

State of Florida



Public Service Commission

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TALLAHASSEE, FLORIDA 32399-0850

-M-E-M-O-R-A-N-D-U-M-

DATE: June 26, 2019

TO: Office of Commission Clerk (Teitzman)

FROM: Division of Engineering (P. Buys, Graves, King, Knoblauch, Salvador) *PSB AM EK LS TJS*
Office of Industry Development and Market Analysis (Bremann, Eastmond, Wendel, Eichler) *SC*
Office of the General Counsel (Trierweiler, Crawford) *JSC JTS BC DE JH BMW CAH*

RE: Docket No. 20180144-EI – Review of 2019-2021 storm hardening plan, Florida Power & Light Company.

Docket No. 20180145-EI – Review of 2019-2021 storm hardening plan, Tampa Electric Company.

Docket No. 20180146-EI – Review of 2019-2021 storm hardening plan, Duke Energy Florida, LLC.

Docket No. 20180147-EI – Review of 2019-2021 storm hardening plan, Gulf Power Company.

Docket No. 20180148-EI – Review of 2019-2021 storm hardening plan, Florida Public Utilities Company.

AGENDA: 07/09/19 – Regular Agenda – Proposed Agency Action - Interested Persons May Participate

COMMISSIONERS ASSIGNED: All Commissioners

PREHEARING OFFICER: Fay

CRITICAL DATES: None

SPECIAL INSTRUCTIONS: None

Case Background

The hurricanes of 2004 and 2005 that made landfall in Florida resulted in extensive storm restoration costs and lengthy electric service interruptions for millions of electric investor-owned utility (IOU) customers. On January 23, 2006, the Florida Public Service Commission (Commission) staff conducted a workshop to discuss the damage to electric utility facilities resulting from these hurricanes and to explore ways of minimizing future storm damage and customer outages. State and local government officials, independent technical experts, and Florida's electric utilities participated in the workshop.

On February 27, 2006, the Commission issued Order No. PSC-06-0144-PAA-EI, in Docket No. 20060078-EI, requiring that the IOUs begin implementing an eight-year inspection cycle of their respective wooden poles.¹ In that Order, the Commission noted:

The severe hurricane seasons of 2004 and 2005 have underscored the importance of system maintenance activities of Florida's electric IOUs. These efforts to maintain system components can reduce the impact of hurricanes and tropical storms upon utilities' transmission and distribution systems. An obvious key component in electric infrastructure is the transmission and distribution poles. If a pole fails, there is a high chance that the equipment on the pole will be damaged, and failure of one pole often causes other poles to fail. Thus, wooden poles must be maintained or replaced over time because they are prone to deterioration. Deteriorated poles have lost some or most of their original strength and are more prone to fail under certain environmental conditions such as high winds or ice loadings. The only way to know for sure which poles...must be replaced is through periodic inspections. [p. 2]

On April 25, 2006, the Commission issued Order No. PSC-06-0351-PAA-EI, in Docket No. 20060198-EI, requiring all IOUs to file plans and estimated implementation costs for 10 ongoing storm preparedness initiatives (Ten Initiatives) on or before June 1, 2006.² The Ten Initiatives are:

1. A Three-Year Vegetation Management Cycle for Distribution Circuits
2. An Audit of Joint-Use Attachment Agreements
3. A Six-Year Transmission Structure Inspection Program
4. Hardening of Existing Transmission Structures
5. A Transmission and Distribution Geographic Information System
6. Post-Storm Data Collection and Forensic Analysis
7. Collection of Detailed Outage Data Differentiating Between the Reliability Performance of Overhead and Underground Systems

¹Docket No. 20060078-EI, *In re: Proposal to require investor-owned electric utilities to implement ten-year wood pole inspection program.*

²Docket No. 20060198-EI, *In re: Requirement for investor-owned electric utilities to file ongoing storm preparedness plans and implementation cost estimates.*

8. Increased Utility Coordination with Local Governments
9. Collaborative Research on Effects of Hurricane Winds and Storm Surge
10. A Natural Disaster Preparedness and Recovery Program

These Ten Initiatives were not intended to encompass all reasonable ongoing storm preparedness activities. Rather, the Commission viewed these initiatives as a starting point of an ongoing process.³ By Order Nos. PSC-06-0781-PAA-EI (addressing Tampa Electric Company (TECO), and Florida Public Utilities Company (FPUC)), PSC-06-0947-PAA-EI (addressing Progress Energy Florida, Inc., and Gulf Power Company (Gulf)), and PSC-07-0468-FOF-EI (addressing Florida Power & Light Company (FPL)), the Commission addressed the adequacy of the IOU's plans for implementing the Ten Initiatives.

The Commission also pursued rulemaking to address the adoption of distribution construction standards more stringent than the minimum safety requirements of the National Electrical Safety Code (NESC) and the identification of areas and circumstances where distribution facilities should be required to be constructed underground.⁴ Rule 25-6.0342, Florida Administrative Code (F.A.C.), was ultimately adopted.⁵

Rule 25-6.0342, F.A.C., requires each IOU to file an Electric Infrastructure Storm Hardening Plan for review and approval by the Commission which includes a description of construction standards, policies, practices, and procedures to enhance the reliability of overhead and underground electrical transmission and distribution facilities. The rule calls for, at a minimum, each IOU's plan to address the following items:

- a. Compliance with the NESC
- b. Extreme Wind Loading (EWL) standards for:
 - i. New construction
 - ii. Major planned work, including expansion, rebuild, or relocation of existing facilities
 - iii. Critical infrastructure facilities and along major thoroughfares
- c. Mitigation of damage due to flooding and storm surges

³Order No. PSC-06-0351-PAA-EI, p. 2, issued April 25, 2006, in Docket No. 20060198-EI, *In re: Requirement for investor-owned electric utilities to file ongoing storm preparedness plans and implementation costs estimates*.

⁴Order No. PSC-06-0556-NOR-EU, issued June 28, 2006, in Docket No. 20060172-EU, *In re: Proposed rules governing placement of new electric distribution facilities underground, and conversion of existing overhead distribution facilities to underground facilities, to address effects of extreme weather events*; and Docket No. 20060173-EU, *In re: Proposed amendments to rules regarding overhead electric facilities to allow more stringent construction standards than required by National Electric Safety Code*.

⁵Order No. PSC-07-0043-FOF-EU, issued January 16, 2007, as amended by Order No. PSC-07-0043AFOF-EU, issued January 17, 2007, in Docket No. 20060172-EU, *In re: Proposed rules governing placement of new electric distribution facilities underground, and conversion of existing overhead distribution facilities to underground facilities, to address effects of extreme weather events*; and Docket No. 20060173-EU, *In re: Proposed amendments to rules regarding overhead electric facilities to allow more stringent construction standards than required by National Electric Safety Code*.

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- d. Placement of facilities to facilitate safe and efficient access for installation and maintenance
- e. A deployment strategy that includes:
 - i. The facilities affected
 - ii. Technical design specifications, construction standards, and construction methodologies
 - iii. The communities and areas where the electric infrastructure improvements are to be made
 - iv. The impact on joint-use facilities on which third-party attachments exist
 - v. An estimate of the costs and benefits to the utility of making the electric infrastructure improvements
 - vi. An estimate of the costs and benefits to third-party attachers affected by the electric infrastructure improvements
- f. The inclusion of Attachment Standards and Procedures for Third-Party Attachers

FPL filed its 2016-2018 storm hardening plan updates on March 15, 2016, which was consolidated with its petition for rate increase. FPL's plan was approved at the November 29, 2016 Commission Conference through a settlement.⁶ On May 2-3, 2016, the other four IOU's filed their 2016-2018 storm hardening plan updates. The Commission approved the storm hardening plans for DEF, FPUC, TECO, and Gulf, at the December 6, 2016 Commission Conference.⁷

After four hurricanes impacted Florida in 2016-2017, the Commission opened Docket No. 20170215-EU to review electric utility storm preparedness and restoration actions (Hurricane Review Docket), and to identify areas where infrastructure damage, outages, and recovery time for customers could be minimized in the future. On May 2-3, 2018, the Commission held a workshop during which information was presented by utilities, customers and their representatives, and local governments. Topics discussed at the workshop included preparation and restoration processes, hardened versus non-hardened facility performance, underground versus overhead performance, impediments to restoration, customer and stakeholder communication, and suggested improvements based on lessons learned.

⁶Order No. PSC-16-0560-AS-EI, issued December 15, 2016, in Docket No. 20160021-EI, *In re: Petition for rate increase by Florida Power & Light Company*.

⁷Order No. PSC-16-0569-PAA-EI, issued December 19, 2016, in Docket No. 20160105-EI, *In re: Petition for approval of 2016-2018 storm hardening plan, pursuant to Rule 25-6.0342, F.A.C., by Tampa Electric Company*; Order No. PSC-16-0570-PAA-EI, issued December 19, 2016, in Docket No. 20160106-EI, *In re: Petition for approval of 2016-2018 storm hardening plan, pursuant to Rule 25-6.0342, F.A.C., by Florida Public Utilities Company*; Order No. PSC-16-0571-PAA-EI, issued December 19, 2016, in Docket No. 20160107-EI, *In re: Petition for approval of 2016-2018 storm hardening plan, pursuant to Rule 25-6.0342, F.A.C., by Duke Energy Florida, LLC*; Order No. PSC-16-0572-PAA-EI, issued December 19, 2016, in Docket No. 20160108-EI, *In re: Petition for approval of 2016-2018 storm hardening plan, pursuant to Rule 25-6.0342, F.A.C., by Gulf Power Company*.

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On July 24, 2018, the Commission issued its “Review of Florida’s Electric Utility Hurricane Preparedness and Restoration Action’s 2018.”⁸ At the July 10, 2018 Internal Affairs meeting, the Commission directed staff to open the storm hardening plan review dockets earlier than previously scheduled and to begin collecting additional details related to:

- Meetings with local governments regarding vegetation management and the identification of critical facilities.
- Utility staffing practices at local emergency operations centers (EOC).
- Planned responses to roadway congestion, motor fuel availability, and lodging accommodation issues.
- Alternatives considered before electing a particular storm hardening project.
- The collection of more uniform performance data for hardened versus non-hardened and underground facilities, including sampling data where appropriate.

On March 1, 2019, the five IOUs filed their 2019-2021 storm hardening plan updates as requested. Docket Nos. 20180144-EI (FPL), 20180145-EI (TECO), 20180146-EI (DEF), 20180147-EI (Gulf) and 20180148-EI (FPUC) were opened. Staff did not conduct a workshop for these updated storm hardening plans as data request responses were sufficient in understanding the updated plans.

This recommendation addresses FPL, TECO, DEF, Gulf, and FPUC’s plan updates as required by Rule 25-6.0342, F.A.C. For each utility, staff’s recommendation addresses:

- I. Wooden Pole Inspection Program
- II. Ten Initiatives
- III. National Electric Safety Code (NESC) Compliance
- IV. Extreme Wind Loading (EWL) Standards
- V. Mitigation of Flooding and Storm Surge Damage
- VI. Facility Placement
- VII. Deployment Strategies
- VIII. Attachment Standards and Procedures for Third-Party Attachments

Attachment A describes the storm hardening requirements of the Wooden Pole Inspection Program and the Ten Initiatives for each IOU. Attachments B through F contain a comparison of FPL, TECO, DEF, Gulf, and FPUC’s provisions of the 2016-2018 approved and updated 2019-2021 Wooden Pole Inspection Programs and Ten Initiatives, and the cost of implementing the approved and updated programs and initiatives.

⁸ Document No. 04847-2018, issued July 24, 2018, in Docket No. 20170215-EU, *In re: Review of electric utility hurricane preparedness and restoration actions.*

Docket Nos. 20180144-EI, 20180145-EI, 20180146-EI, 20180147-EI, 20180148-EI

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The Commission has jurisdiction over this matter pursuant to Sections 366.04 and 366.05, Florida Statutes (F.S.).

Discussion of Issues

Issue 1: Should the Commission approve Florida Power and Light's 2019-2021 storm hardening plan filed in Docket No. 20180144-EI?

Recommendation: Yes. FPL's updated plan is largely a continuation of its current Commission-approved plan. A review of FPL's plan shows that it has the information required by the Commission's rule and orders. Staff notes that approval of FPL's plan does not mean approval for cost recovery. FPL should consider the rate impact before taking proactive steps to improve its system to withstand severe weather events. (P. Buys, Knoblauch, Salvador, Breman, Eastmond, Wendel, Eichler)

Staff Analysis: On Attachment B, staff provides a summary of FPL's current Wooden Pole Inspection Program and Ten Initiatives and the proposed changes. In addition, where available, staff has shown the costs associated with the Wooden Pole Inspection Program and Ten Initiatives for 2016-2018 and 2019-2021. Components of FPL's updated plan are summarized below.

