FPUA RESILIENCE INVESTMENTS

Fort Pierce Utilities Authority is a local municipal utility provider and governing member of the Florida Municipal Power Association (FMPA). We purchase electric from FMPA which is then distributed to over 29,000 customers in the City of Fort Pierce through 420 miles of electric distribution lines that are fully owned and maintained by FPUA. Each year, FPUA and FMPA jointly conduct a Transmission Planning Assessment over our electric infrastructure. This annual assessment ensures that FPUA remains in compliance with 14 different North American Electric Reliability Corporation (NERC) Reliability Standards. This assessment also targets special topics such as Generator Interconnection Studies, Voltage Studies, Import Studies, and Impact Studies related to increases in demand, and retirements and replacements, among others. Using the results of the assessment FPUA's Electric Engineering Department initiates plans to not only ensure compliance, but to make the necessary upgrades to the electric grid that will increase resilience and reduce the likelihood and consequences of disruptive events.

Past Resilience Investments 2020-2022

Over the last 3 completed fiscal years, FPUA has invested $8 million towards improving the reliability and resiliency of the electric grid through 27 different projects.

Installation of Voltage and Current Monitoring Devices **$154,894.00**

In FY2022, FPUA installed a voltage and current monitoring device at its Hartman substation which is located near critical power generation sources. The device will store the last 15 days' worth of data, which will provide critical data for NERC and others in the event that a large power disturbance creates a massive and unexpected outage in the area. In the event of such a disturbance, data is compiled and sent to NERC, providing them an opportunity to research the disturbance if needed. (Project Code 559)

Replacement of Substation Transformers **$1,300,907.94**

From 2020 through 2022, FPUA replaced 2 substation transformers and procured an additional one as backup. Further, FPUA recently installed 2 new transformers along 2nd Street in Downtown Fort Pierce to pre-empt a disturbance that would be caused by additional load on an already overloaded transformer. The transformer is overloaded largely because of the tremendous growth in businesses and population in the downtown area and this proactive addition of two transformers represents an intentional effort by FPUA to anticipate possible disturbances in our aging infrastructure. Similarly, substation transformers are foundational components to the power system that convert electrical energy from the transmission system to the distribution system. Substation transformers serve sections of FPUA's service territory and are rated based on their available capacity to serve. Each substation has 2 transformers,

for a total of 12. Two substation transformers were replaced in order to accommodate the unprecedented growth in our community. (Project Code 594)

Replacement of Substation Regulators **$176,534.72**

In both 2020 & 2021, FPUA replaced 9 substation regulators, 18 in total. FPUA utilizes substation regulators to moderate and control the voltage exiting the substations, in order to protect the electric grid. As the substation regulators reach their useful lifespan, they need to be replaced to prevent surges and outages on the grid. Substation regulators are an integral part of the electric grid as it provides operations personnel to view the voltage at each feed and confirm that utility-standard voltages are being provided to our customers. If the voltage is too low or too high, the regulators will adjust the voltage to be within tolerance. (Project Code 534)

Collaborative Infrastructure Improvements **$72,403.02**

FPUA prides itself on collaborating with other government entities, including St. Lucie County, the City of Fort Pierce, FDOT, etc., to enhance the quality of life and resiliency of our community. When other entities have projects, such as road widening or specific Right-of-Way adjustments, FPUA will make use of the opportunity to upgrade and storm harden our infrastructure. For example, FPUA will relocate facilities or infrastructure, which can include overhead to underground conversion, pole replacement and reconductoring, etc. Larger projects are given a distinct name and project code. Smaller projects are categorized using this project code, which is dedicated to infrastructure enhancements through collaboration with local governments. (Project Code 512)

Causeway Substation Tie-in for Backup **$51,520.87**

In 2020, as an added effort to create a reliable and resilient electric grid, FPUA installed a switchgear, and re-routed primary lines to create a tie-in to our Causeway substation. A backup tie to a substation creates enhanced reliability. In the event that our transmission network that serves the Causeway substation goes down, we now have a backup tie to this substation through our distribution network. In the event a main transmission line feeding the substation is damaged and unusable, the backup tie can be used to facilitate the substation and keep power on for the customers that utilize that substation. The end result is enhanced flexibility, allowing for operations personnel to switch back and forth between main feeder tie and backup tie if needed. (Project Code 545)

