

2030 vision for electric infrastructure

SAND2020-5042C

Efraín O'Neill

A more distributed power system in island, coastal, and remote communities

- Widespread use of onsite renewable energy to yield LOCAL economic, social and environmental benefits
- Solar communities and community microgrids
- A new role for conventional power system components
- Distributed energy for local resiliency
- Electric vehicles
- A trained workforce and informed citizenry

E. O'Neill, A. Irizarry, UPRM

"Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525".

Boundary conditions in the Caribbean

O'Neill

After a disaster you rely on your community

- Hurricanes & earthquakes
- Humid, hot, corrosive, drought conditions (in some areas), strong/extreme winds (storms)
- Dated, conventional, low-inertia power systems
- Resilience is not valued properly
- Context and solutions are different from continental locations
 - Market pushes unsuitable “solutions”, causing implementation problems, maintenance issues and confusion
 - “Poison the well” effect for other sustainable solutions

E. O'Neill, A. Irizarry, UPRM

U.S. Department of Energy ESGC South/Southwest Regional Workshop



Oases of Light deployed after hurricane María
<https://epics.ieee.org/solar-power-aid-puerto-rico/>



U.S. DEPARTMENT OF
ENERGY

Vision for energy storage role

O'Neill

- Storage for control in microgrids and other distributed applications
- Excess storage could provide frequency control and perhaps some ramp control services
 - Welcomed in a grid with less rotating inertia
- Essential to increase resilience in the Caribbean
 - Community microgrids
 - Emergency energy hubs
 - PR residential cost ~ 20 cents/kWh
 - PV + storage already at grid parity
 - PV + batteries for standalone systems

Game changer now

E. O'Neill, A. Irizarry with collaboration from E. Rivera, G. Cosme, E. Parés

Energy Storage Gaps

O'Neill

- Policy, regulatory and business models
 - Must make sense for the Caribbean
- Less cost, more cycles, less maintenance
- Financing
- Battery recycling and maintenance services / market
- Better energy control and monitoring
- Workforce development
- User side considerations
 - Selection, maintenance, safety
 - Citizens are used to “infinite supply of energy”, but will adapt (they always do)



Community leaders during a Solar Communities Colloquium
Bayamón, Puerto Rico, April 2017.

E. O'Neill, A. Irizarry with collaboration from E. Rivera, G. Cosme, E. Parés