Wooden Pole Inspection Program

FPL proposes to continue its eight-year Wooden Pole Inspection Program.⁹ FPL completes inspections on its entire pole population to identify poles that require repair, reinforcement or replacement. Currently, FPL has completed its fifth year of its second eight-year cycle. FPL will continue to file the results of these inspections in FPL's Annual Electric Utility Distribution Reliability Report. The costs for 2019 related to the eight-year Wooden Pole Inspection Program are estimated to be between \$45,000,000 and \$55,000,000; however, cost estimates for 2020 and 2021 were not provided. For 2016-2018, FPL spent \$164,000,000 for its Wooden Pole Inspection Program.

Ten Initiatives

Initiative One – Three-Year Vegetation Management Cycle for Distribution Circuits

FPL proposes no changes to its previously approved trim cycle.¹⁰ Currently, FPL has a three-year average trim cycle for feeders and a six-year average trim cycle for distribution laterals. Since a feeder outage affects a larger number of customers than a lateral outage, a shorter trim cycle is utilized for feeders. Additionally, FPL has a mid-cycle trimming program that addresses tree conditions that could result in outages before its next planned trim cycle. This includes targeted trimming and maintenance of tree species that often grow faster than others. FPL also proposes to continue trimming and/or removing trees that are leaning, damaged, dead, or trees reported by customers as needing attention. The cost for 2019-2021 for Initiative One is estimated between \$196,000,000 and \$206,000,000 as compared to \$189,000,000 spent in 2016-2018.

⁹Order No. PSC-07-0078-PAA-EU, issued January 29, 2007, in Docket No. 20060531-EU, *In re: Review of all electric utility Wooden Pole Inspection Programs*.

¹⁰Order No. PSC-07-0468-FOF-EI, issued May 30, 2007, in Docket No. 20060198-EI, *In re: Requirement for investor-owned electric utilities to file ongoing storm preparedness plans and implementation cost estimates*.

Initiative Two – Audits of Joint-Use Attachment Agreements

There are no proposed changes to this initiative. FPL completes annual audits of joint-use facilities and attachments to the Utility’s poles by cable television (CATV) companies and telecommunication companies. These audits are conducted on a five-year cycle with approximately 20 percent of FPL’s service territory audited each year. The pole attachment audits focus on compliance with existing pole attachment agreements for all FPL-owned and joint-use poles. FPL proposes to continue conducting pole strength assessments in conjunction with its eight-year Wooden Pole Inspection Program. FPL does not specifically track or budget for the costs associated with Initiative Two.

Initiative Three – Six-Year Transmission Structure Inspection Program

There are no proposed changes to this initiative. FPL’s transmission structure inspection program incorporates different cycles depending on the type of inspection and structure. Below is a list of the types of inspections:

1. One-year cycle: Ground level visual inspections (wood, concrete, and steel poles/structures)
2. Six-year cycle: Climbing or bucket truck inspections (wood poles/structures)
3. Ten-year cycle: Climbing or bucket truck inspections (steel and concrete poles/structures)

In addition, FPL also inspects the condition of various transmission pole/structure components, including attachments, insulators, cross-arms, cross-braces, foundations, bolts, conductors, overhead ground wires, guy wires, anchors, and bonding. The 2019-2021 cost for this initiative is estimated to be between \$93,000,000 and \$113,000,000 as compared to \$112,000,000 spent for 2016-2018.

Initiative Four – Hardening of Existing Transmission Structures

There are no proposed changes to this initiative. FPL plans to replace all wooden transmission structures with round spun concrete poles and all ceramic post insulators on concrete poles with polymer post insulators. In addition, FPL has plans to increase the replacement rate for wood transmission structures and ceramic post insulators on square concrete poles. FPL will prioritize these two existing transmission storm hardening initiatives based on factors including proximity to high wind areas, system importance, customer count, and coordination with the distribution critical infrastructure (CIF) storm initiative. FPL reports that at the end of 2018, 93 percent of transmission structures were steel or concrete. The 2019-2021 cost for this initiative is estimated to be between \$105,000,000 and \$150,000,000 as compared to \$136,000,000 spent for 2016-2018.

Initiative Five – Transmission and Distribution Geographic Information System (GIS)

There are no proposed changes to this initiative. FPL has established GIS databases for data on its distribution system, such as pole inspection records (e.g., pole locations and attributes), joint-use audit data, levels of hardening, and information on streetlights. As part of GIS improvements for post-hurricane forensic analysis, FPL developed a mobile tool for electronic inspection,

which creates routes within the hurricane-force wind area. Using these routes, field employees can collect information on observed damage and document the cause of the damage. FPL will continue to update its GIS as needed and maintain updated information on the Company's distribution system. FPL does not specifically track or budget for the costs associated with Initiative Five.

Initiative Six – Post-Storm Data Collection and Forensic Analysis

There are no proposed changes to this initiative. To conduct forensic data collection and analysis, FPL will collect information on the storm path and corresponding wind bands. For overhead distribution, teams will be assigned to specific areas in the path of the storm, and damage that meets patrol criteria will be investigated. For overhead hardened distribution feeders, forensic teams will cover a statistical sample of feeders that experience an interruption in the impacted area. Damage locations are to include poles, wires, and distribution equipment that are damaged or caused a customer outage. While storm damage data is collected in certain areas, restoration crews will begin their work in other locations. This will allow the collection of sample observations for forensic analysis without impeding early restoration work. FPL was impacted by Hurricanes Matthew and Irma in 2016 and 2017, respectively, and forensic data was collected and analyzed for both storms. FPL does not specifically track or budget for the costs associated with Initiative Six.

Initiative Seven – Collection of Detailed Outage Data Differentiating Between the Reliability Performance of Overhead and Underground Systems

There are no proposed changes to this initiative. FPL's plan proposes to continue managing its assets and performing forensic analysis on the performance of overhead and underground systems; however, these metrics are only available on a non-differentiated basis and are not for overhead and underground separately. This is primarily due to FPL's feeders being overhead/underground hybrids and performing calculations on data that could be differentiated may yield misleading results. Evaluation of equipment performance by type may also be available from forensics, depending on the specific characteristics of a given storm and if forensic teams have time to collect adequate data. Data gathered by the teams will depend on whether the restoration process lasts for an extended period of time, and whether or not the equipment is impacted. FPL does not specifically track or budget for the costs associated with Initiative Seven.

In response to information requested in the Hurricane Review Docket, FPL outlined the type of comparable data that the Utility plans to provide for overhead and underground facilities. FPL stated that it will continue to collect and analyze data concerning the performance of its transmission and distribution facilities when they are impacted by storms. The storm damage forensic data will be collected and obtained through field observations and will include pole failures by the type of damage and whether the pole was hardened or non-hardened. In addition, FPL will collect information on non-hardened and hardened overhead and underground facilities for feeders, laterals, and transmission, which will include the number of customers out of service and the population of customers. FPL indicates that depending on the storm's strength, size, path, damage, and speed of restoration, the samples of observation and collection of forensic infrastructure storm damage will vary.

Initiative Eight – Increased Coordination with Local Governments

There are no proposed changes to this initiative. FPL proposes to continue meeting with local governments and communities to discuss critical infrastructure functions, line clearing, storm readiness, joint-use of public rights-of-way, fuel/rate adjustments, and underground conversions. The Company uses e-mail communication and an online Government Portal website, which allows governments to access information on customer outages, estimated restoration times, FPL crew resources, and outage maps. In addition, FPL participates in annual hurricane exercises, which provides the Company input on how to better collaborate in emergency situations. FPL does not specifically track or budget for the costs associated with Initiative Eight.

In response to information requested in the Hurricane Review Docket, FPL discussed its coordination with local governments regarding vegetation management and identification of critical facilities. FPL continues to work with cities, counties, and customers to reinforce the importance of tree maintenance and planting the right tree in the right place. Before storm season, FPL meets with local government representatives and officials to prioritize power restoration for identified facilities that are determined to be critical to the needs of the local communities. FPL provided a list of meetings with seven counties and eight cities, which involved discussions on vegetation management issues. FPL also listed 45 meetings with 29 counties to address critical infrastructure and restoration processes.

FPL has 66 staff assigned to EOCs in 26 counties. FPL strives to have two representatives at each county EOC; however, this number may vary based on the populations of FPL customers in the area. In counties with smaller populations, EOCs receive assistance, information, and support from an assigned External Affairs Manager, while staffing at county EOCs with larger populations will receive additional staff. Staffing also depends on the strength and projected landfall of a storm.

Initiative Nine – Collaborative Research on Effects of Hurricane Winds and Storm Surge

There are no proposed changes to this initiative. FPL will continue to participate in the collaborative research effort with the other Florida IOUs, municipalities, and cooperatives. The collaborative research is facilitated by the Public Utility Research Center (PURC) at the University of Florida and focuses on: (1) undergrounding of electric utility infrastructure; (2) hurricane wind effects; and (3) public outreach. FPL entered into an extension of the memorandum of understanding with PURC in 2018 for two years, effective January 1, 2019, with a provision that the memorandum of understanding will be automatically extended for successive two-year terms. FPL does not specifically track or budget for the costs associated with Initiative Nine.

Initiative Ten – Natural Disaster Preparedness and Recovery Program

There are no proposed changes to this initiative. FPL will continue to refine its Storm Emergency Management Plan, which identifies emergency conditions and the responsibilities and duties of the FPL emergency response organization for severe storms. This plan covers the roles and responsibilities of key positions and includes FPL's overall severe storm emergency processes. These processes describe the planning activities, restoration work, public communications, coordination with government, training, practice exercises, and lessons learned evaluation

systems. This plan is reviewed and revised annually. FPL does not specifically track or budget for the costs associated with Initiative Ten.

In response to information requested in the Hurricane Review Docket, FPL provided its contingency plans for roadway congestion, fuel availability, and lodging accommodation issues. In the event of roadway congestion, FPL communicates with local, state, and federal authorities for assistance. This includes support from agencies such as the Department of Transportation, state/local law enforcement, and the National Guard. FPL also utilizes information from the All Hazards Consortium (AHC), which is a non-profit organization with over 45,000 stakeholders in industry and government that works to improve the capacity to prevent, prepare for, respond to and recover from crises. FPL uses information from the AHC to identify road closures, as well as locating open and/or closed fueling stations, which assists with route selection. FPL has contracts in place to guarantee the availability of fuel and maintains fuel tanks at several company facilities. Additional fuel is procured prior to storm season, which FPL stores in multiple areas throughout its service territory. For lodging accommodations, FPL utilizes a third-party vendor to evaluate room availability and secure lodging in needed areas. Additionally, alternative lodging may be employed, which includes mobile sleepers, cots and tents, and cots in fixed facilities.

National Electrical Safety Code Compliance

Prior to 2007, FPL had generally utilized construction Grade B for all distribution lines. Since construction Grade B is stronger than Grade C, FPL's distribution facilities comply with and, in most cases, exceed the minimum requirements of the NESC. FPL's Distribution Engineering Reference Manual and Distribution Construction Standards have been revised as required to ensure compliance with all applicable rules and regulations. FPL's transmission structures are designed to meet EWL under NESC Rule 250C EWL (extreme wind loading) and are constructed to meet construction Grade B under NESC. The Grades of construction are specified in the NESC on the basis of the required strengths for safety. The relative order of Grades is B, C, and N, with Grade B being the highest or strongest.

Extreme Wind Loading (EWL) Standards

FPL's service area covers multiple wind zones on the NESC extreme wind map for Florida, Figure 250-2(d). FPL determined the most effective option for implementing the extreme wind map would be by county. FPL proposes to continue to divide the application of EWL into three wind regions corresponding to expected extreme winds of 105, 130, and 145 mph. The Utility indicated the use of a smaller number of wind regions generates advantages through efficiency of work methods, training, engineering, and administrative aspects. FPL also indicated that using 105, 130, and 145 mph wind zones is a well-balanced approach that recognizes differences in the EWL requirements in the counties within each region.

New Construction

FPL's 2019-2021 Plan continues with its previously approved approach to apply EWL and its Design Guidelines to harden existing feeders and to design and construct new pole lines. FPL indicates this approach will continue to strengthen its electric system.

Major Planned Work

FPL proposes to continue to apply EWL to existing overhead feeders and to the design and construction of major planned work, including pole line extensions, relocations and certain pole replacements. In achieving the EWL design criteria, FPL proposes to continue to utilize its Design Guidelines, which are primarily associated with changes in pole class, pole type, and desired span lengths to be used.

Critical Infrastructure (CIF)

FPL indicated that it has been strengthening its infrastructure by applying the EWL criteria on infrastructure that serve hundreds of critical facilities and other essential community needs, such as hospitals, police and fire stations, grocery stores, and highway crossings. As stated above, FPL will continue to use its Design Guidelines to achieve the EWL design criteria.

Mitigation of Flooding and Storm Surge Damage

FPL reports that approximately 20 percent of its underground distribution infrastructure is within the Category 1 to Category 3 floodplain as defined by the Florida Department of Community Affairs. FPL implemented a storm surge initiative that utilized the installation of submersible equipment to strengthen the 12 above-grade vaults in the downtown Miami distribution network system. FPL indicated these vaults are more susceptible to storm surge/flooding. This was due to lessons learned in 2014 and 2015. In addition, FPL uses 24-inch concrete pads for transformers that are located in more flood prone areas. This provides an additional 18 inches of flood protection. FPL also has guidelines in place for the prompt post-storm inspection and mitigation of damage to equipment exposed to flooding or storm surge. The guidelines include the necessary steps to purge any sand and water that has impacted the equipment and to restore it to service.