Overhead to Underground Conversion of Transmission & Distribution Lines **$1,818,827.91**

FPUA is beginning the process of converting overhead transmission and distribution lines to underground. Toward that end, in conjunction with the City of Fort Pierce road improvements, FPUA converted 6,500 linear feet of overhead lines to underground along 17th Street, from Orange Avenue to Avenue D. This project also consisted of installing 12 new padmount transformers, and eliminating the overhead transformers. Padmount transformers are insulated, using an oil that fully encompasses the core and coil, and protected from extreme

weather events. Further, FPUA converted another 1,100 linear feet of overhead lines to underground and installed 7 new transformers, as the City of Fort Pierce was improving the road along South 7th Street, 250 linear feet during City of Fort Pierce road improvements along North 8th Street, 3,500 linear feet of overhead lines to underground and 3 new transformers during the City of Fort Pierce roadway improvements along South 5th Street. FPUA also collaborated with St. Lucie County during their roadway improvement project, converting 900 linear feet on Edwards Road, from Oleander Avenue to US 1, and 5,500 linear feet of overhead line to underground as part of an FDOT/St. Lucie County roadway improvement project along the North Causeway Bridge. Additional overhead to underground conversion efforts include 5,500 linear feet and installation of 6 transformers, also replacing much of our dilapidated infrastructure in the coastal village known as St. Lucie Village, 2,500 linear feet and installed 5 transformers within the Tall Pines Mobile Home Park, 1,500 linear feet and installed 4 transformers along Boston Alley, due to a poor-performing lateral, 900 linear feet and installed 3 transformers along McNeil Road, 900 linear feet and installed 1 transformer at Harbor Branch. FPUA customers also requested to have some of their lines undergrounded, a total of 900 linear feet and installed 1 new transformer. (Project Codes 533, 547, 548, 553, 558, 560, 561, 562, 564, 573, 576, 579, 586)

15kV Circuit Breaker Replacement **$78,690.14**

In 2021, FPUA replaced four 15 kV circuit breakers to continue protection of FPUA's electric distribution network from physical contact to the wires, which results in damaging short circuits. Physical contact risks include lightning strikes, vegetation, animals, car accidents, etc. In total, FPUA has 56 15kV circuit breakers in operation, each with an expected life span of 25-30 years. As each circuit breaker begins to reach the end of their useful life, FPUA replaces them. In the event that a circuit breaker needs minor repairs, as long as it is not nearing the end of its useful lifespan, FPUA will rebuild or refurbish the circuit breaker. (Project Code 502)

69kV Circuit Breaker Replacement **$345,727.15**

Over the last 3 years, FPUA replaced three 69 kV circuit breakers in operation and procured an additional 4 circuit breakers to be installed when needed. The primary function of a 69 kV circuit breaker is to protect the transmission network from physical contact, whereas 15 kV breakers protect the distribution network. Transmission systems are different from distribution systems in that the voltage is higher and protection schemes are different, resulting in higher costs for replacement and maintenance. FPUA has a total of twenty-eight 69 kV circuit breakers in operation. (Project Code 509)

Expanded Deployment of TripSavers **$124,431.75**

FPUA installed 7 TripSavers in 2021 and 20 TripSavers in 2022. TripSavers are self-powered, electronically controlled, single-phase reclosers with a vacuum fault interrupter that bring self-healing capabilities to overhead distribution lines. In the event of a short circuit, a TripSaver will disrupt the fault current and attempt to reclose up to three times. If the fault remains, the

device will open and remain that way to provide a visible gap in the power system. This helps isolate the damaged section of the grid, making it easier for utility personnel to locate the fault and make repairs. If the fault stops, service will immediately be restored to the customer. TripSavers have a wide range of programmable settings that allow them to easily be configured to protect the system. (Project Code 503)

