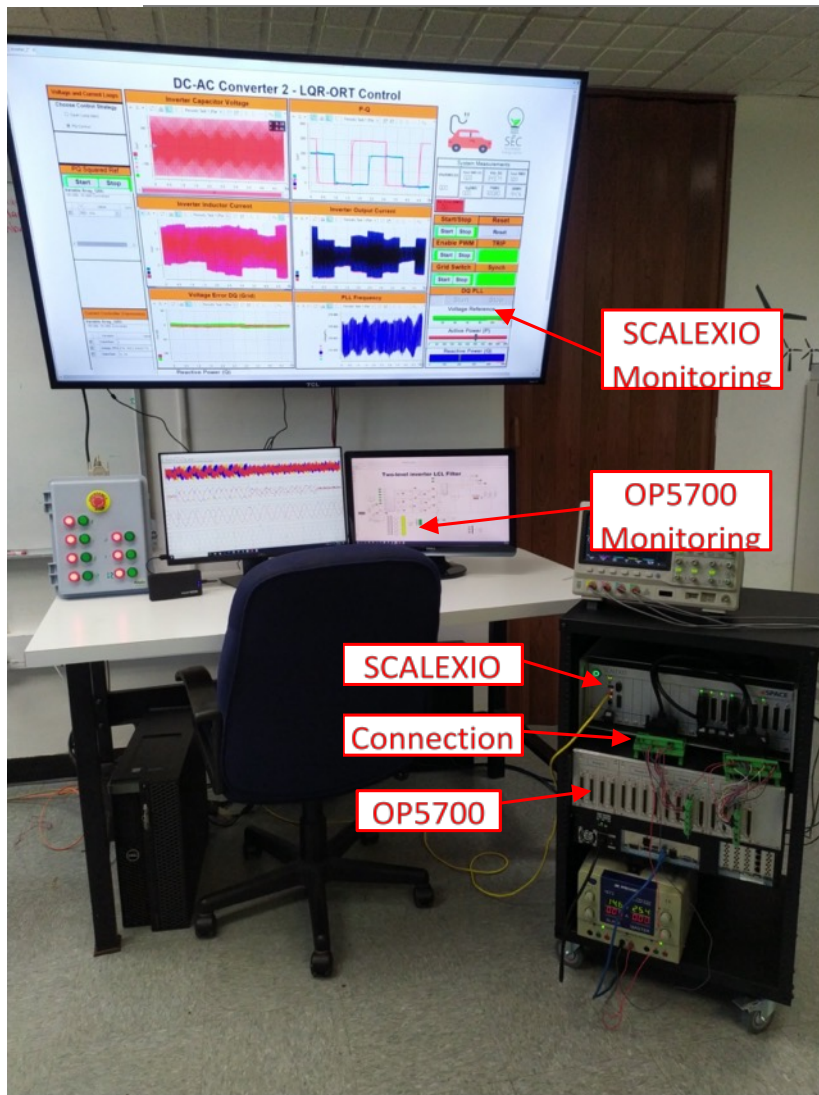
Current Microgrid Laboratory at CID208



Research Activities



Research Activities



Resilient Operation Of Networked Community Microgrids With High Solar Penetration



UNIVERSITY OF
CENTRAL FLORIDA



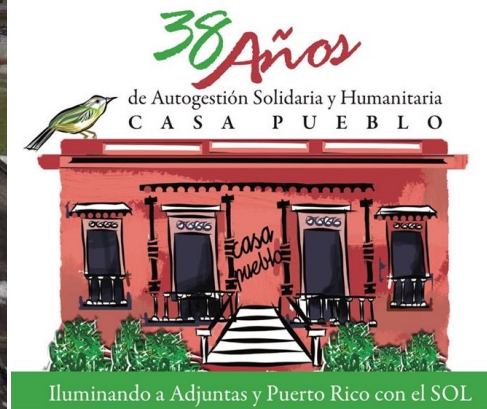
THE UNIVERSITY OF
TENNESSEE
KNOXVILLE

OAK RIDGE
National Laboratory



U.S. DEPARTMENT OF
ENERGY

Office of
Science



This project proposes a novel development and evaluation of a microgrid controller (MGC) that coordinates the cluster operation of the Adjuntas MG to achieve high resiliency and cost-effective operation. Two operation modes are considered – normal and self-healing.