Facility Placement

FPL proposes to continue its existing Distribution Guidelines, which address the location of new and replacement poles. The guidelines state that poles should be placed in front lot lines or accessible locations where feasible. It further states that new poles, when making replacements, should be set as close as possible to the existing pole to avoid the creation of a new pole location. Furthermore, it states that concrete poles are not to be placed in inaccessible locations or locations that could potentially become inaccessible.

Deployment Strategies

FPL will continue to prioritize storm hardening projects based multiple on factors including geographic area, system importance, customer count, and cost. FPL's DERM and DCS provide details on specific engineering information about the design and construction of its distribution and transmission systems. FPL revises its DERM and DCS as required to ensure compliance with all applicable rules and regulations. FPL's plan contains its Design Guidelines and Quick Reference Guide. This Guide contains information for determining pole class, type, and desired span lengths for overhead construction.

Facilities Affected, Including Specifications and Standards

FPL lists feeder and lateral projects in all of its service areas. In 2019, FPL will continue to apply EWL to 312 feeders. FPL reported that as current hardening projects are multi-year projects, some projects are carryovers from prior years. In addition to hardening feeders, FPL plans to complete the conversion of 152 overhead laterals to underground. In 2020 and 2021, FPL will target 260-325 feeders for hardening projects and 250-500 overhead laterals for underground projects. The projects will be spread throughout FPL's service territory.

Areas of Infrastructure Improvements

FPL reported that all new feeder hardening projects are considered wind zone projects. FPL no longer tracks the different types of projects, such as 01 switches, highway crossings, or geographic feeder projects, since FPL is planning to harden all feeders by 2024. However, the methods used to achieve EWL for each feeder will be different. The methods that FPL will continue to utilize are:

- Storm Guying: installing a guy in each direction perpendicular to the line.
- Equipment Relocation: moving equipment on a pole to a near by stronger pole.
- Intermediate Pole: installing a single pole when long span lengths are present, which reduces the span length and increases the wind rating of both adjacent poles.
- Upgrading Pole Class: replacing the existing pole with a higher class pole to increase the pole's wind rating.
- Underground Facilities: utilized if there are significant barriers to building overhead or if it is a more cost-effective option for a specific application.

In addition to hardening feeders, FPL began an underground pilot program to convert overhead lateral to underground. FPL will use two design options for the underground project, the North American and European designs. The North American design will be utilized when the lateral is in the front lot and the European design will be utilized when the lateral is in the rear lot. FPL explained that while it prefers and will attempt to relocate existing facilities from the rear to the front of the customer's premises, there would be instances where that option will not be available. As part of the conversion process, FPL will be installing meter base adaptors, which provide a means to receive underground service to the customers by utilizing the existing meter and meter enclosure.

Joint-Use Facilities

FPL's joint-use pole agreements require pole owners, at their own expense, to maintain poles in a safe and serviceable condition. If a pole is identified as unstable or on the verge of failing, then the pole owner has the financial responsibility for the pole replacement regardless of who performs the pole replacement. In its March 1, 2019, status report on storm hardening activities, FPL noted that approximately 20 percent of its jointly used poles are audited annually through its joint-use surveys. Additionally, FPL-owned joint-use poles are inspected through FPL's pole

inspection program.¹¹ As of year-end 2017, FPL owned approximately 1.2 million distribution poles and was attached to approximately 224,000 non-electric utility distribution poles.

Utility Cost/Benefit Estimates

FPL's updated plan includes estimates of costs to be incurred in connection with its updated plan for 2019 through 2021. The estimates are based upon current work methods, products, and equipment and assume the necessary resources will be available to execute the plan. However, the estimates do not include the incremental costs associated with implementing EWL hardening criteria for the design and construction of new pole lines and major planned work, including pole line extensions and relocations and certain pole replacements. FPL indicated the incremental costs are not specifically tracked. FPL spent a total of \$600,800,000 on its wooden pole inspections and Ten Initiatives for 2016-2018. In 2019-2021, FPL estimates it will spend approximately \$2,270,000,000 for its complete storm hardening plan. Part of the increase is attributed to FPL's underground lateral pilot project. FPL expects 72 percent of its system-wide feeder network will be hardened or underground by year-end 2021 with the execution of its 2019-2021 plan.

FPL claims that the hardening of feeders to EWL has provided significant benefits to its customers and FPL expects the benefits to be recognized in the future. Because the lateral undergrounding project has only recently been initiated, there are no historical results or analyses to quantify the benefits. Attachment B shows a comparison of costs associated with implementation of FPL's current and updated wooden pole inspections and Ten Initiatives.

FPL also considers alternatives before implementing storm hardening projects. FPL explained that for feeder projects, each pole on a feeder is evaluated independently, with various alternatives considered for that pole. Within the same feeder, there could be several different hardening alternatives utilized. The alternatives would include the same methods for hardening a feeder as discussed above. FPL explained that the selected alternative would have been determined based on the considerations including sound engineering practices and feasibility, potential to mitigate damage, potential to improve restoration efficiencies and overall cost.

Attachers Cost/Benefit Estimates

FPL shared a draft of its plan with representatives from all of its third-party attaching entities and solicited input and comments. However, only one entity responded with a question concerning base rate impacts. No information was provided by third-party attachers concerning estimates of their respective costs or benefits stemming from FPL's storm hardening plan.

Attachment Standards and Procedures

FPL's updated plan includes Attachment Standards and Procedures addressing safety, reliability, pole loading capacity, and the storm hardening plan. For example, the procedures specify that "before any additional load is added to an FPL owned pole it is incumbent upon the third-party

¹¹FPSC, Florida Power & Light Company's 2019 Status/Update Report on Storm Hardening/Preparedness and Distribution Reliability, <http://www.floridapsc.com/Files/PDF/Utilities/Electricgas/DistributionReliabilityReports/2018/2018%20Florida%20Power%20and%20Light%20Company%20Distribution%20Reliability%20Report.pdf>, accessed June 6, 2019.

attacher to verify that their additions meet FPL's Design Guidelines and Electric Infrastructure Storm Hardening Plan.”

Conclusion

FPL's updated plan is largely a continuation of its current Commission-approved plan. Based on the review above, FPL's plan has the information required by the Commission's rule and orders and staff recommends it should be approved. Staff notes that approval of FPL's plan does not mean approval for cost recovery.

Issue 2: Should the Commission approve Tampa Electric Company's 2019-2021 storm hardening plan filed in Docket No. 20180145-EI?

Recommendation: Yes. TECO updated plan is largely a continuation of its current Commission-approved plan. A review of TECO's plan shows that it has the information required by the Commission's rule and orders. Staff notes that approval of TECO's plan does not mean approval for cost recovery. TECO should consider the rate impact before taking proactive steps to improve its system to withstand severe weather events. (P. Buys, Knoblauch, Salvador, Breman, Eastmond, Wendel, Eichler)

Staff Analysis: On Attachment C, staff provides a summary of TECO's current Wooden Pole Inspection Program and Ten Initiatives and the proposed changes. In addition, where available, staff has shown the costs associated with the Wooden Pole Inspection Program and Ten Initiatives for 2016-2018 and 2019-2021. Components of TECO's updated plan are summarized below.

Wooden Pole Inspection Program

TECO proposes to continue its eight-year Wooden Pole Inspection Program.¹² The program identifies poles that require repair, reinforcement or replacement. Currently, TECO has completed its fifth year of its second eight-year cycle. TECO will continue to file the results of these inspections in TECO's Annual Electric Utility Distribution Reliability Report. The estimated cost for 2019-2021 related to the eight-year wooden pole inspection is \$3,349,000 as compared to \$3,290,000 spent for 2016-2018.

Ten Initiatives

Initiative One – Three-Year Vegetation Management Cycle for Distribution Circuits

TECO proposes no changes to its previously approved trim cycle.¹³ Currently, both feeder and lateral circuits are trimmed, on average, every four years. TECO reported that its plan allows for the flexibility to change the prioritization of the feeders and laterals depending on growth, reconfiguration or equipment additions to the distribution system. The estimated cost for 2019-2021 for Initiative One is \$38,699,000 as compared to \$26,546,000 spent for 2016-2018.

Initiative Two – Audits of Joint-Use Attachment Agreements

There are no proposed changes to this initiative. TECO will conduct an audit of all pole attachments on an eight-year cycle at a minimum.¹⁴ TECO conducts a comprehensive loading analysis on the joint-use poles to ensure the poles are not overloaded and meet the NESC or TECO's standards, whichever is more stringent. Once TECO receives an application for permission to attach to its poles, an engineering assessment, which includes a comprehensive

¹²Order No. PSC-06-0144-PAA-EI, issued February 27, 2006, in Docket No. 20060078-EI, *In re: Proposal to require investor-owned electric utilities to implement ten-year wood pole inspection program*; and Order No. PSC-07-0078-PAA-EU, issued January 29, 2007, in Docket No. 20060531-EU, *In re: Review of all electric utility Wooden Pole Inspection Programs*.

¹³Order No. PSC-12-0303-PAA-EI, issued June 12, 2012, in Docket No. 20120038-EI, *In re: Petition to modify vegetation management plan by Tampa Electric Company*.

¹⁴Order No. PSC-06-0351-PAA-EI, issued April 25, 2006, in Docket No. 20060198-EI, *In re: Requirement for investor-owned electric utilities to file ongoing storm preparedness plans and implementation cost estimates*.

loading analysis, is performed. The estimated cost for 2019-2021 is \$0, as the requesting third-party attacher pays for the comprehensive pole loading analysis. The costs for 2016-2018 were \$0.

Initiative Three – Six-Year Transmission Structure Inspection Program

There are no proposed changes to the plan for this initiative. TECO’s transmission structure inspection program is a multi-pronged approach with different types of inspections performed on different cycles. Below is a list of the type of inspections:

1. One-year cycle:
 - (i) Ground patrol
 - (ii) Aerial infrared patrol
 - (iii) Substation inspection
2. Eight-year cycle:
 - (i) Above ground inspection
 - (ii) Ground line inspection

The above ground inspection cycle was shifted from a six-year cycle to an eight-year cycle starting in 2015.¹⁵ TECO will continue the one-year cycle inspections of the transmission structures. TECO will also continue to monitor and evaluate the appropriateness of the inspection program to ensure cost-effective storm hardening or reliability opportunities are taken advantage of. The estimated 2019-2021 cost for this initiative is \$1,511,000 as compared to \$1,264,000 spent for 2016-2018.

Initiative Four – Hardening of Existing Transmission Structures

There are no proposed changes to the plan for this initiative. TECO will continue to replace existing wood transmission structures with non-wood structures by utilizing its inspection and maintenance programs. All new transmission line construction projects, system rebuilds and line relocations will be engineered with non-wood structures. TECO will continue to replace insulators that have deteriorated with polymer insulators. TECO reports that 21 percent of its transmission structures remain to be hardened. The costs for 2019-2021 are estimated to be \$13,607,000 as compared to \$37,605,000 spent for 2016-2018.

Initiative Five – Transmission and Distribution Geographic Information System (GIS)

There are no proposed changes to the plan for this initiative. TECO implemented its GIS in 2010. The GIS database contains all facility data for transmission, substation, and distribution systems. The system will help with post-storm damage assessment, forensic analysis, joint-use administration, and the evaluation of construction standards and potential hardening projects. TECO will continue the development of its GIS to improve the functionality and ease of use. There are no incremental costs associated with this initiative.

¹⁵Order No. PSC-14-0684-PAA-EI, issued December 10, 2014, in Docket No. 20140122-EI, *In re: Petition to modify transmission structure inspection cycle, by Tampa Electric Company.*

Initiative Six – Post-Storm Data Collection and Forensic Analysis

There are no proposed changes to the plan for this initiative. TECO hired a third-party to collect the following data in the event a major storm causes damage to its service area.

- Pole/Structure:
 - Type of damage
 - Size and type of pole
 - Likely cause of damage
- Conductor:
 - Type of damage
 - Conductor type and size
 - Likely cause of damage
- Equipment:
 - Type of damage
 - Overhead or underground
 - Size
 - Likely cause of damage
- Hardware:
 - Type of damage
 - Size
 - Likely cause of damage

The third-party personnel will perform the forensic analysis on the data to evaluate the root cause of failure and assess future preventive measures where possible and practical. TECO reported the incremental cost is estimated to be approximately \$113,000 per storm, and will depend on the severity of the storm and the extent of its system damage. The costs for 2019-2021 are estimated to be \$330,000 as compared to \$100,000 spent for 2016-2018.

Initiative Seven – Collection of Detailed Outage Data Differentiating Between the Reliability Performance of Overhead and Underground Systems

There are no proposed changes to the plan for this initiative. TECO's overhead and underground facilities are tracked through its Distribution Outage Database (DOD). The DOD is programmed to distinguish between overhead and underground systems when tracking outage data. TECO has also established a process for collecting post-storm data and performing forensic analysis to ensure the performance of overhead and underground systems are correctly assessed. TECO reported the incremental cost of this initiative is estimated to be \$100,000 per storm.

