

PV Feasibility in Puerto Rico: Design

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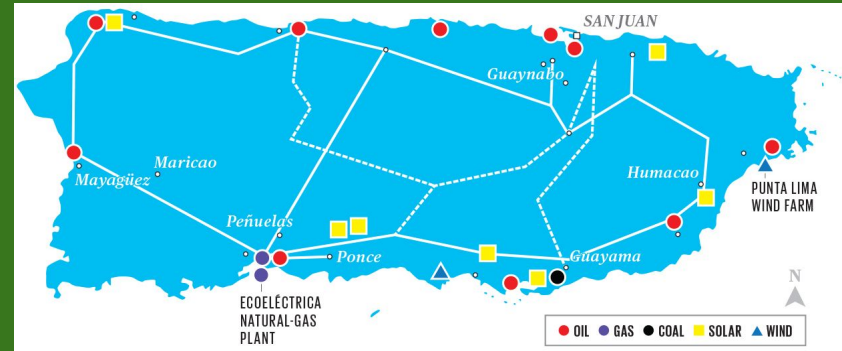
Problem Statement

Our project aims to provide a plan for ensuring reliable and affordable power to all Puerto Rico using photovoltaics combined with battery storage units.

- Puerto Rico's grid is very unstable as a result of frequent hurricanes, outdated power plants, and poor management.
- Adds to Puerto Rico's goal of being 100% reliant on renewable energy by 2050.
- Renovation and modernization of the transmission, distribution, and generation systems.

Residential Rooftop Solar Potential by County

Distributed Solar resource exceeds 20 GW of capacity technical potential.



Design Context

Public Safety, Health, Welfare

- Limited outages during hurricanes
- Greater emergency responder capacity
- Less anxiety over outages
- Less risk for utility employees to repair/fix lines

Global, Cultural, & Social

- Aligning our goal with PR's goal of 100% reliant on renewable sources by 2050
- ...

Environmental

- Significant increase in solar energy usage
- Decrease in reliance on oil and coal power plants
- Possible minor deforestation if large-scale farms are used

Economic

- Funding from government
- Significant payoff and advantages for average resident
- Providing jobs to maintain microgrids
- Families are equipped and trained to take care of their portion

Design Exploration

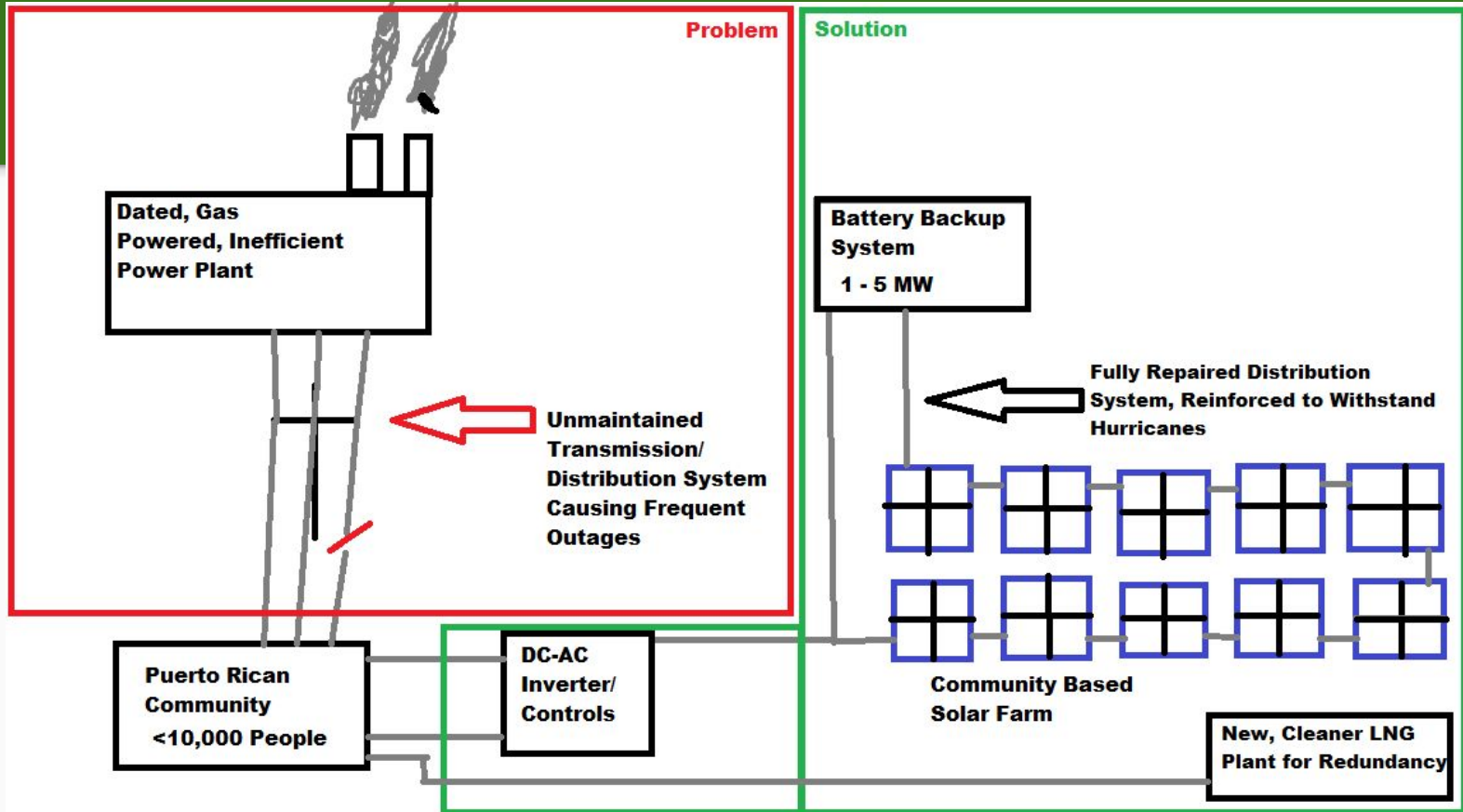
Decisions:

- Community based, Rooftop, or Solar Farm design?
- Acceptable cost for our solution
- How to model final design?
- How to show people of Puerto Rico our solution benefits them in long run

Proposed Design

- Multiple Community based solar farms located strategically throughout Puerto Rico near population centers
- Battery Backups located adjacent to each farm to provide storage from excess generation and power during hurricane related outages
- A new Liquid Natural Gas power plant to provide a steady source of power much more efficiently than existing, outdated oil/diesel generators.

Design Visual and Description



Functionality

Our solution are in line with our goals of creating a 100% renewable energy grid that is also reliable for the island. This can be seen with our community solar farm model, and how we envision this technology benign applied.

Another issue we have recently come to find is PR's dependency on outdated petroleum and diesel generators, we have committed to changing these to LNG generators as our back ups for our renewable energy productions.

Areas of Concern and Development.

- What is the batteries capacity to store enough energy to supply for Puerto Rico Residents.
- What method is better? Microgrid, Solar Farm?
- Can solar energy bring a stable energy for Puerto Rico residents with lower cost?
- Are the solar farms strong enough to withstand frequent hurricanes?

Design Analysis

- Our design has not yet entered a testing phase

Potential Other Ideas To Test

- Offshore wind in addition to solar
- Subsidize Rooftop PV to encourage people to install invest it themselves
- Retool existing, old oil/diesel plants and convert to LNG