



## State Commission Staff "Surge" Call: Evaluating Reliability Investments

May 14, 2018

### Overview

In 2017, extreme weather resulted in \$350 billion in damages across the U.S., with sixteen events causing at least \$1 billion worth of damage each, according to a recent [report](#) on grid resilience. Grid hardening used to mean tree-trimming, undergrounding infrastructure, or having backup diesel generators to reduce the likelihood and duration of outages from weather and other threats. But with new technologies and emerging challenges, grid hardening has taken on a more expansive definition that encompasses automation, utility planning, microgrids and distributed energy resources, cybersecurity, and more. A recent Grid Strategies LLC study on grid resilience argued that investments in the distribution system are the most cost-effective way to reduce the likelihood and duration of outages. As the parties evaluating utility expenditures on grid hardening, state Commissions need to know what works and how to direct ratepayer money to the most effective solutions.

As extreme weather events become more frequent and intense, Commissions will be under more pressure to oversee cost-effective reliability investments. Interestingly, as storms grow more common, expensive investments in grid hardening may become more cost-effective due to the increased probability of outages. Experiences in Alabama, Florida, California, and New Jersey offer valuable lessons for other states. As new grid hardening options emerge, NARUC will assist Commissions in sharing outcomes and elevating best practices for replication.

### Alabama

Alabama frequently deals with high-impact weather events. The Alabama Public Service Commission works closely with Alabama Power, the state's only regulated electric utility, to improve reliability. Both entities must balance reliable electric service with maintaining stable, fair, and equitable rates.

In 2011, tornadoes caused 412,000 customers to lose power (some as long as seven days) at a total cost of \$191 million. Hurricanes and winter storms in 2017 caused five significant outages, with restoration generally taking between one and three days. Following Hurricane Andrew in 1992, blizzards in 1993, and flooding and ice storms in 1994, the Commission approved a Natural Disaster Reserve (NDR) in 1994, allowing Alabama Power to establish a reserve fund to cover expenses associated with these weather events. In 2005, the Commission formalized the fund into a [Rate Rider NDR](#). The NDR reserves a funding target of \$75 million, funded by customer monthly charges. The target is adjusted when the NDR reserve balance falls below \$50 million and when it reaches the target of \$75 million. In 2017, \$24 million of NDR funding was used to respond to weather events.

Alabama Power participates in mutual assistance programs through the Southeastern Electric Exchange, offering two important benefits to ratepayers: the availability of additional utility employees to expedite restoration during an outage and a platform for regional utilities to share best practices on storm management.



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The Commission receives monthly reports from Alabama Power that provide transparent information about the causes and locations of significant outages. These reports help the Commission identify any locations experiencing an unusual number of outages. Ratepayers can also notify the Commission about outages.

Tree trimming is an important strategy for Alabama Power to help improve the reliability and resiliency of its electric grid. The utility has a target of performing inspections of transmission poles every six years and distribution poles every ten years. Alabama Power also conducts storm simulation and training exercises for its staff, maintains predetermined staging areas with necessary equipment to enable quick restoration, and replaces older cables and wires with new materials offering better reliability and quicker repairs after faults.

Most of the state's transmission and distribution network is above ground, but Alabama Power is undergrounding many of its critical fiber-optic cables. By doing this, Alabama Power can increase the reliability of its communications during outages. Undergrounding communications lines is particularly important given the increased automation of Alabama Power's system. Additionally, advanced metering infrastructure installed between 2008 and 2010 automatically notifies the utility when a customer experiences an outage and allows for a quicker response time to restore power.

Alabama deals with a variety of weather events – tornadoes, hurricanes, thunderstorms, and winter storms, which have the potential to cause power outages. Restoring power, therefore, is a priority not only to Alabama Power Company, but also to the Commission. As such, the Commission is constantly working with Alabama Power to ensure reliability, through preventative measures and quick response times to restore electricity when outages occur.

## **Florida**

In 2004 and 2005, eight major storms caused about \$2 billion in utility restoration costs in Florida. Restoration took up to 18 days. Following those storms, the state legislature ordered the Commission to look at what should be done to enhance the reliability of Florida's transmission and distribution grids during extreme weather events. Utilities, city officials from around the state, university researchers, and other stakeholders provided information on ways to mitigate future storm damage and customer outages. The Commission issued various orders regarding pole inspections and reporting requirements. The Commission also adopted rules to encourage undergrounding of distribution facilities and amended existing rules regarding transmission construction standards. The Commission runs an annual storm preparation workshop and requires annual distribution reliability reports from regulated utilities. Utilities and county emergency officials annually work to identify critical facilities such as 911 call centers, hospitals, and fire stations.

After about a decade with no major hurricanes, Florida experienced four major storms in the past few years, the biggest being Hurricane Irma in 2017. Irma impacted all 67 counties in Florida and caused 6.7 million customers to lose power. Power was restored to the majority of customers within 10 days. Many outages came from trees outside utility right-of-ways. Following Irma and other storms in 2016 and 2017, the Commission opened a docket to review hurricane preparedness and restoration actions. The Commission will be reviewing and discussing staff's findings at an internal affairs meeting scheduled for June 2018.



