

MONEY WELL-SPENT:

HOW INVESTMENTS IN ELECTRIC INFRASTRUCTURE BOOST RELIABILITY, RESILIENCY AND CUSTOMER SATISFACTION

by John Egan



THE OVERVIEW:

FMEA members are working to improve electric grid reliability and resilience.

THE GOOD NEWS:

In many cases, these added investments did not increase electricity prices on customers' bills.

MORE GOOD NEWS:

Small changes have led to big reliability improvements.

EVEN BETTER NEWS:

Customers and elected officials are noticing the improved electric service.

In Florida, tropical storms and hurricanes are a serious threat for half of the year, but public power utilities prepare year-round for natural disasters.

Municipal electric utilities are taking proactive steps to make their distribution systems stronger and more resilient to fulfill a critical mission: Keep the lights on 24/7 for 365 days of the year.

They are ramping up tree trimming, placing overhead lines underground, replacing substation relays, adding protective equipment to infrastructure in the field, installing new feeders, carefully inspecting utility poles and replacing many with stronger ones built to withstand the most intense hurricanes, and more.

But developing a more resilient grid not only makes it easier to recover from severe storms. The six FMEA members we interviewed agreed that system-hardening has produced significant benefits even on blue sky days, including higher electric reliability and improved customer satisfaction.

Keys Energy Services

“Geographically, we live in a uniquely challenging environment,” said Dan

“Our elected officials, and customers, understand and appreciate our efforts to **strengthen** our utility assets for everyday **reliability** and against extreme weather.”

– Dan Sabino, Assistant General Manager and Director of Engineering and Control at Keys Energy Services (KEYS)

Sabino, assistant general manager and director of engineering and control at Keys Energy Services (KEYS). “Our poles are subjected to saltwater, termites, tropical heat, moisture and, of course, hurricanes.”

The utility, which serves about 30,000 customers at the southernmost tip of the state, inspects every one of its wooden utility poles once every four years. Starting

in 2015, KEYS began replacing weakened wood poles with either concrete poles or ductile iron poles, both of which are manufactured to withstand wind speeds of 150 miles per hour — a Category 4 hurricane.

“Our customers deserve the best service we can provide,” Sabino said. “We go above and beyond the electric utility industry standard because our customers deserve more.”

In late 2021, KEYS began a program to replace 208 wooden poles with ductile iron versions as a result of pole inspections. KEYS will replace an additional 86 poles in its fiber backbone. During severe weather, the new poles are designed to better protect fiber that ensures continuous communication with substations. That program is scheduled to be complete by the spring of 2022.

In another hardening step, roughly 425 wooden poles that serve critical facilities like hospitals, police stations, government buildings and first-responder facilities, are scheduled to be replaced by ductile iron poles, an investment of about \$6 million.

Between 2007 and 2019, Sabino estimated KEYS spent approximately \$20.5 million on distribution pole testing and replacement. The additions to harden the system did not cost customers extra money.





“We have been able to keep the delivered prices of electricity flat for five years as we hardened our system,” Sabino said, adding that the outlays were funded from the normal capital budget.

KEYS has been working to storm-harden its electric system for at least 15 years, as its service area is particularly vulnerable to hurricanes.

The results have been impressive. As an example, Sabino recalled Hurricane Irma, a Category 4 hurricane that raked the KEYS’ service area in 2017. “There was a lot of damage, but no storm-hardened pole fell.”

Prior to KEYS’ asset-hardening efforts, customer power outages averaged 79 minutes per year between 2005 and 2007. After years of system improvements and asset-hardening investments, the utility’s reliability improved and outages fell to 47 minutes a year for the most recent three-year average, 2018-2020.

“Our elected officials, and customers, understand and appreciate our efforts to strengthen our utility assets for everyday reliability and against extreme weather,” he said. “In terms of the elements, people who live here know what we’re up against. Really, there’s no end in sight for our storm-hardening efforts.”

City of Alachua

The City of Alachua has taken several steps to invest in resiliency and improve system reliability. The utility spent about \$2 million over the last five years to underground its distribution lines, estimated City Manager Mike DaRoza. The utility also recently completed work on a new \$6.5 million substation that was strategically located to provide additional transmission capacity. A third step was to shorten the length of distribution feeders to reduce exposure to severe weather and enhance reliability.

Alachua is also planning to install TripSavers on overhead lines starting in early 2022. TripSavers, an advanced “self-healing” technology, prevent temporary faults on lines from becoming sustained outages.