HONNOLD
FOUNDATION

Developing socially and economically generative, resilient PV-energy systems for low- and moderate-income communities: Applications for Puerto Rico



Project Team	University of Puerto Rico-Mayaguez
Arizona State University	Cecilio Ortiz Marla Perez Lugo Fabio Andrade Marcel Castro
Clark Miller Elisabeth Graffy Kris Mayes Richard King Christiana Honsberg	National Renewable Energy Laboratory Benjamin Sigrin Meghan Mooney

(04/2019 – 03/2022)

The project proposes **innovative pathways** for accelerating photovoltaic (PV) technology adoption among **low- and moderate-income (LMI) communities** in ways that generate positive social and economic benefits, including higher levels of energy security and socio-economic resilience.

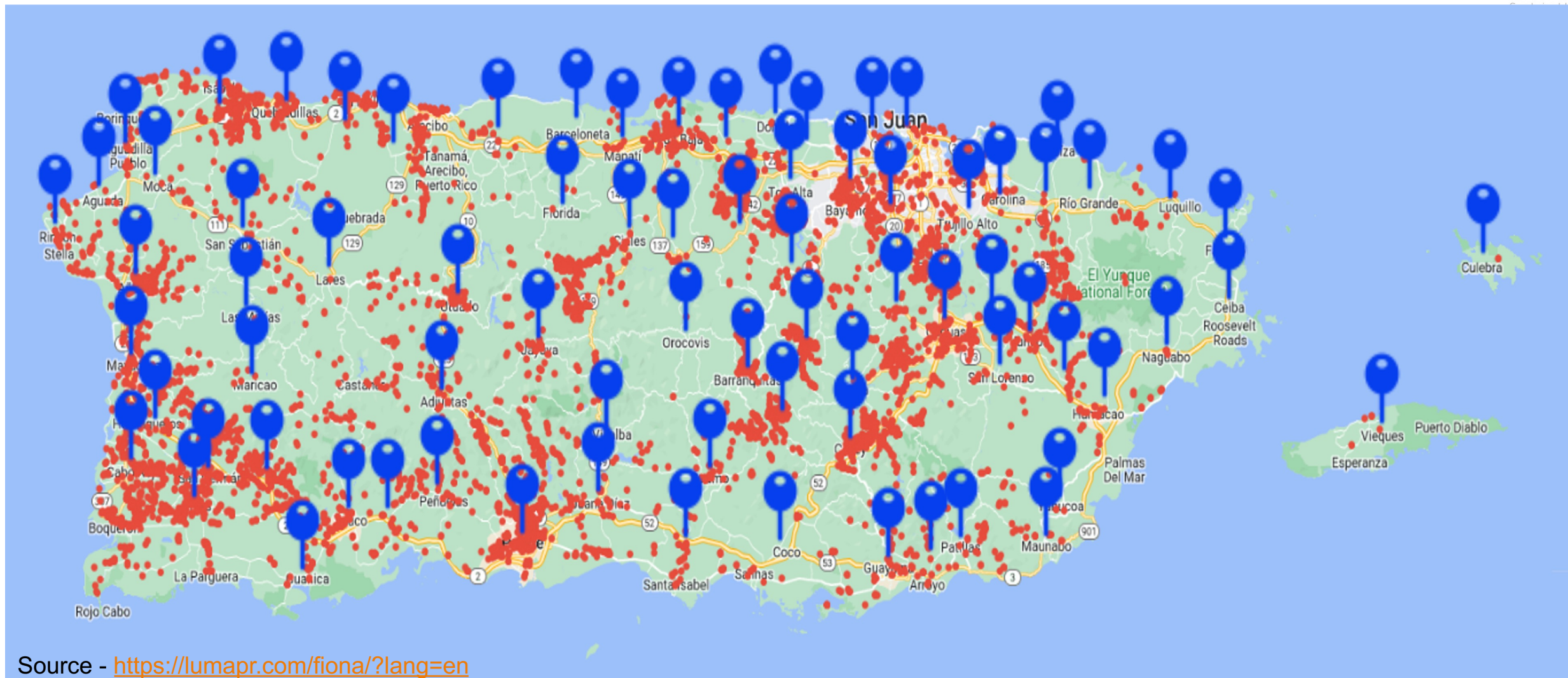


U.S. DEPARTMENT OF
ENERGY

Office of
Science



Hurricane Fiona: Power Impact



Source - <https://lumapr.com/fiona/?lang=en>

Hurricane Maria: Power Impact

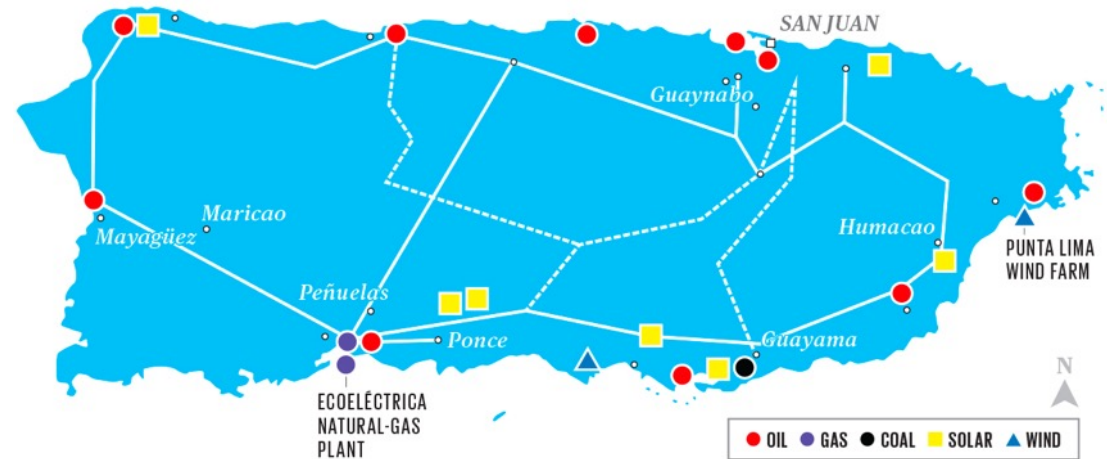
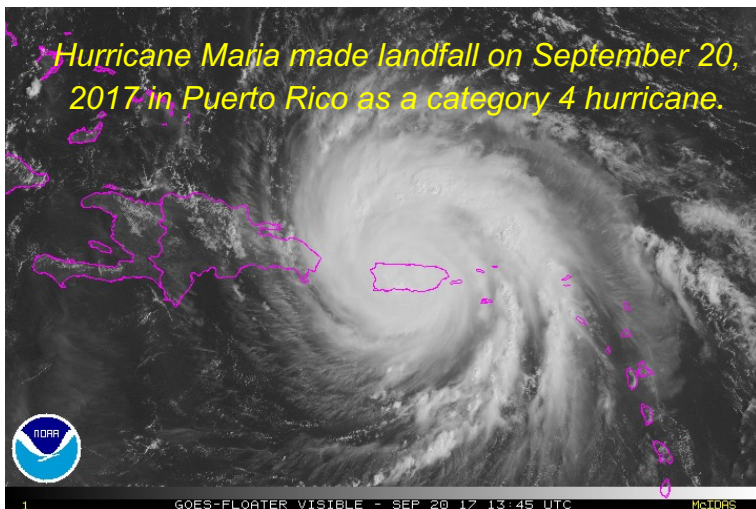