Electric System VAR Control Expansion **$139,880.77**

FPUA also expanded its Electric System Volt-Amperes Reactive (VAR) Controls by purchasing 3 capacitor banks in 2020 and installed them in 2021. VAR's are energy losses that result from loading conditions in the system and are undesirable on the distribution network because they create additional currents on the lines, reducing the voltage and occasionally the power as well. Capacitor banks assist with reducing the amount of VAR on the power lines and resulting in an increase in voltage and power quality for our customers**.** (Project Code 510)

Storm Hardening Program Incidental Upgrades **$525,230.59**

FPUA has a robust Storm Hardening Program, which entails the replacement, repair or refurbishment of electric transmission and distribution facilities to withstand weather-related events, such as hurricanes, flooding, excessive heat, etc. These projects are considered a blanket for smaller projects related to storm hardening as larger projects receive a new project number to specify exact material and labor used for that project. The storm hardening program is a combination of multiple, smaller scale projects involving replacements of transmission, substation and distribution system infrastructure, such as pole and transformer replacement, reconductoring, overhead to underground conversions, etc. (Project Code 502 & 520)

Underground Vault Replacement **$23,628.32**

An unsafe and outdated underground vault was removed and replaced with an above-ground padmount transformer, at a location on North 7th Street. A vault is an underground box designed to hold transformers, wiring, etc. Vaults are considered an antiquated practice due to their safety risk. A vault's tight quarters make maintaining them difficult, tedious, and unsafe, and pose a risk to the electric grid in the event water enters the vault. In fact, some older vaults require confined space professional certification and air quality, asbestos, bacteria, etc., are concerns in older unmaintained vaults. Padmount transformers are used as replacements, and are safer to work on, easier and less expensive to maintain, and provides service upgrades that improve power quality. (Project Code 527)

Pole Inspections and Replacements **$2,105,035.64**

Between 2020 and 2022, FPUA replaced or improved a total of 731 poles. FPUA's contractor Osmose Pole Inspections identifies utility poles that need to be upgraded or replaced. In 2021, Osmose identified 1,999 poles that need enhancements or replacements.

Tree Trimming **$1,036,551.22**

FPUA also maintains vegetation throughout the electric grid, inspecting and clearing an average of 80-85 miles of lines. FPUA currently utilizes a local, private contractor for tree trimming. On average, crews are able to maintain two substations per fiscal year.

Future Planned Resilience Investments 2024-2026

Fort Pierce Utilities Authority's Electric Engineering department plans to invest $14.5 million, at least 12 major projects, to improve the electric grid, over the next 3 years, These projects will increase the reliability, and reduce the risk of disruptive events to FPUA's electric grid.

Replacement of Substation Transformers **$3,000,000**

FPUA plans to replace 3 transformers over the next 3 years, in order to continue improving reliability and capacity for increased demand. As foundational components of the power system, substation transformers convert electrical energy from the transmission system to the distribution system, which then service FPUA's customers. The estimated costs for these replacements is $3 million. (Project Code 594)

Substation Improvement Projects **$820,000**

As part of FPUA's efforts to storm harden its transmission system, specifically its substations, FPUA plans to replace 2 Line Relays at its Causeway Substation. Relay's convert small electric currents into larger currents and are a component of electrical substation equipment for the protection of systems against abnormal situations, such as faults[1]. When a relay senses a fault, it identifies the location and sends an interruption message of tripped command to the specific point of the circuit. Further, FPUA plans on Ground Grid Rehabilitation which will assist in providing a safe path for stray voltages and currents to go to ground. This also maintains the safety of personnel within the substation so there is no exposure to electrical shock. As previously mentioned, FPUA utilizes capacitor banks as protection for the grid. FPUA plans on upgrading and updating the protection schemes and breakers on the existing capacitor bank at its Garden City Substation. This project also moves FPUA forward toward replacing the capacitor bank with a smart-grid style unit that will perform the same function as a capacitor, but has a different setup. (Project Code 506)

