



SOFTWARE TOOLS VOUCHER PROGRAM: QUEST FOR EVALUATING MICROGRID DESIGNS IN PUERTO RICO

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Objective

Demonstrate capabilities of QuEST to support energy storage stakeholders by evaluating battery energy storage system designs and performance under various grid conditions.

Why This Work Is Needed

- There are technical barriers for stakeholders in energy storage evaluation - commercial software often costly
- Challenging to estimate value of resilience-oriented microgrids that also provide demand response or peak shaving

What We Do

- Optimize BESS for Demand Response and Peak Shaving
- Optimal dispatch of BESS system over several configurations → understand configurations' load-shifting capabilities
- Enhancing Grid Resilience with BESS
- Evaluate financial benefits of load-shifting using resilience-oriented microgrids → improve understanding of value proposition

Progress

- Designed and evaluated microgrid design scenarios based on proposed resilience-oriented system sizes
- Quantitatively estimate avoided generation and costs during regular operation of a microgrid primarily designed for resilience
- Demonstrated usefulness of tool
- Report underway

Model Scenario & Inputs

- Site
 - Islands of Vieques and Culebra (Puerto Rico) connected to main island by undersea cable, limited on-island generation, many outages
 - Microgrid proposed by local utility (LUMA) to provide power during outages
 - Designs intended for 1-, 2-, or 3-hour outages

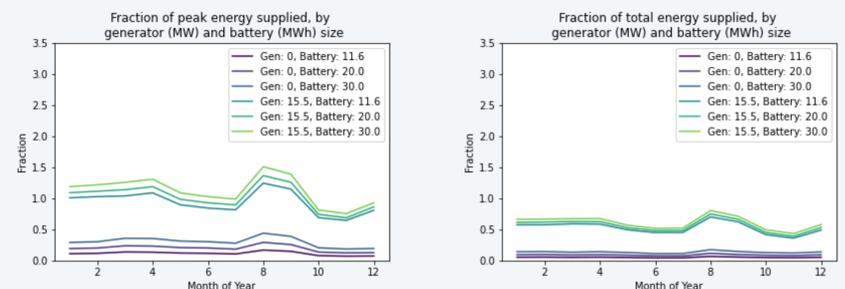


Inputs

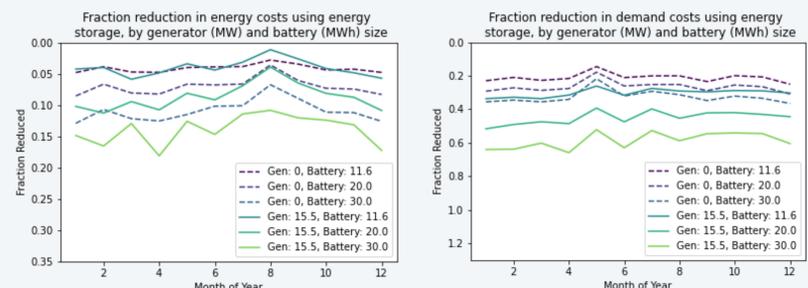
Model Input	Value or Source
Electricity Rates	LUMA TOU transmission rates
Load data	Adapted from LUMA 2023-2024 loads
Distributed generator size (MW)	0 or 15
Battery power (MW)	11.6
Battery energy (MWh)	11.6, 20, or 30

- Backfeeding to the main island permitted

Case Studies/ Results



- Demand reduction strongest during peak periods (9:00-22:00) - appropriate for TOU rates



- Energy costs not reduced as much as demand costs – also appropriate for TOU rates
- Reductions in energy costs more sensitive to battery size than generator size; opposite true for demand costs

Next Steps

Continue developing tool according to data needed for stakeholders' desired insights.

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