Photo: Erika P. Rodriguez



Photo: Alexis Kwasinski



Photo: Erika P. Rodriguez



Photo: Alexis Kwasinski

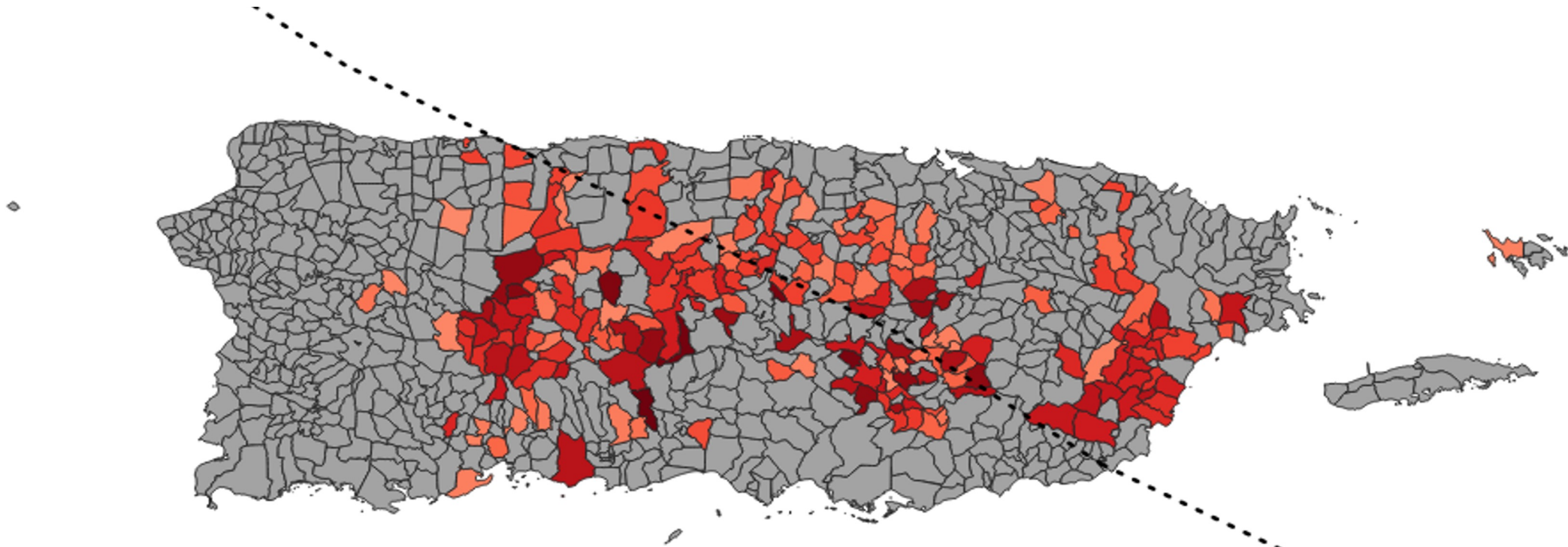


Photo: Erika P. Rodriguez

Rebuilding Puerto Rico's power grid: The inside story - M Gallucci - IEEE Spectrum, 2018

Hurricane Maria Effects on Puerto Rico Electric Power Infrastructure - A. Kwasinski, F. Andrade, M. Castro-Sitiriche, and E. O'Neill-Carrillo

Communities with homes that were reconnected to PREPA from April to August 2018: 62,000 families



Barrio Salud, Mayagüez PR.

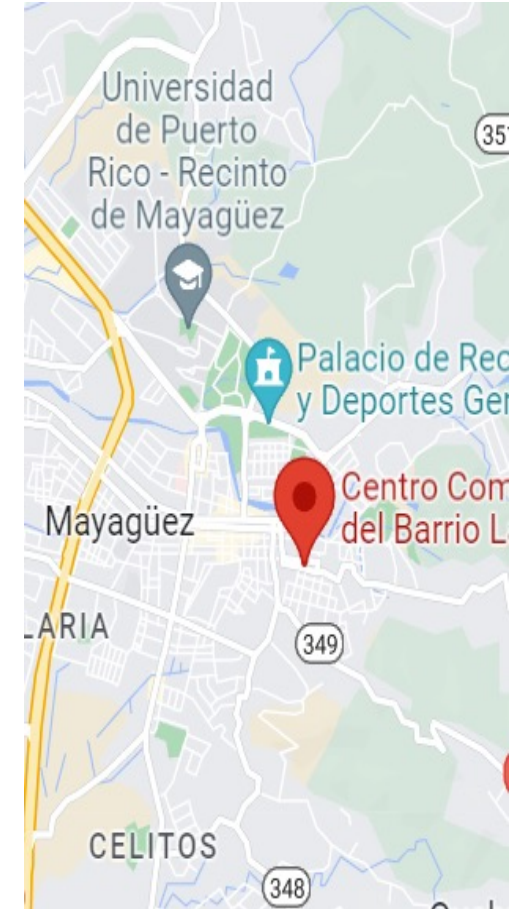


Photo: Fabio Andrade, June 2020.