DaRoza estimated the utility, which serves about 5,000 customers, has invested \$9.6 million in hardening its electric distribution system over the last five years. He said larger commercial customers have expressed satisfaction with the utility’s efforts and recognized the improvement in electric reliability.

All this was done without an increase in retail electric prices, DaRoza said, and there are no immediate plans to increase those prices.

For the last two years, Alachua’s upgrades have taken place against the backdrop of

COVID-19. Like all businesses, the pandemic required Florida utilities to establish workplace safety procedures, including adding personal protective equipment and new procedures for mutual aid during emergencies.

“As the mutual aid coordinator for the state’s public power utilities, FMEA was the critical communications conduit to disseminate knowledge gained, share important information and update guidelines for mutual aid efforts,” DaRoza said. “FMEA really stepped up to meet the informational challenge of COVID-19, which allowed our city to remain customer-focused, deliver superior services, and continue with our strategic capital improvement plans. Thank you FMEA!”

Beaches Energy Services

“As long as the lights are on, people are happy, and the lights are on more since we began hardening our system,” said Allen Putnam, general manager of Beaches Energy Services. “We’re getting more ‘thank you’ notes these days because our customers’ electric service is less affected by inclement weather, trees and wildlife.”

In the mid-1980s, about 80 percent of Beaches’ distribution lines were overhead. The utility started an undergrounding program in 1997, and today the system is 85 percent belowground, which has improved reliability and resilience dramatically.

“Our reliability has improved greatly,” Putnam said, “and customer satisfaction is up significantly as a result.”

Don Cuevas, an engineering supervisor at Beaches, estimated the utility, which serves more than 35,000 customers, has invested \$2 million to \$3 million per year over the last 10-15 years to underground overhead lines, as well as replace underground lines and wood poles with concrete.

Another \$2 million annually has been invested in modernizing substations and maintaining and repairing transmission lines utilizing drones and LIDAR (Light Detection and Ranging), a remote sensing method. Substation modernization involves replacing mechanical relays with electronic ones. The relay replacement “will be an ongoing process, extending as far as the eye can see,” Cuevas said.

A few years ago, Beaches added a second transformer at its Guana substation and replaced its largest transformer at its Samson substation. A more than \$10 million investment, these upgrades ultimately reduce costs and prevent power outages.

In a coastal area, utility aesthetics are particularly important to customers and the community. Undergrounding a system is a time-consuming, costly and often disruptive project, resulting in torn-up streets and sidewalks. Beaches has taken efforts to use directional drilling methods in its undergrounding projects instead of digging up the streets. This method helps keep costs down and results in minimal traffic disruptions. In addition, there have been no rate impacts as a direct result of the system-hardening improvements, Putnam said.

City of Wauchula

Like other FMEA members, the City of Wauchula regularly inspects its wood utility poles, replacing weakened ones, and it has stepped up tree trimming.

Since starting its wooden pole inspection program in 2017-2018, the city has replaced about 11 percent of its estimated 3,000 wooden poles.

To improve the utility’s reliability, Wauchula added a second interconnection

LAKE WORTH BEACH ELECTRIC UTILITY BEGINS LARGE PROJECT

by Lake Worth Beach Communications



Lake Worth Beach Electric Utility has embarked on an expansive project to provide more reliable and resilient service for their customers.

As part of the ongoing System Hardening and Reliability Improvement Program, crews are working to install poles that can withstand a hurricane of Category 5 or higher with capacity distribution wires or “circuits,” which will provide the future energy needs of Lake Worth Beach customers.

Accompanying this work, and a key component of the project, is the upgrading of the city’s substations that feed the circuits.

Crews have begun work on a new substation at Seventh Avenue North, which will replace an existing substation built in 1970. The new substation will be able to withstand Category 5 hurricanes and is designed to handle the increased load from the city’s growth over the past 50 years, including reserve capacity for future growth.

LE Myers, an electrical contractor and construction company, won the bid to carry out the construction. Their teams expect to complete the project around March 2022, in time for the upgraded circuits to tie in.

Lineworkers are working hard to minimize disruption while the work takes place. In many cases the utility’s poles are in backyards, and crews use special tools to safely get in and safely remove the old pole, and then replace it with the new pole.

The new poles are either wood, concrete or iron, and all are designed to withstand the worst likely weather. Part of the work includes repairing any damage to customer property that may occur during the project.