In response to information requested in the Hurricane Review Docket, TECO outlined the type of comparable data that the Utility plans to provide for overhead and underground facilities.

TECO will collect data on distribution facilities that were impacted by severe storms. The data will include the type of facility damaged, down/broken wires, cause of damage, damage locations, and if the structures were hardened or not. In addition, data will be collected on underground systems, which will include damage to pad mounted equipment. TECO will compare damage to overhead hardened structures to damage of underground facilities in the same geographic areas.

Initiative Eight – Increased Coordination with Local Governments

There are no proposed changes to the plan for this initiative. TECO will continue to participate with local and municipal government agencies within its service area in planning and facilitating joint storm exercises. TECO will also continue to maintain governmental contacts and participate in disaster recovery committees. Participating in the committees will help with collaboration in planning, protection, response, recovery and mitigation efforts during disaster recovery efforts. There is no estimated cost for this initiative.

In response to information requested in the Hurricane Review Docket, TECO discussed its coordination with local governments regarding vegetation management and identification of critical facilities. Annually, TECO communicates with local and state governmental officials on various topics, including vegetation management, joint emergency recovery strategy planning, and resource sharing for clearing power lines from roads. To identify and prioritize critical facilities, TECO works with County Emergency Management officials and other stakeholders throughout the year. Additionally, TECO provided a list of the meetings that took place with local governments, and the topics that were discussed. TECO met with Hillsborough, Pasco, Pinellas, and Polk counties to discuss issues such as prioritization of power restoration, public shelters, and updates for water and wastewater facilities. TECO also met with the City of Temple Terrace and Plant City regarding emergency preparations and push crew options.

Other information that TECO provided was a summary of its staffing practices at local EOCs. The number of staffing varied from two to eight utility staff at each local EOC, depending on several factors such as the magnitude of the event, EOC capacity, amount of damage, EOC operating hours, and available personnel. TECO representatives at the EOCs are responsible for facilitating and responding to critical community issues in support of safety and power restoration.

Initiative Nine – Collaborative Research on Effects of Hurricane Winds and Storm Surge

There are no proposed changes to the plan for this initiative. TECO will continue to participate in the collaborative research effort with the other Florida IOUs, municipals, and cooperatives. The collaborative research is facilitated by PURC at the University of Florida and focuses on: (1) undergrounding of electric utility infrastructure; (2) hurricane wind effects; and (3) public outreach. TECO signed an extension of the memorandum of understanding with PURC in December 2018 for two years, with a provision that the memorandum of understanding will be automatically extended for successive two-year terms. TECO reported that the incremental cost of this initiative would be determined by the research projects. TECO spent \$0 in 2016-2018 for this initiative.

Initiative Ten – Natural Disaster Preparedness and Recovery Program

TECO will continue to refine this initiative. TECO's Emergency Management Plan addresses all hazards, including extreme weather events. The plan is reviewed annually. TECO continues to use the policy labeled Emergency Management and Business Continuity, which delineates the responsibility at employee, company, and community levels. TECO will also continue to participate in internal and external preparedness exercises, collaborating with government emergency management agencies, at local, state, and federal levels. TECO has a full time position to work with other utilities and utility trade association committees to bring new technology and best practices to TECO, and guide the implementation and integration into TECO's emergency response plan. TECO will implement a Damage Assessment System software tool, which will automate input, tracking, reporting and dispatching of restoration work by June 2017.

In response to information requested in the Hurricane Review Docket, TECO provided its contingency plans for roadway congestion, fuel availability, and lodging accommodation issues. In the event of roadway congestion, TECO will obtain information to determine any viable alternative routes, or work with local or State EOCs depending on the location, nature and severity of the congestion. With respect to fuel availability, TECO has agreements with two bulk fuel vendors and a mobile fuel vendor to supply diesel and gasoline fuel when needed. The vendors obtain fuel supplies from Port Tampa Bay, or a main fuel supply facility in Georgia if Port Tampa Bay is unable to supply fuel. If lodging is required for mutual aid crews, TECO maintains a list of hotels that it has verbal agreements with to utilize hotel rooms, which are secured pre-storm for post-storm occupancy. During Hurricane Irma, TECO utilized alternative housing, where cots and mattresses were placed in open gym style facilities, as well as employing camp style facilities.

National Electrical Safety Code Compliance

TECO's 2019-2021 storm hardening plan addresses how the Utility complies with the NESC pursuant to Rule 25-6.0345, F.A.C. TECO indicates that its transmission and distribution facilities are designed to meet NESC construction Grade B. The Grades of construction are specified in the NESC on the basis of the required strengths for safety. The relative order of Grades is B, C, and N, with Grade B being the highest.

Extreme Wind Loading (EWL) Standards

TECO's service territory is divided into two wind regions. The western half is in the 120 mph zone and the eastern half is in the 110 mph zone. For design consistency, the 120 mph wind standard is applied on all 69 kV structures throughout the service area. In addition, a 133 mph wind standard is applied to all 138 kV and 230 kV structures throughout TECO's service area. TECO uses pole loading software, PoleForeman and PLS-CADD, to assure compliance with all NESC loading requirements. PoleForeman is used to design distribution facilities. To design transmission facilities, TECO uses PLS-CADD. TECO complies with NESC Rule 250B instead of NESC Rule 250C EWL to design the installation of its distribution structures. TECO asserts that its pole loading analysis has shown that the Utility's design for poles shorter than 60 feet above ground, which relies on the NESC Rule 250B and construction Grade B, meet or exceed the strength requirements of NESC Rules 261A1c, 261A2e, and 261A3d.

New Construction

TECO utilizes NESC construction Grade B to design new transmission and distribution facilities. To replace its transmission and distribution facilities, TECO also utilizes NESC construction Grade B. All TECO's distribution structures are shorter than 60 feet above ground or water level. TECO's standard for all new distribution poles is chromated copper arsenate treated wood poles. TECO's street light structures are designed to meet NESC Rules 250C, 261A1c, 261A2e, and 261A3d.

Major Planned Work

TECO utilizes NESC construction Grade B loading criteria as the basis for the Company's construction standard for all new construction, major planned work, expansions, rebuilds and relocations on the overhead distribution system.

Critical Infrastructure (CIF)

TECO, in conjunction with local government emergency management, has identified the Utility's critical facilities and associated circuits feeding loads, which are deemed necessary for business continuity and continuity of government. As such, critical community facilities are identified based on being most critical to the overall health of the community. Such facilities include hospitals, emergency shelters, master pumping stations, wastewater plants, major communications facilities, flood control structures, electric and gas utilities, emergency operation centers, as well as police and fire stations. The circuits serving these facilities have the highest restoration priority level. TECO has hardened several circuits, which feed extreme wind criteria data to critical need customers.

Mitigation of Flooding and Storm Surge Damage

TECO has adopted the use of submersible switchgear for critical customers in areas predicted to be impacted by storm surge and in areas prone to flooding as identified by the Federal Emergency Management Agency (FEMA) flood maps. Since 2004, all the primary switchgear has been specified using 100 percent stainless steel enclosures, and since 2008 all pad mounted transformers have been specified using 100 percent stainless steel enclosures to reduce the corrosive effects from salt spray, effluent irrigation spray and to help harden the equipment against the corrosive effects of a saltwater storm surge. TECO has not experienced any storms that have had a significant impact on the underground distribution system. Therefore, no lessons learned have been obtained from actual damage to the Company's underground system.

Facility Placement

TECO proposes to continue placement of all new distribution facilities in the public right-of-way. TECO's policy is that new residential lines must be front lot and truck accessible, while commercial lines may be rear lot but must be truck accessible. In addition, TECO proposes to continue evaluating community and customer requests to relocate overhead facilities from rear lot locations to the front of a customer's property on a case-by-case basis.

Deployment Strategies

TECO's updated plan contains a detailed three-year deployment strategy, which is a continuation of inspection programs, technical design specifications, construction standards and methodologies. TECO indicated that its deployment strategy will enhance system reliability and reduce storm restoration costs.

Facilities Affected, Including Specifications and Standards

For all new transmission, distribution and substation facilities, TECO will implement its enhanced construction standards. TECO reported that the majority of new distribution facilities are placed underground; however, it has approximately 106 miles of new overhead distribution construction, which included reconductoring, line extensions and new circuits/feeders. TECO plans to construct, rerate or rebuild approximately 41 miles of overhead transmission. TECO's maintenance programs will strengthen and upgrade its system, along with its storm hardening initiatives as addressed above. TECO will continue its construction programs piloting the EWL standard for distribution facilities serving CIF, also addressed above.

Areas of Infrastructure Improvements

TECO's updated plan provides a detailed description of areas where electric infrastructure improvements will be made. Below is a list of projects and a brief description:

- **Downtown Network:** The Downtown Network is considered a CIF. TECO will inspect and test eight low-lying vaults per year and if leaks are found, all pertinent gaskets will be replaced.
- **Overhead to Underground Conversion of Interstate Highway Crossings:** A fallen distribution line over an interstate highway can block traffic and the repairs can be lengthy. To help first responders and others during emergencies, all new distribution line interstate crossings will be underground. TECO has converted 16 interstate highway crossings with 22 remaining left to be converted.
- **Submersible Padmount Switchgear:** TECO is using submersible padmount switchgear designed to withstand intrusion from water while remaining in service. TECO's deployment strategy plan is to deploy the submersible gear for all new CIF and to retrofit switchgears serving CIF loads.
- **Hospital Hardening/Resiliency Improvements:** In 2017, TECO initiated its storm hardening/ resiliency improvements for six major hospitals: Tampa General Hospital, St. Joseph Hospital, Memorial Hospital, South Bay Hospital, South Florida Baptist Hospital and Winter Haven's Women's Hospital. The improvements included installing additional switchgears, loop-thru transformers, underground primary cables, and updating the primary feeds.
- **Advanced Distribution Management System (ADMS) and Advances Metering Infrastructure (AMI):** TECO will be implementing a new ADMS and installing new AMI meters throughout its service territory. The ADMS will increase reliability and provide transparency of information. The benefits will include quicker response time to outages resulting in shorter outage times, efficient integration of distributed energy resources and an overall increased electrical system situational awareness. The customers will have more information on their energy usage, which will provide for better control and increased flexibility. In addition, the customers will have access to more convenient services such as on-demand remote connections or disconnection when moving. At this time, the ADMS is not operational. TECO plans to install a total of 270,000 AMI meters at the end of 2019, with 130,000 meters already installed at the end of March 2019. TECO plans to install 340,000 AMI meters in 2020 and 130,000 AMI meters in 2021.

- Tampa General Hospital: Tampa General Hospital is a CIF and is located on Davis Island. TECO will replace three existing switchgears with submersible switchgears and relocate the primary feeds attached to the bridge. The primary feeds will be placed under the channel adjacent to the hospital.
- 69 kV Transmission Circuit No. 66042: This transmission circuit has structures currently located in Tampa Bay. TECO plans to underground the section of transmission line currently located in an open tidal area of Tampa Bay.

Joint-Use Facilities

TECO will conduct joint-use audits. The cost of these audits will be shared by all attaching entities. If an unauthorized third-party attacher is found, the attachment owner will be responsible to pay for a complete engineering study and corrective actions required to meet the NESC standards. TECO performs pole loading stress tests as part of its pole inspection program on any joint-use pole that contains new attachments following a new permitting process. If a pole fails the preliminary stress test, a comprehensive pole loading analysis will be conducted to determine if the pole is overloaded. TECO will continue conducting its pole attachment audits to identify the location of each pole, the facilities attached, and to obtain verification of current joint-use agreements. As of year-end 2017, TECO had a total of 262,910 utility distribution poles and was attached to 13,440 non-electric utility distribution poles.

Utility Cost/Benefit Estimates

TECO's updated plan includes estimates of costs to be incurred in connection with its updated plan for 2019 through 2021. This includes pole replacements, inspections of distribution and transmission facilities, vegetation management, and other projects. TECO spent a total of \$68,885,000 on its Ten Initiatives for 2016-2018. In 2019-2021, TECO estimates it will spend approximately \$155,752,000 on the complete storm hardening plan. Attachment B shows a comparison of costs associated with implementation of TECO's current and updated wooden pole inspections and Ten Initiatives.

TECO indicated that the storm hardening projects are determined based upon potential negative impacts on public safety and health, magnitude and impact on customers likely affected by an outage, environmental impacts and access constraints that may exist following a potential major storm. Once a project has been selected, TECO will perform an internal formal cost analysis. Alternatives are considered for each project. Alternatives could include not undergrounding a whole circuit due to excessive costs and only a portion that went through significant tree canopy.

Attachers Cost/Benefit Estimates

TECO states that its updated plan is expected to provide benefit to all joint-users and have minimal impact on third-party attachers to the Company's system. TECO states that the largest impacts will come from increased pole inspections. TECO did not report any additional third-party attacher cost or benefit information.

