



# Resiliency & Storm Hardening

*Prudent  
Investments  
to Weather  
Storms*





# Overview

Historic wildfires in California. Category 5 hurricanes in Florida. Superstorms in the Northeast. Major weather events and natural disasters affect millions of Americans each year, wreaking billions of dollars economic and property damage and often resulting in loss of life.

As a result, conversations about resiliency and grid hardening are increasingly prevalent in the energy industry as well as with policymakers and the public. Protecting the electric supply is one of the most critical components of disaster relief and can mean the difference between life and death for impacted communities.

What lessons can be learned from past storms? How can we prevent outages or more quickly restore power after the next disaster? What is being done to strengthen the grid across America? What are the economic benefits of investing in grid improvements?

Energy Fairness has researched resiliency and hardening efforts across the country and studied these questions to help policymakers, power providers, and consumers make informed decisions on preparing for the next severe weather event. To put it simply, resiliency and storm hardening measures dramatically improve power restoration, mitigate economic damage, and save lives.

This short white paper outlines common steps taken across the country to make the electric grid stronger and more resilient and demonstrates why these investments are necessary for the future.

# Severe weather and natural disasters cost billions of dollars annually. Economic costs mount significantly every day the lights are out.

A 2018 National Oceanographic and Atmospheric Administration (NOAA) report found natural disasters and severe weather events in 2017 cost the United States a record \$306 billion in damages.<sup>1</sup>

Superstorm Sandy cost between \$27-\$52 billion in 2012.

Hurricane Irma cost \$51 billion 2017.

The 2018 California wildfires are predicted to cost \$400 billion.<sup>2</sup>

These staggering costs demonstrate the crucial need for utilities and elected officials to make infrastructure investments in the electric grid that can either withstand major weather events or quickly be restored in their aftermath.

But resiliency and hardening efforts are not solely required for disaster-level events. Even common power outages cost businesses and families money. In 2009, the Lawrence Berkeley National Laboratory found an 8-hour power outage cost residential customers \$10.60, small businesses \$5,185, and larger businesses up to \$70,000.<sup>3</sup>

In short, even minor weather conditions or aging utility infrastructure can cost customers big time.

The combined effect of common power outages and major disasters means thousands of lost jobs and billions less in economic activity.

Investments in grid hardening mean shorter restoration times after outages, ameliorating economic damages and helping folks get back to normal faster. And it saves utilities significant funds in the long-run from constant restoration efforts.

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<sup>1</sup> <https://www.cbsnews.com/news/us-record-306-billion-natural-disasters-last-year-hurricanes-wildfires/>

<sup>2</sup> <https://www.accuweather.com/en/weather-news/accuweather-predicts-2018-wildfires-will-cost-california-total-economic-losses-of-400-billion/70006691>

<sup>3</sup> <http://news.ufl.edu/articles/2017/09/should-power-lines-go-underground.php>

# Hardening and resilience measures work. Power outages and restoration times fall dramatically when investments are made to strengthen the grid.

Due to its vulnerability to hurricanes, Florida is often looked at by policymakers and utilities across the country as a leader in hardening efforts.

Following the 2004 and 2005 hurricane seasons, the Florida Public Service Commission required utilities to file hardening plans every three years. Following nearly a decade of nearly hurricane-free activity, the 2016, 2017, and 2018 seasons have seen multiple major hurricanes make landfall in the state. A July 2018 PSC review of utility performance during these hurricanes found: “Florida’s aggressive storm hardening programs are working,” and “The length of outages was reduced markedly from the 2004-2005 storm season.”<sup>4</sup>

Nor’easters and wildfires have also made New York, New Jersey, and California other state leaders in resilience and storm hardening.

While the types of weather or disaster events may vary by region, the lessons learned share many commonalities. Chief among them is that hardening works.

Many strategies exist to improve resilience and harden infrastructure to damage. We will briefly examine each below.