This project will ensure that the city’s infrastructure is ready for future storms and is the best possible investment for Lake Worth Beach customers, following the philosophy: “Do it once, do it right!”

at its one substation in 2009 and a third in 2020, at a cost of about \$2 million each. When that third line was added, Wauchula also implemented a SCADA (Supervisory Control and Data Acquisition) system, which gives the utility better intelligence on the real-time health of its distribution network.

The utility has also invested in replacing inefficient equipment on its system. It recently replaced four aging oil-filled regulators, at a cost of roughly \$2 million. The old oil-filled regulators contained polychlorinated biphenyls (PCBs), so replacing those regulators, used to cool equipment, was a step forward environmentally.

James Braddock, Wauchula's director of support services and internal auditing, noted the utility completed a fuse transformer coordination project a few years back, which improved reliability and efficiency.

Going forward, Braddock said another reliability and resiliency project will add capacitor banks near the end of its three distribution lines. Wauchula serves about 3,000 customer-owners.

These investments have had substantial impacts on Wauchula's reliability. Braddock, a Wauchula customer himself since 1989 and an employee since 2000, feels the impacts of fewer outages and shorter outages than in the past.

"There are some aspects of the asset-hardening journey that never end," he commented. "We have beautiful oak trees in our service area. We trim them more frequently now, but they grow back. We know people would prefer their trees to grow without trimming, but more than

that, they want their power to be reliable. They seem to accept the trade-off."

City of Tallahassee

System-hardening is not limited to poles and lines. The City of Tallahassee recently added about 20 megawatts of generation at a substation to provide added assurance to critical loads, including a hospital and a police station.

"One of our bulk-power substations was served by a radial feed, and that substation provides power to a police station and hospital," said David Byrne, assistant general manager for electric and gas utilities. "If that radial feed was disrupted, the hospital and police station would lose power."

That happened in 2016, when Hurricane Hermine hit Tallahassee.

The substation in question, BP-12, was located in an urban area, and the extensive construction needed to add a second feeder would have been costly and disruptive, he recalled.

So Tallahassee went in another direction, adding new generation that could be used to island the critical loads at the hospital and police station during severe weather. The utility collaborated with the hospital, Tallahassee Memorial HealthCare, to build two 9.8-megawatt, gas-fired, reciprocating internal combustion engine (RICE) generators. The new units, constructed on land



donated by the hospital adjacent to the BP-12 substation, came online in 2018.

These “quick start” units can come online in less than 10 minutes. “These new units helped us avoid the cost and hassle of building a second feeder while giving us new generation that we needed anyway,” Byrne remarked. “It was a great example of collaborating with a customer for mutual benefit.”

“This was a fresh approach to resolving a traditional utility dilemma,” Byrne said. “I could see a couple of places on our system where we could replicate what we did with the hospital, where we add quick-start generation that we need while improving system reliability and resilience for our customers.”

Green Cove Springs

Trees used to grow less than 2 feet from power lines in Green Cove Springs. Not surprisingly, when the winds blew, trees swayed and made contact with power lines, causing outages.

But these days, trees are trimmed to a 10-foot circumference around poles, and outages are way down, according to Andy Yeager, electric director at the utility.

Outages have dropped by two-thirds since Green Cove Springs began its asset-hardening activities. “Tree-trimming has made a tremendous difference,” Yeager said, estimating about 65 percent of the electric reliability improvements in Green Cove Springs stemmed from more aggressive vegetation management.

“People come to city council meetings and say, ‘I don’t know what you’re doing, but the lights are staying on more now,’” Yeager continued. “Customers feel we have made great improvements.”

The utility has done more than up its tree-trimming game. It has installed animal guards on all distribution feeders and laterals to keep squirrels and other wildlife off the equipment. It also installed a new feeder circuit and

substation transformer at its single transmission-fed substation.

Three of its distribution substations got new underground takeoff feeder circuits as well, which provide an extra measure of reliability. The utility is implementing a SCADA system and upgrading its fuse coordination on laterals and equipment throughout the city to limit the areas of outages. And like all Florida public power utilities, it routinely inspects and replaces wood poles.

Yeager estimated the utility, which serves about 4,900 customer-owners, has spent about \$500,000 per year over the last few years on asset-hardening. This year’s budget includes a similar amount. Those outlays have not caused retail electric prices to rise, he added.

Across Florida, public power utilities are making investments large and small to meet the needs of their local communities, improve the customer experience and ensure the lights come on — and stay on — in all kinds of situations. ■