Attachment Standards and Procedures

TECO's updated plan includes Attachment Standards and Procedures addressing safety, reliability, and pole loading capacity. The updated plan also addresses engineering standards and procedures for attachments by others to the Utility's transmission and distribution poles that meet or exceed the NESC (ANSI C-2) pursuant to Rule 25-6.034, F.A.C.

Conclusion

TECO's updated plan is largely a continuation of its current Commission-approved plan. Based on the review above, it indicates that TECO's plan has the information required by the Commission's rule and orders and staff recommends it should be approved. Staff notes that approval of TECO's plan does not mean approval for cost recovery.

Issue 3: Should the Commission approve Duke Energy Florida, LLC's 2019-2021 storm hardening plan filed in Docket No. 20180146-EI?

Recommendation: Yes. DEF's updated plan is largely a continuation of its current Commission-approved plan. A review of DEF's plan shows that it has the information required by the Commission's rule and orders. Staff notes that approval of DEF's plan does not mean approval for cost recovery. DEF should consider the rate impact before taking proactive steps to improve its system to withstand severe weather events. (P. Buys, Knoblauch, Salvador, Breman, Eastmond, Wendel, Eichler)

Staff Analysis: On Attachment D, staff provides a summary of DEF's current Wooden Pole Inspection Program and Ten Initiatives and the proposed changes. In addition, where available, staff has shown the costs associated with the Wooden Pole Inspection Programs and Ten Initiatives for 2016-2018 and 2019-2021. Components of DEF's updated plan are summarized below.

Wooden Pole Inspection Program

DEF proposes to continue its eight-year Wooden Pole Inspection Program.¹⁶ The program includes inspection of DEF's transmission, distribution, and joint-use wooden poles. Poles are identified that require repair, reinforcement or replacement. Currently, DEF has completed its fourth year of its second eight-year cycle. DEF will continue to file the results of these inspections in its Annual Electric Utility Distribution Reliability Report. The estimated cost for 2019-2021 related to the eight-year wooden pole inspection is \$12,500,000 as compared to \$12,300,000 spent for 2016-2018.

Ten Initiatives

Initiative One – Three-Year Vegetation Management Cycle for Distribution Circuits

DEF proposes no changes to its previously approved trim cycle. Currently, its feeder and lateral circuits are trimmed, on average, every three years and five years, respectively.¹⁷ DEF reported that annual variations for projected miles to be trimmed are expected as the Utility manages its resources and unit cost factors associated with its vegetation management. The estimated cost for 2019-2021 for Initiative One is \$151,300,000 as compared to \$98,050,000 spent in 2016-2018.

Initiative Two – Audits of Joint-Use Attachment Agreements

There are no proposed changes to the plan for this initiative. DEF will conduct an audit of all pole attachments on an eight-year cycle at a minimum.¹⁸ DEF conducts partial audits of its pole attachments throughout the year. The Utility performs a full Joint-Use Pole Loading Analysis on an eight-year cycle. DEF reported that when it discovers unauthorized attachments on its poles, it follows up with the unauthorized attacher. DEF explained that for each group of poles in a tangent line, the pole that had the most visible loading, line angle, and longest or uneven span

¹⁶Order No. PSC-06-0144-PAA-EI, issued February 27, 2006, in Docket No. 20060078-EI, *In re: Proposal to require investor-owned electric utilities to implement ten-year wood pole inspection program.*

¹⁷Order No. PSC-06-0947-PAA-EI, issued November 13, 2006, in Docket No. 20060198-EI, *In re: Requirement for investor-owner electric utilities to file ongoing storm preparedness plans and implementation cost estimates.*

¹⁸Order No. PSC-06-0351-PAA-EI, issued April 25, 2006, in Docket No. 20060198-EI, *In re: Requirement for investor-owned electric utilities to file ongoing storm preparedness plans and implementation cost estimates.*

length was selected for wind loading analysis. If that pole failed, the next worst-case pole would be analyzed as well. The estimated cost for 2019-2021 is \$1,320,000 as compared to \$1,329,000 spent in 2016-2018.

Initiative Three – Six-Year Transmission Structure Inspection Program

There are no proposed changes to the plan for this initiative. DEF's transmission structure inspection program is on a five-year cycle. DEF inspects transmission circuits, substations, tower structures and poles. DEF performs ground patrol of transmission line structures, associated hardware, and conductors on a routine basis to identify potential problems. DEF reported that the estimated and actual amounts for the transmission inspections include the inspections, emergency response, preventative maintenance, and training. For this initiative, DEF spent \$22,372,000 in 2016-2018. For 2019, DEF provided an estimated cost of \$8,250,000; however, estimated costs for 2020 and 2021 were not available at this level of detail.

Initiative Four – Hardening of Existing Transmission Structures

There is no change in the plan for this initiative. DEF will continue to harden its transmission structures, which includes maintenance pole change-outs, insulator replacements, Department of Transportation/customer relocations, line rebuilds, and system planning additions. DEF notes that the transmission structures are designed to withstand the current NESC requirements and are built utilizing steel or concrete structures. For this initiative, DEF spent \$405,916,000 in 2016-2018. For 2019, DEF provided an estimated cost of \$160,188,000; however, estimated costs for 2020 and 2021 were not available at this level of detail. DEF reported that there was a decrease in governmental (projects requested by the Department of Transportation) and rebuild (projects which will include a complete replacement of transmission line structures, conductors, and all supporting equipment) projects over the last three years.

Initiative Five – Transmission and Distribution Geographic Information System (GIS)

There are no proposed changes to the plan for this initiative. DEF implemented a new GIS, Work Management System, and Asset Management System in 2017, and it is expected that all transmission line assets will be entered into the GIS by the end of 2020. With the utilization of these systems, DEF is able to facilitate compliance tracking, maintenance, planning, and risk management of the major distribution and transmission assets. DEF has created and enhanced key performance indicators that are used to measure and monitor the quality of its GIS and Outage Management System (OMS) data. DEF reports that the consistency, accuracy, and dependability of these systems have led to improvements in the reliability and performance of its system, and it has also contributed to the safety of DEF's field employees. Initiative Five is part of DEF's normal business; therefore, DEF does not track or project the costs associated with this initiative.

Initiative Six – Post-Storm Data Collection and Forensic Analysis

There are no proposed changes to the plan for this initiative. DEF has established forensic teams that collect information regarding poles damaged during storm events and data at failure sites to determine the nature and causes of failure. DEF also collects available performance information on overhead and underground facilities as part of its storm restoration process. In collaboration with University of Florida's PURC, DEF and the other IOUs developed a common format to

collect and track data related to damage discovered during forensic investigations. In addition, weather stations were installed across Florida as part of the collaboration with PURC and the other IOUs. As a result, DEF is now able to correlate experienced outages with nearby wind speeds. This type of information is augmented with on-site forensic data following a major storm event. For this initiative, DEF spent \$327,400 in 2016-2018. For 2019, DEF provided an estimated cost of \$257,500; however, estimating the cost is difficult as it will depend on whether DEF is impacted by a major storm event and the level of damage.

Initiative Seven – Collection of Detailed Outage Data Differentiating Between the Reliability Performance of Overhead and Underground Systems

There are no proposed changes to the plan for this initiative. As referenced above, DEF collects available performance information on overhead and underground facilities as part of its storm restoration process. DEF uses its OMS, its Customer Service System, and GIS to help analyze the percentage of storm caused outages on overhead and underground systems. One hundred percent of the overhead and underground distribution systems are in the GIS, as well as one hundred percent of the underground transmission system. For the overhead transmission system, there is less than one percent of the data remaining to be entered into the GIS, which should be completed by 2020. Initiative Seven is part of DEF's normal business; therefore, DEF does not track or project the costs associated with this initiative.

In response to information requested in the Hurricane Review Docket, DEF outlined the type of comparable data that the Utility plans to provide for overhead and underground facilities. For performance comparisons between hardened versus non-hardened facilities for wind impacts, DEF will conduct Forensic Damage Assessments of both types of facilities immediately following extreme weather events. A database of hardened line segments and comparative non-hardened line segments in the same area will be used, ensuring that both samples assessed experienced similar extreme weather conditions. Since underground facilities are more susceptible to storm surge and water intrusion, and overhead facilities are more susceptible to debris being blown by high winds, another means of comparison is needed to complement the Forensic Damage Assessment., such as reliability trends over a period of time.

Initiative Eight – Increased Coordination with Local Governments

There are no proposed changes to the plan for this initiative. DEF's storm planning and response program is operational year-round with over 40 employees assigned full-time to coordinate with local governments on issues such as emergency planning, vegetation management, undergrounding, and service related issues. DEF will continue to visit the different EOCs to review storm procedures and participate in several different storm drills. DEF also offers electronic outage information that can be imported into county GIS systems, as well as an interactive outage map that provides county-specific power restoration estimates. Initiative Eight is part of DEF's normal business; therefore, DEF does not track or project the costs associated with this initiative.

In response to information requested in the Hurricane Review Docket, DEF discussed its coordination with local governments regarding vegetation management and identification of critical facilities. DEF meets with cities and counties prior to initiating a vegetation management

projects in local areas, and works with local governments regarding the “Right Tree, Right Place” concept. DEF also works with local governments and county EOCs to identify and prioritize infrastructure and feeder circuits that are determined to be critical prior to a storm. DEF identified over 90 meetings with cities and counties in 2018, including topics that were discussed and any pending or follow-up issues, such as addressing hurricane preparedness and response.

DEF has six Government and Community Relations Managers who act as the main point of contact for communities during a storm event. Additionally, for EOCs that are not staffed in person, a manager or representative will provide the needed support by phone. While there are one or more designated DEF employees assigned to each EOC, staffing is scalable and will depend on the individual storm.

Initiative Nine – Collaborative Research on Effects of Hurricane Winds and Storm Surge

There are no proposed changes to the plan for this initiative. DEF will continue to participate in the collaborative research effort with the other Florida IOUs, municipals and cooperatives. The collaborative research is facilitated by PURC at the University of Florida and focuses on: (1) undergrounding of electric utility infrastructure; (2) hurricane wind effects; and (3) public outreach. DEF signed an extension of the memorandum of understanding with PURC in December 2018 for two years, with a provision that the memorandum of understanding will be automatically extended for successive two-year terms. In addition to DEF’s involvement with PURC, DEF actively engages as both participant and presenter with different organizations. These organizations, such as, Southeastern Electric Exchange, Edison Electric Institute, and Institute of Electrical and Electronics Engineers, review and assess hardening alternatives. Initiative Nine is part of DEF’s normal business; therefore, DEF does not track or project the costs associated with this initiative.

Initiative Ten – Natural Disaster Preparedness and Recovery Program

DEF will continue to refine this initiative. DEF’s storm recovery plan is reviewed and updated annually based on lessons learned from the previous storm season and organizational needs. The Distribution System Storm Operational Plan and the Transmission Storm Plan incorporates organizational redesign at DEF, internal feedback, suggestions, and customer survey responses. DEF uses the EWL standards in accordance with the NESC in all planning of transmission upgrades, rebuilds and expansions of existing facilities. Initiative Ten is part of DEF’s normal business; therefore, DEF does not track or project the costs associated with this initiative.

In response to information requested in the Hurricane Review Docket, DEF provided its contingency plans for roadway congestion, fuel availability, and lodging accommodation issues. In the event of roadway congestion, DEF communicates with the Department of Transportation and highway patrol/police escorts to determine which roadways are safe and for assistance in route selection. Plans for fuel and lodging are reviewed and updated annually to assure the resources are available in the event of a storm. These resources are secured prior to landfall, and if needed, DEF coordinates with the State EOC and county EOCs for additional support.

National Electrical Safety Code Compliance

DEF’s 2019-2021 storm hardening plan is based on accepted industry practices designed to meet or exceed the requirements of the NESC. These standards, practices, policies, and procedures are

followed on all new construction, rebuilding, and relocations of existing facilities. DEF utilizes construction Grade B for all its transmission facilities. DEF utilizes construction Grade C to design its distribution facilities at all places except for those locations where construction Grade B is required per NESC Section 242. The Grades of construction are specified in the NESC on the basis of the required strengths for safety. The relative order of Grades is B, C, and N, with Grade B being the highest.

Extreme Wind Loading Standards

All DEF new transmission structures are being designed to comply with the NESC Rule 250C EWL. DEF utilizes the PLS-CADD software to design transmission facilities. DEF uses pole loading software, PoleForeman and PLS-CADD, to assure compliance with all NESC loading requirements. PoleForeman is used to design distribution facilities. To design transmission facilities DEF uses PLS-CADD. Most DEF distribution poles are less than 60 feet in height. DEF states that all its distribution poles shorter than 60 feet meet the loading requirements of NESC Rules 261A1c, 261A2e, or 261A3d for extreme wind.

New Construction

With respect to new construction for transmission poles, DEF's transmission department is building all new construction with either steel or concrete pole material. Virtually all new transmission structures exceed a height of 60 feet above ground and are being designed using the NESC EWL criteria. Construction Grade B is utilized for new construction, replacements, and relocations of transmission facilities. DEF indicated that the NESC does not call for the extreme wind design standard for distribution poles under 60 feet in height. However, as discussed above, all DEF distribution poles shorter than 60 feet meet the loading requirements of NESC Rules 261A1c, 261A2e, or 261A3d for extreme wind, which imply compliance with NESC Rule 250C EWL.