## *Targeted Undergrounding*

Putting overhead lines underground offers many benefits, from protection against wind and debris, to aesthetic improvements for neighborhoods. Undergrounded distribution and transmission lines often perform better during disasters and weather events than overhead lines. However, the cost to underground the entirety of a utility’s overhead lines is often prohibitive. And undergrounding is not an ideal solution in areas prone to flooding.

Targeted undergrounding of key laterals, though, offers a strategic way for many utilities across the country to protect key parts of their systems from failure while keeping costs affordable. The 2018 Florida PSC report noted the state’s three major IOU’s have undergrounded roughly 40% of their lines and that undergrounded facilities performed much better than overhead facilities during the recent hurricanes.

<sup>4</sup> <http://www.floridapsc.com/Files/PDF/Publications/Reports/Electricgas/UtilityHurricanePreparednessRestorationActions2018.pdf>



## *Improving Standards for Power Poles and Wires*

Utilities are making great strides in improving the strength of poles and wires to prevent damage from wind, debris, and fire.

Replacing wooden power poles with concrete poles or composite poles can withstand stronger wind gusts and damage from wildfires.

In California, utilities are making the switch to insulated cables that are less susceptible to catching fire after coming into contact with debris. Following Superstorm Sandy, New Jersey's PSG&E's storm hardening program included beefing up line design standards, as well.

Utilities can increasingly benefit from technology to isolate outages in the grid and contain damage. Current limiting fuses will allow California utilities to reduce the risk of line ignitions as well as protect more customers on the grid from outages.

Improving recloser operations can dramatically reduce outage times. For example, in 2018, a New Jersey hospital saw its power restored in just 29 minutes, while the rest of the circuit that services the facility and surrounding area was down for 1,346 minutes.<sup>5</sup>

## *Location of Facilities*

As in real estate, location matters. Specifically, the location of utility facilities. In coastal and other low-lying areas prone to flooding, building substations on higher ground, having submersible equipment, adding flood monitors and storm-resistant doors to substations, and using flood walls are all important considerations that can protect against damage and outages.

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<sup>5</sup> <https://www.utilitydive.com/news/emerging-best-practices-for-utility-grid-hardening/541301/>

## *Vegetation Management*

The most uniform tactic in the storm-hardening arsenal may be vegetation management. Trees and branches in California can spark wildfires by coming into contact with wires. In Florida, outages after hurricanes are commonly due to fallen debris. Inadequate vegetation management can hinder restoration efforts in critical hours after a natural disaster, or even exacerbate the problem.

Key challenges with respect to vegetation management include utilities' ability to clear potentially problematic vegetation from properties they do not own. Increased partnerships with local governments and property owners are needed to ensure all harmful vegetation can be removed as part of utilities' routine management programs.

## *Smart Grids and Other Technologies*

As technology advances, utilities' options to monitor and isolate outages improves. Smart grids offer emerging opportunities to quickly find and contain outages. Infrared inspections can help identify infrastructure problems the naked eye cannot see. Mobile command centers operated by utilities allow greater access and response time to problems and improve utilities' ability to interact with affected communities.



# Conclusion

Massive economic damage. Desperate communities needing relief. Millions without power. Storms, fires, and weather events in the last year alone powerfully illustrate the need for storm-hardened and resilient electric grids.

We cannot wait for the next storm to prepare. Investments in storm-hardening and resiliency projects are necessary to protect consumers and businesses when disaster strikes.

Governments and utilities have various means of cost recovery depending on state law to pay for such upgrades, but these are the most important investments IOU's can make, especially in states prone to disasters.

Luckily, the proof is in the pudding. Storm hardening works and provides year-round benefits. Remember, it is not just after major storms or disasters that customers expect the power to come back on quickly. A hardened and resilient grid means run of the mill outages are less frequent and restoration times are shorter.

As lawmakers and others continue their work to better prepare storm-sensitive regions for storms and other natural disasters, they should keep all options on the table. Whether that means under-grounding power lines, replacing current poles with more storm-resistant options, or building additional grid infrastructure, customers deserve to know their elected officials and power providers are doing everything possible to prepare for the next severe event. All preparation comes with a cost, of course, but the price of doing nothing is always much higher.

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## End Notes

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