

Distributed Generation and Energy Storage for Resiliency

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Key Takeaways

- Millions of dollars are spent yearly on disaster relief linked to preventable grid failures, and this number is only rising.
- Distributed energy generation plus storage increases safety and reliability for off-grid remote locations.
- Distributed energy generation plus storage reduces risk due to potential damages that power outages might represent to critical infrastructure.

What is this about?

The energy industry is known as one where widespread technological adoption moves rather slowly due to the high capital costs of switching current equipment, behavior, and culture. Nevertheless, forecasts for distributed generation plus storage solution remain bullish as these are already providing users with energy resiliency, independence, reliability, and security, all which are becoming continuously more valuable as the effects of climate change aggravate. Distributed generation from renewable energy sources, such as solar plus storage is proving to be a viable solution for areas of the world prone to natural disasters, where the local electrical grid infrastructure lacks the sturdiness and adaptability to withstand such events.

Effects of Weather on Electrical Grid

- In the developing world the grid fails constantly due to incapacity of operators and lack of required infrastructure, and resources.
- In the developed world most power outages originate from storms disrupting some of the many cables in place needed to sustain a typical working grid.

Effects of High Impact, Low Probability Events

The number of power outages might seem low, taking into account that these systems work all year round and that most of these outages last a brief time. Nevertheless, even these small grid failures may represent significant losses of life and money when they hit fragile infrastructures such as Hospitals.

Recommendations Learned Lessons

What happened in Puerto Rico should be taken as a case study of the potential chaotic impact that a grid failure due to storms can come to be. When our electrical grids are disrupted in unprecedented ways by low probability storms that hit, which confabulate with other variables to lead to disaster, even in a territory of the most economically developed nation on Earth. Fortunately, energy strategies which are proving to be much more resilient than alternatives, such as micro-grids coupled with distributed generation and storage have shown tremendous resiliency to these events. Having such micro-grids in place in Puerto Rico in 2017, at least in critical points of such infrastructure could have saved money and lives.

Weather as a Disruptor

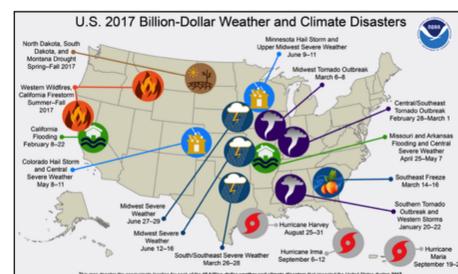


Figure 1: Yearly Economic Impact of Weather on Infrastructure

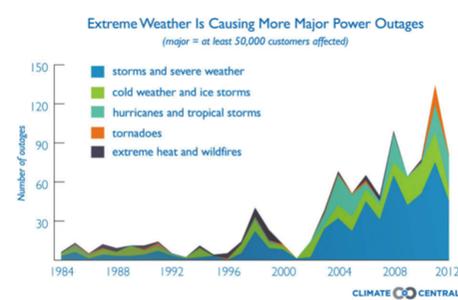


Figure 2: Yearly Power Outages Linked to Weather

Case Study: Puerto Rico

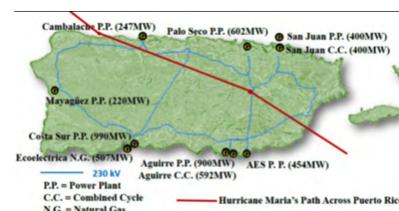


Figure 3: Trajectory of Hurricane Maria PR's Grid

In 2017 Puerto Rico, a territory of the United States, was struck by three hurricanes causing significant damages to their local infrastructure.

An already poor electrical infrastructure and a bureaucratic and corrupt system led to a prolonged recovery for the islands' grid. The lucky and affluent ones were able to get generators that would at least supply for their minimal needs, but most of the population suffered during these months, lacking even the most basic services for survival. Such catastrophic scenario led to thousands of dead and billions in losses.

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