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## California

California faces a different issue: wildfires. In 2017, California's worst fire year, \$13 billion in total suppression, insurance, and recovery costs were incurred. Fires are becoming less frequent but more widespread, with most fires started by the Santa Ana and Diablo hot dry winds across the state. Climate change is expected to elongate the season for these wind patterns, exposing the state to increased fire risk.

The Commission's goal is to institute policies to lessen the risk of utility-owned assets starting or spreading wildfires. Vegetation and equipment inspection are critical to keeping risk low. After 2007 fires resulted in over a million evacuations, the Commission started engaging with CAL FIRE to map high-risk areas and improve vegetation and inspection practices in targeted locations. In conjunction with CAL FIRE and independent consultants, the Commission developed and adopted a "[CPUC Fire-Threat Map](#)." The CPUC Fire-Threat Map contains three tiers: Tier 1 – existing regulations deemed to be sufficient, Tier 2 – elevated risk (to people and improved property) of catastrophic wildfire from utility ignition, and Tier 3 – extreme risk (to people and improved property) of catastrophic wildfire from utility ignition.

In addition, the Commission adopted regulations for High Fire Threat Districts (HFTD), which include Tiers 2 and 3 from the fire threat map, and Zone 1 High Hazard Zones (HHZs) from a separate, independently developed (i.e. not specific to any Commission purpose) map of tree mortality from a joint USFS and CAL FIRE effort in response to tree mortality/bark beetle related issues. The new regulations include vegetation management programs and inspection requirements (reducing the time between inspections for assets in high-risk locations).

San Diego Gas & Electric and Pacific Gas & Electric both identified wildfires as their highest risk in Commission-mandated risk assessment mitigation phase plans. These plans also outlined pilots and investments in mitigating fire risk that the Commission had not specifically ordered.

California is also dealing with questions around inverse condemnation following the last season of wildfires. Property owners have the ability to sue utilities, as government-regulated monopolies, for reimbursement for damaged property. Even if the utilities are found not to be negligent, utility-owned equipment still affects fires and landowners may be able to sue for damages. The state legislature will determine whether regulated utilities can be held responsible for damages.

## New Jersey

Grid hardening in New Jersey started around Hurricane Irene in 2011, which caused 3 million customers to lose power for approximately a week from overhead line damage due to heavy, wet snow. The Commission noticed that not all regulated utilities were responding to outages in a uniform manner or as quickly as they should. The Commission issued a report with over 100 recommendations for utilities to follow for storm response and general infrastructure requirements just before Superstorm Sandy knocked out electrical power to over 12 million customers for up to 10 days and caused damage to gas utilities.

Shortly after Sandy and the issue of the recommendations, the Board instructed the gas and electric utilities to submit storm hardening plans under a new proceeding. One utility applied for a \$4 billion infrastructure project containing substation protection, substation raising, new muster centers, data system management, and new communications systems. The Commission approved a \$1 billion investment to start. Other utilities were focused on substation raising, as approximately 30 substations were completely



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flooded during Sandy. Utilities also proposed small pockets of distribution automation and selective undergrounding. Most of the state's utilities established the concept of "lockout zones" within a mile of substations in which circuits within this region would be hardened, including selective undergrounding.

The Commission revised its vegetation management rules in 2015. The new rules required vertical clearing to get rid of overhang, more frequent vegetation inspections, and specific capabilities for utility employees doing vegetation inspections. Following many tree-related outages during four Nor'easter storms in early 2018, the Board is looking into additional vegetation management efforts.

New Jersey has also been pushing distribution automation, which includes advanced metering infrastructure (AMI) and smart meters. The Commission issued an order allowing Rockland Electric to institute an AMI program with a three-year buildout. After three years, the Commission will evaluate whether the project delivers operational and storm benefits and decide whether to expand the program to more utilities.

New Jersey began a town center DER microgrid program after Sandy in 2012. The state received 800 MW of requests for federal and state disaster recovery money to purchase diesel generators, and after FEMA money had been distributed, the state had \$400 million left over for other requests. However, diesel generators do not work well in long-term situations and the state decided it would be more beneficial to have microgrids capable of 24/7 operation and islanding. The Commission is looking at connecting multiple critical facilities in a town center structure, crossing multiple rights of way with multiple DERs. The challenge is making it work cost-effectively under blue sky conditions and assuring availability to perform critical services under grey sky conditions. Microgrids will need a redundant set of wires underground to assure performance under grey skies.

The Commission started an informal proceeding, speaking with stakeholders to outline a program focused on making prudent investments in microgrids that can benefit multiple customers. Thirteen technology-neutral feasibility studies are currently in development at a total cost of \$2 million to ratepayers, with results expected in June. Projects will have already received the support of electric and gas utilities by the time a feasibility study is completed. The Commission will work with Lawrence Berkeley National Lab and Rutgers University to identify which projects should move to the design phase. The state will fund a large portion of detailed engineering designs, with applicants contributing some funding. Applicants will be responsible for ultimately financing the project.

## **Discussion**

The Q&A portion of the call centered on cost-benefit analysis for grid hardening or disaster mitigation investments. Many hardening investments are proposed in general rate cases, making it difficult for Commission staff to pull out those costs and try to weigh them against the benefits of reduced outage time. Commissions are not always able to tie investments to real benefits – in California, for example, improved tree trimming practices don't easily translate into observable wildfire prevention. Further, it is difficult to quantify the value of lost load for particular customers that might lose power during a weather event.