Solar power potential

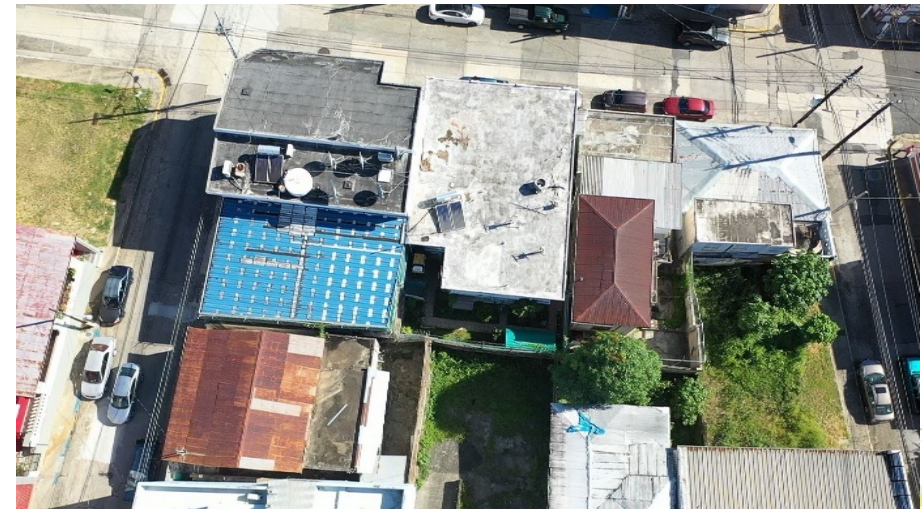
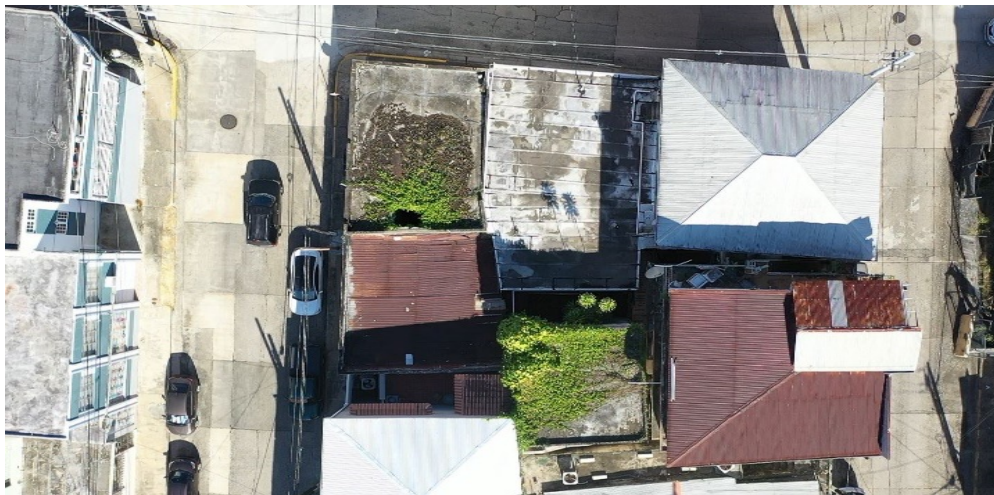
Barrio Salud, Mayagüez PR.



Source: Google Project Sunroof.

Current state of the rooftops

Barrio Salud, Mayagüez PR.



Energy Justice: Collaboration with Oasis de Luz



Jayuya
noviembre, 2017

marcel.castro@upr.edu



Jayuya
Febrero, 2018

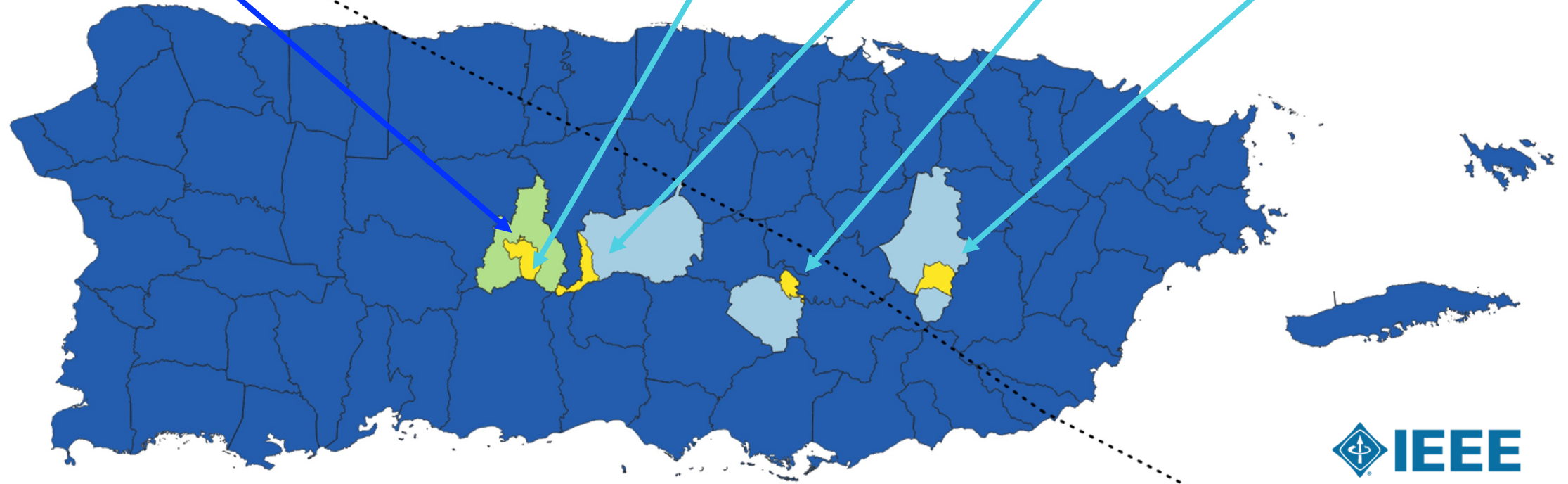
marcel.castro@upr.edu

“Oasis de Luz” ... Oasis of Light for the Mountain

November 2017: Jayuya Pueblo

2018:

