Photovoltaic Feasibility in Puerto Rico

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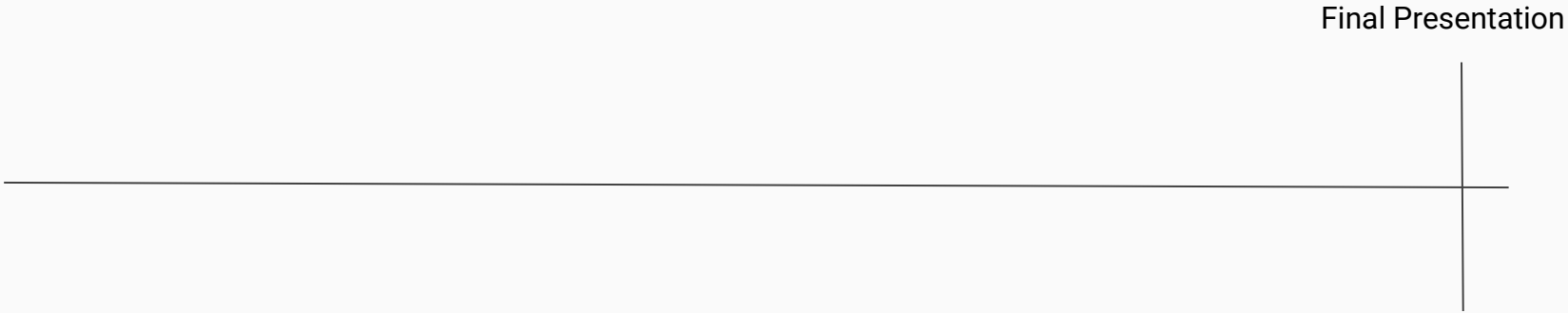
Problem Statement

Our project is the proposal for a more reliable and sustainable grind for Puerto Rico and its citizens. Many of the power plants in Puerto Rico were built in 60s and 70s are at the end of their life cycle, making them unreliable. This was further exacerbated by Hurricane Maria in 2017. While there has been a restoration effort put forward there must be a complete renovation and modernization of the transmission, distribution, and generation systems of the grid.

Goals

The overarching goal is to develop a sustainable grid model and to provide recommendations that increase the reliability of electricity, as well as to help Puerto Rico reach their goal of 100% renewable energy by 2050.

Timeline



Requirements and Constraints

- Must Provide a minimum of approximately 6.15 TWh to meet the current demand in PR
- Decrease the price per kWh for the people to make it more affordable while still profitable for the utility company (Genera PR)
- Final plan must be economically feasible given the approx. $3B USD allocated from US Government for improving the grid.
- The grid has to be stable under several weather conditions.
- Must be easy to maintain and operate.

Applicable Engineering Standards

- IEEE 1547: “IEEE Standard Conformance Test Procedures for Equipment Interconnecting Distributed Energy Resources with Electric Power Systems and Associated Interfaces.”
- NECA-23: “Designing, Installing, Operating, & Maintaining Microgrids” (NECA417-19)
- IEEE 929-2000: “IEEE Recommended Practice for Utility Interface of Photovoltaic Systems”

Bids

1. Microgrids
2. Community solar farms
3. Supplemental Liquified Natural Gas
4. Offshore Wind
5. Rooftop Solar
6. Underground transmission lines

Users

- Primary users are the residents of Puerto Rico
- Secondary users are those who operate and maintain grid during power outages

- Key desires:
  - Safety
  - Stability
  - Savings

Who is the person for this map?

Energy Consumer in Puerto Rico

Puerto Rican Energy consumers have been suffering through under-performing power infrastructure since 2017's Hurricane Maria. There are currently government proposals and goals for the power production on the island, but we wil test the feasibility and efficiency of these proposed solutions.

Pains

What are their fears, frustrations and worries?

They constantly face power outages, which is not only frustrating, but poses many health risks.

They may be worried about their family and loved ones.

They pay a lot of money for unreliable electricity.

Gains

What are their wants, needs, and hopes?

They want to be supplied with reliable power, and to have affordably priced energy.

To have a grid which is resilient to natural disasters and can provide economic stability.