Major Planned Work

DEF utilizes NESC Rule 250C EWL for all major planned transmission work, including expansions, rebuilds, and relocation of existing facilities. DEF's distribution poles meet the loading requirements of NESC Rules 261A1c, 261A2e, or 261A3d for extreme wind, which imply compliance with NESC Rule 250C EWL.

Critical Infrastructure (CIF)

DEF stated in its filing that it has not adopted the extreme wind standard for its distribution level critical infrastructure. However, DEF has also stated that its poles shorter than 60 feet meet the extreme wind loading requirements of NESC Rule 250C EWL when analyzed without conductors, which is what the NESC requires. DEF believes that installing distribution poles constructed to extreme wind standards around facilities such as hospitals and police stations in DEF's service territory would unnecessarily increase costs and restoration time if those poles are knocked down by fallen trees or flying debris such as roofs or signs. DEF states that its current level of construction, around critical facilities and around all other facilities, has performed well during weather events. DEF indicated that there were no storm hardened structures failures during the 2017 and 2018 hurricanes.

Mitigation of Flooding and Storm Surge Damage

In areas where underground equipment may be exposed to minor storm surge and/or shorter-term water intrusion, DEF has used its prioritization model to identify areas where certain mitigation projects will be put into place to test whether flood mitigation techniques and devices can be used to protect equipment such as switchgears, pad mounted transformers and pedestals. In these selected project sites, DEF will test: (1) stainless steel equipment; (2) submersible connectors; raised mounting boxes; (3) cold shrink sealing tubes; and (4) submersible secondary blocks. DEF will continue to adapt its flood and storm surge strategies based on information that it collects, as well as information gathered by other utilities in Florida and throughout the nation. Following Hurricane Michael, multiple pad mounted transformers that had been raised to resist flooding at Alligator Point and St. George Island were pushed off their fiberglass pads by the storm surge. DEF is reviewing its current specifications to determine if other solutions exist.

Facility Placement

DEF reported that it will continue to use front lot construction for all new distribution facilities and all replacement distribution facilities unless specific operational, safety, or other site-specific reasons exist. As specified in DEF's Distribution Engineering Manual, lines outside of a residential development should be located to allow for truck access and reduced tree exposure and trimming on one side of the line when possible.

Deployment Strategies

DEF engaged Davies Consulting to develop a comprehensive prioritization model. DEF uses the model to help identify potential hardening projects, procedures, and strategies. DEF reported that the model has been improved and enhanced to better reflect the changes in its overall storm hardening strategy throughout the years. DEF will continue to adjust its prioritization model as appropriate.

DEF's prioritization model is set up to analyze hardening alternatives as part of its Grid Investment Plan (GIP). The GIP includes:

- Targeted Underground Program (TUG): This activity attempts to eliminate tree and debris related outages by converting heavily vegetated neighborhoods prone to power outages from overhead to underground facilities to decrease outages, reduce momentary interruptions, improve major storm restoration time, and reduce costs.
- Deteriorated Conductor Program: This activity replaces over burdened overhead conductors that are prone to outages due to its brittle composition, small load capacity and poor connection qualities. The small copper conductor will be replaced with aluminum conductors to improve overall reliability.
- Transformer Retrofit Program: This activity retrofits Completely Self-Protected (CSP) transformers. The retrofit activity includes replacing aged or problematic fuse cutouts and adding fuses where they previously did not exist. In addition, the retrofit includes adding external fused cutouts, replacing bare copper wires with covered copper, and adding animal mitigation. DEF indicated that the retrofitting of the CSP transformers in lieu of replacing the transformers is a cost-effective method of reducing outages.

- Self-Optimizing Grid (SOG) Program: This activity will utilize automated switching devices (ASDs) and an automation program to isolate faults and automatically reconfigure the system to reduce the number of customers experiencing an outage. SOG program will provide:
 - Connectivity with automated switching.
 - Capacity on the circuits to allow most circuits to be restored from alternate sources.
 - Automated control with Supervisory Control and Data Acquisition (SCADA)-enable ASDs to isolate faults and reconfigure the system.
 - Segmentation such that distribution circuits have much smaller line segments, which reduces the number of customers affected by outages.
- Live Front Switchgear Replacement Program: This activity will replace aged Live Front Switchgear prior to failure. This will improve overall reliability, result in faster outage restoration and improve safety when working in the switchgears.

The development of the prioritization model begins with DEF's engineers and field personnel providing a list of desired projects. The projects are evaluated based on the following criteria:

- Major storm outage reduction impact
- Community storm impact
- Third-party impact
- Overall reliability
- Financial cost

Facilities Affected, Including Specifications and Standards

All of DEF's facilities are affected by its standards, policies, procedures, practices, and applications discussed in its storm hardening plan. Specific facility types are addressed within the plan (e.g., upgrading all transmission poles to concrete and steel, using front lot construction for all new distribution lines where possible). As a result, all areas of DEF's service territory are impacted by its storm hardening efforts.

Areas of Infrastructure Improvements

All areas of DEF's service territory are impacted by its storm hardening efforts. Below is a list of the proposed 2019-2021 distribution projects:

- Apopka: two overhead (OH) to underground (UG) conversion, one backlot conversion, six transformer retrofit, one SOG, eight deteriorated conductor, one TUG, and two switchgear replacement.
- Buena Vista: one deteriorated conductor, two feeder tie, one SOG, nine switchgear replacement, three transformer retrofit, and one TUG.
- Clearwater: two deteriorated conductor, one SOG, two switchgear replacement, and four TUG.

- Clermont: one feeder tie and one TUG.
- Deland: nine deteriorated conductor, two SOG, one transformer retrofit, and eleven TUG.
- Highlands: two deteriorated conductor, five feeder tie, three transformer retrofit and one SOG.
- Inverness: one backlot conversion, six submersible UG, five switchgear replacement, two transformer retrofit, and twenty-nine TUG.
- Jamestown: four SOG, one deteriorated conductor, eleven switchgear replacement, and one TUG.
- Lake Wales: three deteriorated conductor, one feeder tie, two SOG, four transformer retrofit, and five TUG.
- Longwood: one OH to UG conversion, one SOG, five transformer retrofit, and three TUG.
- Monticello: three deteriorated conductor, two feeder tie, twelve transformers retrofit, one SOG, and forty-three TUG.
- Ocala: two deteriorated conductor, one feeder tie, one SOG, two switchgear replacement, one transformer retrofit, and seven TUG.
- SE Orlando: two OH to UG conversion, one switchgear replacement, seven transformer retrofit, and two deteriorated conductor.
- Seven Springs: two deteriorated conductor, two feeder tie, one switchgear replacement, three TUG.
- St. Petersburg: one feeder tie, one SOG, two transformer retrofit, and one TUG.
- Walsingham: two transformer retrofit and six TUG.
- Winter Garden: one deteriorated conductor, two feeder tie, one SOG, four switchgear replacement and one transformer retrofit.
- Zephyrhills: one deteriorated conductor and two TUG.

DEF's approach in deciding the storm hardening projects is to consider the unique circumstances of each potential location. Below are the variables DEF considers:

- Operating history and environment
- Community impact and customer input
- Exposure to storm surge and flooding
- Equipment condition
- Historical and forecast storm experience
- Potential impacts on third-parties

DEF believes this approach leads to the best solution for each discrete segment of its system. As discussed in Initiative Four, DEF is planning to continue to replace transmission poles with either concrete or steel poles. Most projects are identified during the transmission pole inspections. For the North Florida area, DEF listed 56 new, rebuilds, or relocation projects for its transmission system. The projects are planned over the three-year period 2019 through 2021. For the South Florida area, DEF listed 90 transmission projects for the same time period.

Joint-Use Facilities

In accordance with DEF's Joint-Use Pole Attachment Guidelines, DEF notifies third-parties that transfers are needed when DEF determines that a pole replacement is necessary. DEF conducts joint-use pole attachment audits on a seven-year cycle, with its most recent audit being completed in 2013. Currently, DEF is in the seventh year of its second round of wooden pole inspections and expects to complete them by year-end 2020. As of year-end 2017, DEF owned approximately 1.1 million electric utility distribution poles and was attached to 16,213 non-electric utility distribution poles.

Utility Cost/Benefit Estimates

DEF's updated plan includes estimates of costs to be incurred in connection with its updated plan for 2019 through 2021. This includes pole replacements, inspections of distribution and transmission facilities, vegetation management, and other projects. For 2016 through 2018, DEF spent a total of \$651,405,943 on its storm hardening plan. DEF estimates it will spend approximately \$179,400,000 for 2019. Attachment D shows a comparison of costs associated with implementation of DEF's current and updated Wooden Pole Inspection Program and Ten Initiatives.

As discussed above, DEF's selection process for storm hardening projects is a combination of the following items: (1) major storm outage reduction; (2) community storm impact; (3) third-party impact; and (3) overall reliability and cost. In addition, each storm hardening project type utilities historic reliability information to drive the target selection process, such as the system average interruption frequency index (SAIFI), customers experiencing multiple interruptions (CEMI), and events per miles. DEF's storm hardening projects are reviewed on a case-by-case basis. This provides an added benefit to DEF and its customers to ensure that the right type of storm hardening project is performed for that unique area.

Attachers Cost/Benefit Estimates

DEF provided information to third-parties who would be affected by its storm hardening projects. DEF believes that, in addition to itself, any entity jointly attached to its equipment would benefit from its proposed storm hardening projects. DEF provided available cost/benefit information to the third-party attachers. DEF did not report any responses from third-party attachers regarding cost or benefit information.

Attachment Standards and Procedures

DEF's updated plan includes Joint-Use Pole Attachment Guidelines addressing its joint-use process, construction standards, timelines, financial responsibilities, and key company contacts responsible for completing permit requests. DEF reports that all newly proposed joint-use attachments are field checked and designed using generally accepted engineering practices to assure that the new attachments do not overload the poles.

Conclusion

DEF's updated plan is largely a continuation of its current Commission-approved plan. Based on the review above, DEF's plan has the information required by the Commission's rule and orders and staff recommends it should be approved. Staff notes that approval of DEF's plan does not mean approval for cost recovery.

Issue 4: Should the Commission approve Gulf Power Company's 2019-2021 storm hardening plan filed in Docket No. 20180147-EI?

Recommendation: Yes. Gulf's updated plan is largely a continuation of its current Commission-approved plan. A review of Gulf's plan shows that it has the information required by the Commission's rule and orders. Staff notes that approval of Gulf's plan does not mean approval for cost recovery. Gulf should consider the rate impact before taking proactive steps to improve its system to withstand severe weather events. (P. Buys, Knoblauch, Salvador, Breman, Eastmond, Wendel, Eichler)

Staff Analysis: On Attachment E, staff provides a summary of Gulf's current Wooden Pole Inspection Program and Ten Initiatives and the proposed changes. In addition, where available, staff has shown the costs associated with the Wooden Pole Inspection Program and Ten Initiatives for 2016-2018 and 2019-2021. Components of Gulf's updated plan are summarized below.

Wooden Pole Inspection Program

Gulf proposes to continue its eight-year Wooden Pole Inspection Program.¹⁹ Gulf utilizes an inspection matrix that ensures that all poles receive a visual inspection with sounding, boring, and excavation as appropriate. The program identifies poles that require repair, reinforcement or replacement. Currently, Gulf has completed its fifth year of its second eight-year cycle. Gulf will continue to file the results of these inspections in its Annual Electric Utility Distribution Reliability Report. The estimated cost for 2019-2021 related to the eight-year Wooden Pole Inspection Program is \$8,379,000 as compared to \$6,841,000 spent in 2016-2018.

Ten Initiatives

Initiative One – Three-Year Vegetation Management Cycle for Distribution Circuits

Gulf proposes no changes to its previously approved trim cycle.²⁰ Currently, the feeders are trimmed on a three-year cycle and lateral circuits are trimmed on a four-year cycle. Gulf's vegetation management plan includes an annual inspection and corrective action plan on the remaining two-thirds of the main feeders that are not part of the trim cycle that year. Lateral distribution lines are managed on a reliability-based program to achieve a four-year average cycle. Gulf began a pilot program in 2016 to procure easements from private property owners for select feeders. This allows Gulf to address vegetation management concerns for feeders that serve key customers, experience reliability issues, and have heavy exposure to off right-of-way vegetation. The estimated cost for 2019-2021 for Initiative One is expected to be between \$15,000,000 to \$18,000,000 as compared to \$19,631,000 spent in 2016-2018.

¹⁹Order No. PSC-07-0078-PAA-EU, issued January 29, 2007, in Docket No. 20060531-EU, *In re: Review of all electric utility Wooden Pole Inspection Programs*.

²⁰Order No. PSC-10-0688-PAA-EI, issued November 15, 2010, in Docket No. 20100265-EI, *In re: Review of 2010 Electric Infrastructure Storm Hardening Plan filed pursuant to Rule 25-6.0342, F.A.C., submitted by Gulf Power Company*.