Jayuya, Orocovis, Aibonito, Caguas



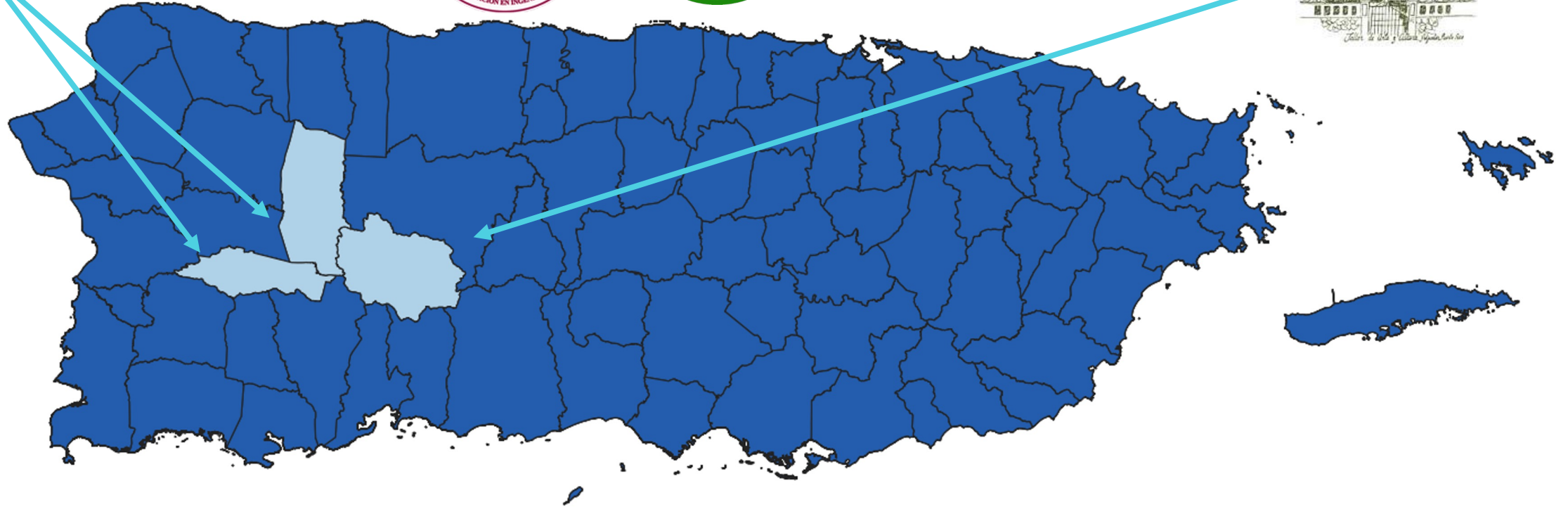


Pilot Microgrids in Puerto Rico

Microgrid Laboratory and Solar Workforce Development



UPRM Power Community Engagement: Community Microgrid Projects

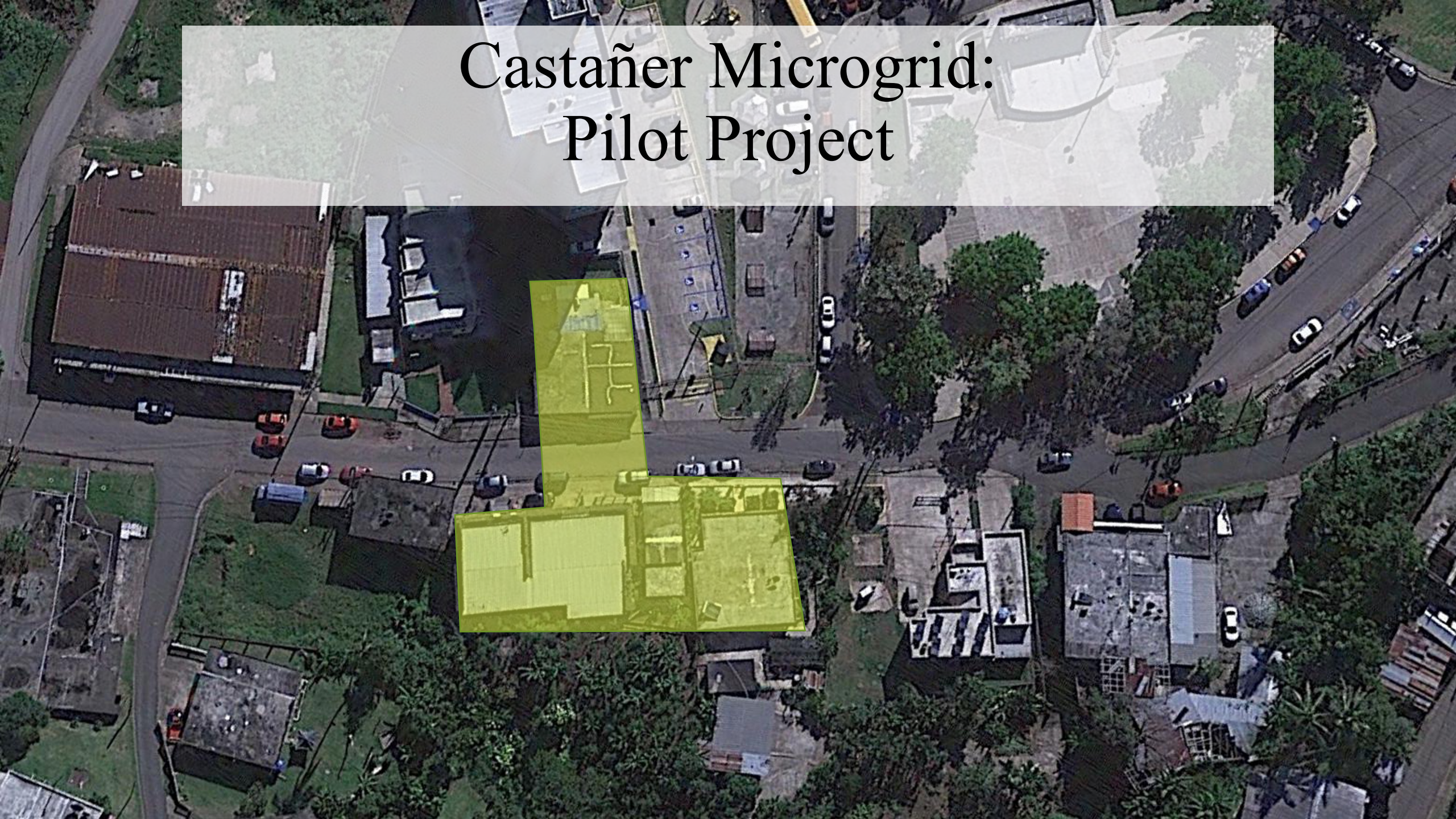


UPRM Team: Marcel Castro-Sitiriche, Agustín Irizarry, Fabio Andrade, Gerson Beauchamp from Electrical and Computer Engineering, Arturo Massol from Biology, Solar Business Accelerator Project, EDA Funds, 2019-2023 and Resilient Operation of Networked Community Microgrids with High Solar Penetration Project, DOE Funds, 2021-2024.



Castañer, Lares
Noviembre, 2020
Foto: marcel

Castañer Microgrid: Pilot Project



Castañer Microgrid:



Photographer: Alejandro Granadillo/Bloomberg



Castañer, Lares
Noviembre, 2020
Foto: marcel



Photo Credit: Cooperativa Hidroeléctrica de la Montaña
<https://www.eesi.org/articles/view/microgrids-in-puerto-rico-keep-rural-communities-connected>

