

BLOG

Two sides of the same coin: A beginner's guide to hardening and resiliency

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It's approaching that time of year in the Northeast when the weather turns wet and cold and unpredictable. I can tune in to the local news or consult the forecast for an idea of things to come, and purchase and make ready weather-appropriate gear in preparation (we know Northeasterners love their gear). But after learning a bit about energy storage, it has me wondering in a larger context, how is the unexpected prepared for and handled on the grid?



When we recently looked at [energy storage on the blog](#), we mentioned its role in helping cities and towns become more resilient to extreme weather by providing backup in case of an outage. But there's this other term that pops up when talking about resiliency, and that's *hardening*, and they're often spoken about together.

To explain what exactly these concepts are and how they work in tandem, here's a novice's introduction to resiliency and hardening.

A hardened infrastructure, a resilient system

According to a [report](#) by the Department of Energy, which looked at utilities with hardening and resiliency strategies planned or in place, hardening is "physically changing the infrastructure to make it less susceptible to damage from extreme wind, flooding, or flying debris." Hardening efforts protect facilities against weather events by making it easier to withstand significant damage.

Some of the hardening strategies electric utilities have in place against flooding risks and high winds take the shape of elevating facilities and stations above flood level or relocating stations to areas at less risk of flooding, putting power lines underground, and generally reinforcing poles and structures with stronger and more durable materials. As a supplement to hardening, some utilities use advanced technologies like GIS (geographic information system)-based applications that predict the scope of damage before an impending weather event, as well as analyze and map damage sites after a storm. This knowledge can be used to inform the public and improve infrastructure.

Resiliency, on the other hand, "refers to the ability of an energy facility to recover quickly from damage to any of its components or to any of the external systems on which it depends." Less focused on helping to prevent damages, resiliency is the continued operability and function of a facility *despite* damage, and the ability to bounce back from damages and outages. Resiliency means being ready for what might come. This readiness can be defined by two categories: general readiness and storm-related readiness. General readiness resiliency efforts by electric utilities might include improving employee communications and preparedness training, regular pole inspection and maintenance, managing vegetation away from power lines, removing tree limbs that might pose a risk of an outage during a storm, and preparing mobile transformers and substations to provide temporary service while normal operations are being restored. Storm-related readiness focuses on ensuring emergency measures are ready to deploy in the immediate aftermath of a storm. It might involve establishing fuel contracts for vehicles, generators, and other emergency equipment and ensuring that these emergency operations will be adequately powered when needed.

Hardening and resiliency, not hardening vs. resiliency

After Superstorm Sandy took its toll in New Jersey, there has been much discussion about [increasing the resiliency of the electric grid](#). Some say [that hardening is limited](#) and that it's not possible to ever completely harden the electric infrastructure, which is why making the grid more resilient means both hardening the infrastructure while carrying out resiliency strategies.

Evidence that resiliency is supported (and funded) can be found in many states. New York [passed an order](#) earlier this year awarding Con Edison \$1 billion to continue the Storm Hardening and Resiliency Collaborative and develop strategies to prepare their utilities for climate change. The Department of Transportation also [just awarded \\$3.59 billion](#) toward creating stronger public transportation in areas affected by Sandy. In Massachusetts, the DOER [announced \\$40M](#) would be awarded to communities toward preparing against outages and service interruptions during severe weather. Other states including Florida, Texas, Oklahoma, and Kentucky have also been at the forefront of utility hardening.

With increased discussions about the [relationship between climate and energy](#) there seems to be a general emphasis on the value and importance of resiliency and hardening and the changing grid. These concepts and strategies aren't just buzzwords. While they're not the same thing, they work together and they're here to stay. If you'd like to read more research and opinions, please feel free to read on from the list below.

Reports:

[Hardening and Resiliency](#) - a report from the Department of Energy

[Before And After The Storm](#) – a report from the Edison Electric Institute

[Risk & Resiliency After Sandy](#) – from The New York Building Congress

[Building Better, Building Smarter – Opportunities for Design and Development](#) – from the Post-Sandy Initiative

[Building Resiliency Task Force Report](#) – from the Urban Green Council

[Economic Benefits of Increasing Grid Resilience to Weather Outages](#) – from the President's Council of Economic Advisers and the U.S. Department of Energy

Opinions and analysis:

[Resilient and Sustainable Infrastructure for Urban Energy Systems](#) – from Resilience.org

[Utility System Hardening](#) – from *Public Utilities Fortnightly*

[Hardening, Resiliency, and Cost Recovery: Utilities Respond to Extreme Weather](#) - from Environmental Energy Insights

[Here Are 1.2 Billion More Reasons Why Resiliency Is a Big Deal for the Power Sector](#) – from GreenTech Media

[Lessons in Resiliency and Risk](#) – from *POWER*

[Rethinking "Grid" Resilience: Are We Gold Plating The Electric Grid?](#) – from *Forbes*

[U.S. DOE Urges NJ, Other States to Spend Big on Hardening Power Grid](#) – from NJ Spotlight

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