Initiative Two – Audits of Joint-Use Attachment Agreements

There are no proposed changes to the plan for this initiative. Gulf performs field audits of joint-use poles every five years as outlined in contractual agreements with third party attachers. Both utility-owned poles with third party attachers and non-utility poles where Gulf is the third party attacher, are included in the audit. Gulf's last audit of attachments on its distribution system was conducted in 2016. Gulf reported that any dangerous situations identified during the audits are immediately reported to the pole owner. Dangerous conditions may include buckling, splitting or broken poles, or low hanging conductors or cables. Gulf anticipates similar data will be collected and/or verified in the next field audit scheduled for 2021. The estimated cost for 2019-2021 is \$500,000 compared to \$496,000 for 2016-2018.

Initiative Three – Six-Year Transmission Structure Inspection Program

There are no proposed changes to the plan for this initiative. Gulf's transmission line inspections include a ground line treatment inspection, a comprehensive walking inspection, and aerial inspections. The transmission inspections are based on two alternating 12-year cycles, which results in structures being inspected at least once every 6 years. Gulf inspects all of its substations at least once annually. The inspections include visual inspections of all structures. The estimated cost for this initiative for 2019-2021 is \$900,000 as compared to \$769,000 spent in 2016-2018.

Initiative Four – Hardening of Existing Transmission Structures

There are no proposed changes to the plan for this initiative. Gulf will continue the design and construction of its new facilities based on the NESC and EWL. The standard for all new transmission lines used by Gulf is Grade B construction. Gulf's main objective is to design a structure that has a capacity greater than the maximum expected load. Gulf's previous plan was to continue the replacement of wooden H-frame cross-arms with steel cross-arms on transmission facilities. However, based on data and the performance of wooden structures on the transmission system during Hurricane Michael, Gulf plans to begin replacing all wooden structures with concrete or steel in a systematic approach moving forward. Currently, Gulf has 4,817 wooden structures on its transmission system, with 75-250 structures planned to be replaced with concrete or steel in 2019, and 100-400 wood structures replaced in years 2020 and 2021. The cost for 2019-2021 is estimated between \$22,000,000 to \$55,000,000 as compared to \$6,862,000 spent in 2016-2018.

Initiative Five – Transmission and Distribution Geographic Information System (GIS)

There are no proposed changes to the plan for this initiative. Gulf reported that its GIS uses database information that is continuously maintained and updated with transmission, distribution and land information across its service area. Gulf completed its distribution facilities mapping transition to its Distribution GIS in 2009. The transmission system has been completely captured in the Transmission GIS database. The Distribution GIS and Transmission GIS are continually updated with any additions and changes as the associated work orders for maintenance, system improvements, and new business are completed. This ongoing process provides Gulf sufficient information to use with collected forensic data to assess performance of its overhead and underground systems in the event of a major storm. During the period 2019-2021, Gulf will be transitioning its GIS data to systems utilized by NextEra Energy as part of the Company's

acquisition; however, the GIS data will be maintained and updated as needed. There are no incremental costs associated with this initiative.

Initiative Six – Post-Storm Data Collection and Forensic Analysis

There are no proposed changes to the plan for this initiative. Contractors will aid Gulf in the collection of field data after a major storm. In addition, data will be collected on pre-determined projects constructed to EWL criteria and in other designated overhead and underground areas. The information collected by Gulf’s contractors will be utilized to perform a forensic analysis. Gulf reported that this “fact finding” assessment of existing facilities would help in the evaluation of its construction standards going forward.

Initiative Seven – Collection of Detailed Outage Data Differentiating Between the Reliability Performance of Overhead and Underground Systems

There are no proposed changes to the plan for this initiative. Gulf will continue its record keeping and analysis of data associated with overhead and underground outages. Gulf collects data on outages as they occur, for the following situations:

- If underground cables are:
 - Direct buried
 - Direct buried with injection treatment
 - In a conduit
- Whether the pole type is:
 - Concrete
 - Wood
 - Steel

In response to information requested in the Hurricane Review Docket, Gulf outlined the type of comparable data that the Utility plans to provide for overhead and underground facilities. Gulf will continue to collect forensic data on damaged facilities following a major event. The goal of the data collection would be to capture damage based on map tiles that were affected by the storm path. Gulf explained the pre-determined map tiles have been identified that would possibly allow for the collection of valid forensic data on hardened overhead, non-hardened overhead, and underground facilities that experienced similar weather conditions. The data for overhead facilities would include location, circuit information, damage description, break location, and cause of damage. The data collected for underground facilities would include location, identifier, damage description and cause of damage.

Initiative Eight – Increased Coordination with Local Governments

There are no proposed changes to the plan for this initiative. Gulf meets with governmental entities for all major projects, as appropriate, to discuss the scope of the project and coordinate activities involved with project implementation. Gulf maintains year-round contact with city and county officials to ensure cooperation in planning, good communication, and coordination of activities. Gulf assigns employees to county EOCs throughout Northwest Florida to assist during

emergencies. Gulf also conducts a storm drill each year. There is no estimated cost for this initiative.

In response to information requested in the Hurricane Review Docket, Gulf discussed its coordination with local governments regarding vegetation management and identification of critical facilities. Gulf works with city and county representatives to ensure that they are aware of upcoming trimming activities, as some areas require noticing prior to the initiation of trimming. Gulf meets regularly with officials to discuss topics such as storm restoration plans, procedures, and priorities. A sample of Gulf's meetings with several cities and counties was provided, and Gulf will have this information available going forward.

Gulf has 12 employees that are currently available to support county EOCs, depending on the event and needs of the county. Gulf also has personnel that staff the State EOC during activations. Their responsibilities are to obtain, prioritize, and process information from the State EOC, then provide progress reports and restoration status to EOC personnel and management.

Initiative Nine – Collaborative Research on Effects of Hurricane Winds and Storm Surge

There are no proposed changes to the plan for this initiative. Gulf will continue to participate in the collaborative research effort with other Florida IOUs, municipalities, and cooperatives. The collaborative research is facilitated by PURC at the University of Florida and focuses on: (1) undergrounding of electric utility infrastructure; (2) hurricane wind effects; and (3) public outreach. Gulf signed an extension of the memorandum of understanding with PURC in December 2018 for two years, with a provision that the memorandum of understanding will be automatically extended for successive two-year terms. Gulf estimated the cost for 2019-2021 for this initiative would be \$60,000 comparably, the same amount was spent in 2016-2018.

Initiative Ten – Natural Disaster Preparedness and Recovery Program

Gulf will continue to refine this initiative. Gulf uses the strategy described in its Storm Restoration Procedures Manual to respond to any natural disaster that may occur. Annually, Gulf develops and refines its planning and preparations for the possibility of a natural disaster. Gulf's restoration procedures establish a plan of action to be utilized for the operation and restoration of generation, transmission, and distribution facilities during disasters. Gulf continues to provide annual refresher training in the area of storm preparedness for various storm roles at minimal cost. Mock hurricane drills are held annually. There is no estimated cost for this initiative.

In response to information requested in the Hurricane Review Docket, Gulf provided its contingency plans for roadway congestion, fuel availability, and lodging accommodation issues. In the event of roadway congestion, Gulf communicates with local, state, and federal authorities for assistance, as well as coordinating with law enforcement to route crews, resources, and equipment to affected areas. For fuel availability, Gulf has a primary fuel supplier for "blue sky" days, along with two backup suppliers who can also provide fueling equipment and support personnel when needed. For large storm events, contracts are in place with vendor lodging and can be utilized, while for smaller events, Gulf assesses the availability of local hotel accommodations.

National Electrical Safety Code Compliance

Gulf's distribution system complies with all applicable sections of the NESC. Gulf's transmission system complies with all applicable sections of the NESC in effect at the time of initial construction. For its substations, Gulf uses the American Society of Civil Engineers 7 EWL criteria for structural design and selection. Gulf uses construction Grade B on all new transmission lines. The Grades of construction are specified in the NESC on the basis of the required strengths for safety. The relative order of Grades is B, C, and N, with Grade B being the highest.

Extreme Wind Loading (EWL) Standards

As a result of Gulf's system performance during Hurricane Michael and the associated data obtained from forensic analysis, combined with the sharing of FPL's experience with its own storm hardening initiatives, Gulf is proposing to increase its future storm hardening efforts. Initially, in addition to continuing other aspects of its previously approved plans that have proven to be beneficial, Gulf is proposing to invest approximately \$5 to \$12 million in 2019 and an estimated \$14 to \$40 million over the remainder of this plan in projects associated with strengthening existing critical infrastructure facilities to current EWL standards per the NESC. Gulf uses pole loading software, PoleForeman and PLS-CADD, to assure compliance with all NESC loading requirements. PoleForeman is used to design distribution facilities. To design transmission facilities Gulf uses PLS-CADD.

New Construction

Gulf will continue the design and construction of new facilities based on the NESC. In addition, when practical and feasible, consideration will be given to upgrade existing transmission facilities when capital maintenance is performed.

Major Planned Work

Gulf utilizes NESC Rule 250C EWL to design all new and replacement structures on the transmission system, as well as on the distribution system.

Critical Infrastructure (CIF)

Initially, Gulf's process for identifying storm hardening projects was focused on interstate crossings, double circuit pole lines, key infrastructure, and areas that were difficult to repair or would affect a large number of customers. Storm hardening projects then migrated toward focusing on critical infrastructures such as hospitals, storm shelters, emergency operations centers, and others. More recent projects continue to be directed at critical infrastructures and may include more commercial corridors that would provide needed community support. Gulf learned during Hurricane Michael that mitigating damage to critical facilities and minimizing restoration time are crucial to the communities Gulf serves. Gulf proposes all new construction and work performed on critical infrastructure facilities meet the EWL standards.

Mitigation of Flooding and Storm Surge Damage

Gulf has developed overhead and underground storm hardening specifications to minimize damage in areas subject to flooding and storm surges. These specifications will continue to evolve as Gulf continues to seek out best practices and learns from the review of gathered forensic data with respect to storm hardening and storm surge mitigation. All future underground

transmission projects located within the possible storm surge area will be engineered to consider the impact of flooding or storm surge from weather events.

Facility Placement

Gulf proposes to continue placement of all new distribution facilities in the public right-of-way. Gulf reported that it would continue to promote replacement of facilities adjacent to public roads; to use easements, public streets, roads, and highways; to obtain easements for underground facilities; and to use road right-of-ways for conversions of overhead to underground facilities.

Deployment Strategies

Gulf's updated plan contains a detailed three-year deployment strategy, which is a continuation of inspection programs, technical design specifications, construction standards and methodologies.

Facilities Affected, Including Specifications and Standards

Gulf will continue to develop overhead and underground storm hardening specifications for its distribution system. Gulf reported that these specifications would continue to evolve as the Utility seeks out best practices and learns from the review of gathered forensic data. As discussed, Gulf will continue to use the EWL standards for all new construction, major projects and maintenance work. Gulf also will continue to utilize overload and strength factors greater than or equal to those required in the NESC for its transmission system. These design criteria are used on all new installation and completed rebuild projects throughout Gulf's service area.

Gulf performed a risk assessment on all its substations. The risk assessment was completed based on information provided by the National Oceanic and Atmospheric Administration's (NOAA) Sea, Lake and Overland Surges from Hurricanes (SLOSH) model. Gulf will implement flood monitoring on vulnerable substations and review switch house construction standards for possible replacement and strengthening. Gulf's Emergency Response Plan has been established for all substations.

Areas of Infrastructure Improvements

Gulf's updated plan provides a detailed description of the electric infrastructure improvements that will be made. All three regions (Central, Eastern, and Western) of Gulf's service territory will be impacted. Below is a brief description of some projects:

- **Feeder Patrols:** Gulf reports annually, by June 1, all of its critical lines would be inspected up to the first protective device for loose down guys, slack primary and leaning poles. Gulf will correct all problems found during the inspection.
- **Infrared Patrols:** Also, annually, by June 1, Gulf will perform infrared inspections of critical equipment on main line three-phase feeders. The devices with problems, such as feeder switches, capacitors, regulators and automatic over-current protective devices will be repaired.
- **Distribution Automation:** Gulf proposes to continue the installation of additional distribution automation devices to further segment the feeders for outage restoration. The devices will protect its customers by limiting the affect of temporary faults and sustained outages. The devices will be either controlled by Gulf's Distribution

Supervisory Control and Data Acquisition (DSCADA) system and/or function as part of automated restoration schemes.

- Strategic Installation of Automated Overhead Faulted Circuit Indicators (FCI): Gulf explained that FCIs are devices designed to indicate the passage of fault current. An FCI will reduce customer outage time by expediting the location of outage causes, thereby aiding in the isolation of the problem. This will help to restore service to some customers while Gulf is correcting the problem.

Gulf's proposed storm hardening projects for 2019 are listed below. Gulf indicated that each of the projects will be implemented using EWL construction standards as part of the upgrade.