Collaborative Infrastructure Improvements **$1,500,000**

In anticipation of future collaborative projects with the City of Fort Pierce, St. Lucie County, and FDOT, FPUA plans on investing at least $1.5 million. Project can include overhead to

[1] Electric Substation Components & their Workings. Electrical Substation Components List - Diagram, Working & Functions (watelectrical.com)

underground conversion during roadway improvements, pole replacements, reconductoring, etc. These projects are strictly based on the capital improvement plans of each entity. (Project Code 512)

15k V Circuit Breaker Replacement **$270,000**

As mentioned before, FPUA has 56 15 kV circuit breakers in operation, and each year some need to be replaced, as they have reached the end of their useful life. FPUA plans to replace 3 circuit breakers each year, for a total of 9 at an estimated total cost of $270,000. (Project Code 502)

69 kV Circuit Breaker Replacement **$300,000**

FPUA has twenty-eight 69 kV circuit breakers in operation, each with the standard lifespan of roughly 25-30 years. As previously mentioned, the function of the 69 kV circuit breaker is to protect the electric transmission network from physical contact to the wires, resulting in damaging short circuit. FPUA plans to replace at least one 69 kV breaker each year over the next 3 years for a total cost of $300,000. (Project Code 509)

Expanded Deployment of TripSavers **$450,000**

FPUA will continue deploying TripSavers, installing 20 TripSavers each year, a total of 60, over the next 3 years. FPUA currently has 76 TripSavers installed out of 3,326 prospective locations, about 2.3% of its electric grid. Installing 60 additional TripSavers will bring coverage to 4.1%. (Project Code 503)

Electric System VAR Control Expansion **$300,000**

The Electric Engineering Department plans to install at least 1 capacitor bank on select feeder lines throughout the electric grid. In order to protect against energy losses that result from loading conditions in the system, known as VARs, FPUA utilizes capacitor banks in order to adjust the voltage and protect the grid. (Project Code 510)

Storm Hardening Program **$3,700,000**

As part of the plans for FPUA's Storm Hardening Program, FPUA has selected 7,000 linear feet of Feeder lines, located on Edwards Road, that will be upgraded over the next 3 years. Further, FPUA plans to rebuild for the Feeder on S 13th Street, consisting of Pole, wire, and transformer upgrades. FPUA also plans to carry out Grid Modernization and Power Quality upgrades, such as Distribution Transformer Monitoring, Distribution Line Capacitor Control and Monitoring, reconductoring, distribution transformer upgrades and regulator or distribution line capacitor placements. Not only does this assist in storm hardening the electric grid, they also assist in maintaining ANSI C84.1 and IEEE 519 Utility Standards for Power Quality. FPUA also plans to

implement System Tie Point Upgrades, which assist in creating a more reliable system if the need arises to switch between feeders. (Project Code 508)

Conversion of Transmission & Distribution Lines from Overhead to Underground $**1,600,000**

Separate from the collaborative effort with our local governments, FPUA also plans to convert 8,000 linear feet of overhead electric lines to underground. FPUA estimates the cost of these reliability improvements to be at least $1.6 million. FPUA understand the importance of a resilient electric grid and will continue to make these important improvements to reduce the likelihood and frequency of disruptive events in the Fort Pierce community.

Pole Inspections and Replacements **$1,350,000**

FPUA anticipates replacing 200-300 poles in the electric distribution system each year, for the next 3 years. FPUA will utilize Osmose Pole Inspections to identify which poles need to be replaced. These upgrades can include switching out aged wooden poles to new wood or concrete poles, and switching concrete poles to iron ductile poles.

Tree Trimming **$1,300,000**

Overgrown vegetation poses the most common problem when thinking about reliability and resiliency in the Fort Pierce service territory. As a coastal city, impacts from extreme weather like heavy rains and high winds pose an eminent risk that results in vegetation disrupting electric service. As an added effort of protection, FPUA recently hired its own Tree Trimmer and Line Clearing Specialist, in order to devote more time to this type of reliability and resiliency enhancement. The projected costs for this project total to $1.3 million over the next three years.