Adjuntas - Microgrid



Maricao Microgrid: In Progress

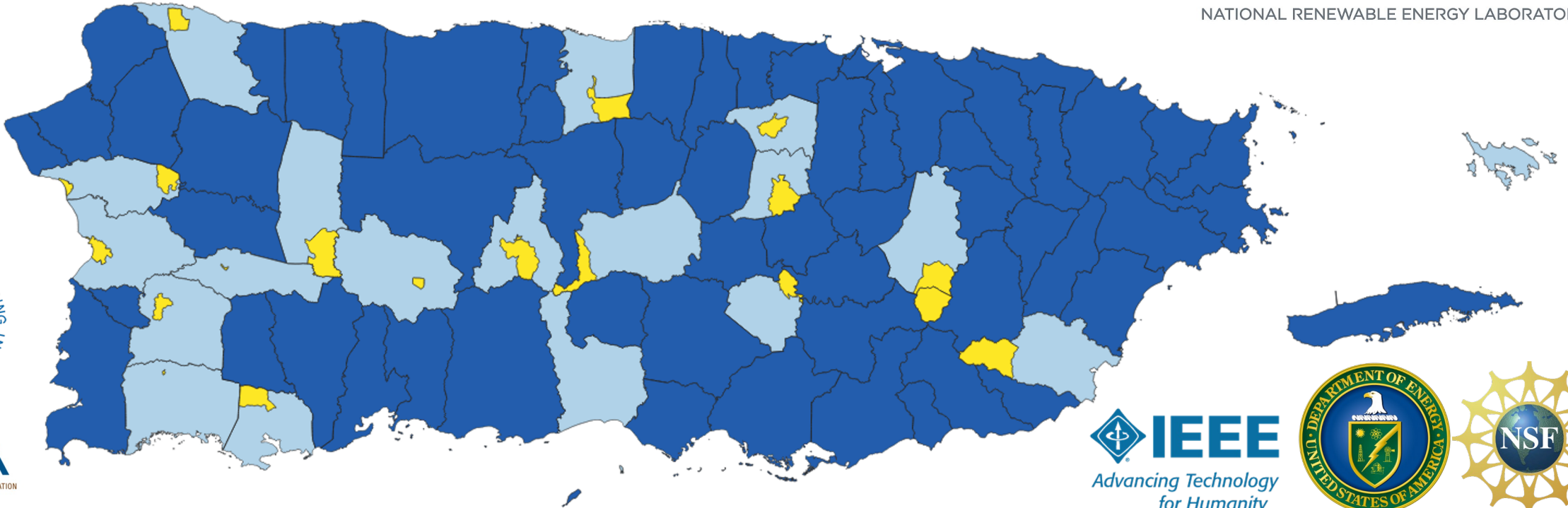
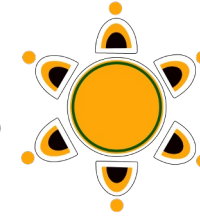




UPRM Power Community Engagement: Communities in 19 Municipalities



Barrio
Eléctrico

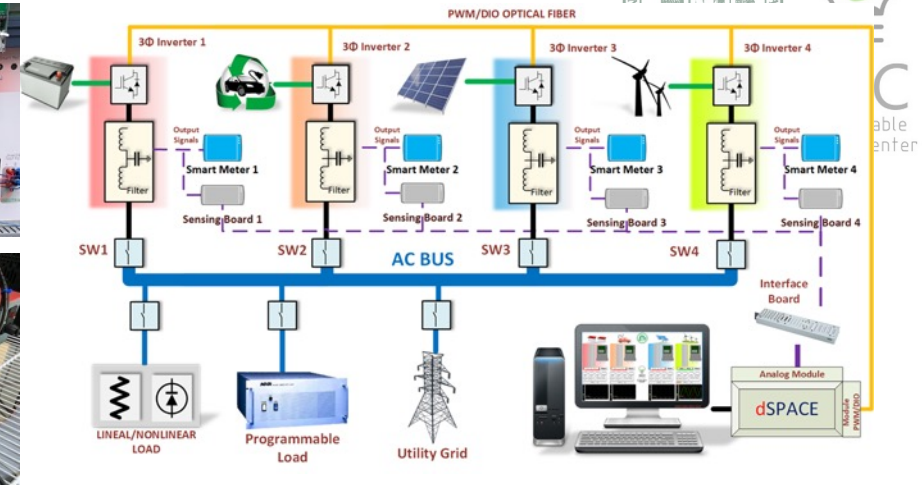


UPRM Team: Luisa Seijo from Social Sciences, Ricardo Fuentes from Economics, Lizzette González from Agricultural Science, Reinaldo Rosado from Social Sciences, Ingrid Rodríguez from Social Sciences, Francisco Maldonado from Civil Engineering, Marcel Castro-Sitiriche, Agustín Irizarry, Efraín O’Neill, Erick Aponte, Lionel Orama, Eduardo Ortiz, Rafael Rodríguez-Solís Fabio Andrade, Gerson Beauchamp from Electrical and Computer Engineering, Arturo Massol from Biology, Christopher Papadopoulos from Engineering Sciences, William Frey from Business Administration, 2019-2024.

UPRM's Microgrid Laboratory



Microgrid Laboratory



Solar House



9/10/23

Community Initiatives



Community Initiatives



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Thank you!!! Questions???