- Valparaiso: one CIF
- Panama City: two CIF
- Panama City Beach: one coastal feeder
- Escambia County: five community feeders

Joint-Use Facilities

Third-party attachment notification protocols are contained within contracts held by Gulf. Before third-parties attach, upgrade, or overlash cables to any Gulf structure, they must comply with a pre-notification process designed to inform Gulf of any proposed actions. The pre-notification involves a field pre-inspection with pole measurements, strength and loading calculations, work order preparation (if necessary), and a post-inspection of all work that is paid for by the requesting third-party attacher. As of year-end 2017, Gulf had a total of 202,706 utility distribution poles and was attached to 62,826 non-electric utility distribution poles. Gulf conducts field audits of its joint-use pole attachments on a five-year cycle, with its last audit completed in 2016. Gulf's next field audit is scheduled for 2021.

Utility Cost/Benefit Estimates

Gulf's updated plan includes estimates of costs to be incurred in connection with its updated plan for 2019 through 2021. These costs include continuation of its transition and implementation of Grade B construction, CIF improvements, feeder patrols, and other projects. For 2016 through 2018, Gulf spent a total of \$78,808,293 on its storm hardening plan. Gulf estimates it will spend approximately \$184,000,000 to \$265,000,000 for 2019 through 2021. Gulf attributes the increase in costs to an increase in storm hardening projects throughout its service territory and the replacement of wooden structures on the transmission system as opposed to just replacing the wooden cross-arms on the transmission system. In addition, as a result of Gulf's acquisition by NextEra Energy, Gulf will begin using FPL's construction standards and best practices for its storm hardening projects, which will increase the costs of the projects. Attachment E shows a comparison of costs associated with implementation of Gulf's current and updated wooden pole inspections and Ten Initiatives.

As a benefit to the Utility and its customers, Gulf's process for identifying storm hardening projects has evolved from focusing on feeders that were hard to repair and had a large number of customers affected to critical infrastructures to feeders that provide commercial community support. Gulf evaluates possible projects based on input and collaboration from employees in

each district as well as determining feeders that contain critical customers, large number of customers, and/or feeders that may have experienced below normal reliability performance.

Attachers Cost/Benefit Estimates

Gulf requested input from third-party attachers in the development of its storm hardening plan. Gulf provided third-party attachers information about its updated plan. No cost and benefit data was received from third-party attachers prior to the published date of Gulf's plan. Gulf reported that it would continue to coordinate with interested third-party attachers to discuss major company and customer construction projects, construction standards, inspection programs, and operational issues.

Attachment Standards and Procedures

Gulf's updated plan includes EWL standards as specified by Figure 250-2(d) of the NESC. Also included in its plan are engineering standards for overhead and underground storm hardening that meet or exceed the NESC pursuant to Rule 25-6.034, F.A.C., and procedures for attachments by others to the Utility's systems.

Conclusion

Gulf's updated plan is largely a continuation of its current Commission-approved plan. Based on the review above, it indicates that Gulf's plan has the information required by the Commission's rule and orders and staff recommends it should be approved. Staff notes that approval of Gulf's plan does not mean approval for cost recovery.

Issue 5: Should the Commission approve Florida Public Utilities Company's 2019-2021 storm hardening plan filed in Docket No. 20180148-EI?

Recommendation: Yes. FPUC's updated plan is largely a continuation of its current Commission-approved plan. A review of FPUC's plan shows that it has the information required by the Commission's rule and orders. Staff notes that approval of FPUC's plan does not mean approval for cost recovery. FPUC should consider the rate impact before taking proactive steps to improve its system to withstand severe weather events. (P. Buys, Knoblauch, Salvador, Breman, Eastmond, Wendel, Eichler)

Staff Analysis: On Attachment F, staff provides a summary of FPUC's current Wooden Pole Inspection Program and Ten Initiatives and the proposed changes. In addition, where available, staff has shown the costs associated with the Wooden Pole Inspection Program and Ten Initiatives for 2016-2018 and 2019-2021. Components of FPUC's updated plan are summarized below.

Wooden Pole Inspection Program

FPUC is continuing its eight-year Wooden Pole Inspection Program.^{21,22} The program identifies poles that require repair, reinforcement or replacement. An outside contractor, Osmose Utilities Services, Inc., performs all wooden pole inspections, including strength and loading tests. Currently, FPUC completed its third year of its second eight-year cycle. FPUC will continue to file the results of these inspections in its Annual Electric Utility Distribution Reliability Report. The estimated cost for 2019-2021 related to the eight-year Wooden Pole Inspection Program is \$1,305,000 as compared to \$2,032,000 spent for 2016-2018.

Ten Initiatives

Initiative One – Three-Year Vegetation Management Cycle for Distribution Circuits

FPUC proposes no changes to its previously approved trim cycle. Currently, its feeder and lateral circuits are trimmed, on average, every three years and six years, respectively.²³ FPUC reported that it has 139.63 miles of feeders and 570.87 miles of laterals. FPUC will continue to communicate with customers and local governments to address vegetation management. The estimated cost for 2019-2021 for Initiative One is \$3,285,000 as compared to \$2,933,000 spent for 2016-2018.

Initiative Two – Audits of Joint-Use Attachment Agreements

There are no proposed changes to the plan for this initiative. FPUC has joint-use agreements with multiple third-party attachers. In 2016, GIS mapping information was used in conducting an audit on all joint-use attachers in order to determine the number of attachments and identify any existing violations. A total of 7,101 telecommunication and 12,568 cable television attachments

²¹Order No. PSC-06-0144-PAA-EI, issued February 27, 2006, in Docket No. 20060078-EI, *In re: Proposal to require investor-owned electric utilities to implement ten-year wood pole inspection program.*

²²Order No. PSC-07-0078-PAA-EU, issued January 29, 2007, in Docket No. 20060531-EU, *In re: Review of all electric utility Wooden Pole Inspection Programs.*

²³Order No. PSC-10-0687-PAA-EI, issued November 15, 2010, in Docket No. 20100264-EI, *In re: Review of 2010 Electric Infrastructure Storm Hardening Plan filed pursuant to Rule 25-6.0342, F.A.C., submitted by Florida Public Utilities Company.*

within the distribution system were identified. Additionally, FPUC was attached to 513 other company poles. FPUC does not perform strength and loading assessments during the joint-use audits as these tests are performed during the wooden pole inspections. The audits include:

- Pole Locations
- Owner of the pole
- City and county location
- Pole type, height, class and treatment
- Pole date manufactured, inspected, and retreated
- Joint-use attacher name and type (telecommunication, cable)
- Violations
- Miscellaneous comments

Data collected from the audit will be analyzed to determine the number of poles found to be overloaded, number of unauthorized attachers and customer outages related to these situations. Instances where a pole failure could occur will be addressed immediately. The estimated cost for 2019-2021 is \$0 as compared to \$83,000 spent for 2016-2018.

Initiative Three – Six-Year Transmission Structure Inspection Program

There are no proposed changes to the plan for this initiative. FPUC's transmission structure inspection program includes a detailed inspection of its 138 kV and 69 kV transmission lines on a six-year cycle and transmission substations on an annual cycle. The program includes inspecting transmission towers and transmission-supporting equipment such as insulators, guying, grounding, conductor splicing, cross-braces, cross-arms, and bolts. The program also includes inspecting all structures, buss work, insulators, grounding, bracing and bolts at the transmission substations. The estimated cost for this initiative for 2019-2021 is \$51,000 as compared to \$55,250 spent for 2016-2018.

Initiative Four – Hardening of Existing Transmission Structures

There are no proposed changes to the plan for this initiative. FPUC's 138 kV transmission system is constructed using concrete and steel structures. In December 2018, the six-year transmission inspection was completed by a contractor, and any identified structure or material failures will be addressed by FPUC. The 69 kV transmission system consists of 217 poles, with 105 of them being concrete. FPUC will continue to replace the wooden poles when it is necessary due to construction requirements or concerns with the integrity of the pole. FPUC reports that by the end of 2021, there will be approximately 40 percent of its transmission structures left to be hardened. The costs for 2019-2021 are estimated to be \$1,900,000 as compared to approximately \$2,573,000 spent in 2016-2018.

Initiative Five – Transmission and Distribution Geographic Information System (GIS)

There are no proposed changes to the plan for this initiative. FPUC implemented its GIS in 2008. The GIS identifies the distribution and transmission facilities on a land base map. This allows

FPUC the ability to record data on all physical assets. The system communicates with FPUC's Customer Information System and functions as an Outage Management System (OMS) that allows collection of data used in determining reliability. FPUC's GIS also collects information regarding joint-use attachments, which provide additional information in conducting the joint-use audits. The costs for 2019-2021 are estimated to be \$120,000 as compared to \$299,000 spent in 2016-2018.

Initiative Six – Post-Storm Data Collection and Forensic Analysis

There are no proposed changes to the plan for this initiative. FPUC has a forensics team to coordinate communications, schedule data collection, and to report the findings. FPUC utilizes a contractor to collect, analyze and report on field data collected, which is entered into FPUC's OMS. The contractor will perform a forensic investigation at damage locations. The criteria for damage locations include, but are not limited to: poles, wires, cross-arms, insulators, transformers, reclosers, capacitor banks, cutouts, and any other equipment that is damaged or has caused a customer outage. Data will also be collected on damaged facilities as defined as broken poles, leaning poles, broken or downed wires, damaged line equipment, and any other incident that has caused a customer outage. The costs spent for 2016-2018 were \$1,629,000 for Initiative Six. The estimated costs for 2019-2021 have not been determined at this time.

Initiative Seven – Collection of Detailed Outage Data Differentiating Between the Reliability Performance of Overhead and Underground Systems

There are no proposed changes to the plan for this initiative. FPUC will continue to collect outage data for overhead and underground systems in order to evaluate the reliability associated with the two systems. The forensic team report form allows for both overhead and underground damage to be entered. The data will be entered separately for each incident.

In response to information requested in the Hurricane Review Docket, FPUC outlined the type of comparable data that the Utility plans to provide for overhead and underground facilities. FPUC will collect data on a sample of its facilities that have had significant impact from wind and will include both storm hardened and non-hardened facilities. Included in the data collected will be where the location is, what type of facilities failed, and what caused the failure. In order to compare overhead and underground performance, FPUC plans to review physical performance, outage rates, and restoration times to make comparisons.

Initiative Eight – Increased Coordination with Local Governments

There are no proposed changes to the plan for this initiative. FPUC reports that it actively participates with local governments in pre-planning and coordinating activities for emergency situations. FPUC will have personnel located at the county EOCs on a 24-hour basis during emergencies, and as needed at the State EOC. FPUC will continue discussing undergrounding and vegetation management issues with local governments. To reduce impacts to overall reliability, FPUC reported that there is continued cooperation between all parties to address vegetation management in a cost-effective approach whenever possible. To ensure customer issues are quickly addressed, FPUC has a dedicated manager who is responsible for maintaining relationships with local and state governments, as well business and community leaders.

In response to information requested in the Hurricane Review Docket, FPUC discussed its coordination with local governments regarding vegetation management and identification of critical facilities. FPUC stated that formal meetings with local governments were not documented; however, FPUC met with two cities and three counties, and provided a list of topics discussed. FPUC works closely with local governments on a routine basis on vegetation management activities, and to maintain a list of critical facilities. During a storm event, FPUC employees are located at a county or city EOC, if requested, and up-to-date contact information with local governments is verified on an annual basis. FPUC staffs five employees in two county and one city EOC, with staffing for several other EOCs on an as-needed basis.

Initiative Nine – Collaborative Research on Effects of Hurricane Winds and Storm Surge

There are no proposed changes to the plan for this initiative. FPUC will continue to participate in the collaborative research effort with the other Florida IOUs, municipals and cooperatives. The collaborative research is facilitated by PURC at the University of Florida and focuses on: (1) undergrounding of electric utility infrastructure; (2) hurricane wind effects; and (3) public outreach. FPUC will continue to support PURC's effort but does not intend to conduct other types of research at this time. The costs for 2019-2021 are estimated to be \$3,000 as compared to \$3,000 spent in 2016-2018.

Initiative Ten – Natural Disaster Preparedness and Recovery Program

FPUC will continue to refine this initiative. FPUC's Disaster Preparedness and Recovery Plan provides guidelines under which the Utility will operate in emergency conditions. In order to ensure orderly and efficient service restoration, the guidelines address the following objectives:

- Safety of employees, contractors, and the general public
- Early damage assessment
- Request additional manpower
- Provide for orderly restoration activities
- Provide all logistical needs for employees and contractors
- Provide ongoing preparation of FPUC's employees, buildings, and equipment
- Provide support and additional resources for FPUC's employees and families

FPUC will utilize the plan to prepare for storms annually. The plan will also ensure that all employees are aware of their responsibilities during the storms.

In response to information requested in the Hurricane Review Docket, FPUC discussed contingency planning for roadway congestion, fuel availability, and lodging accommodation. For roadway congestion, FPUC coordinates with EOCs in impacted areas for assistance from state and local law enforcement. For fuel availability, FPUC has an emergency fueling contract with a supplier that provides fuel during events as needed, as well as emergency fuel tanks on Amelia Island. To ensure lodging accommodations are met, FPUC has lodging plans in place, which are made annually, and are adjusted based on the track and intensity of a storm. A variety of hotels

are utilized to ensure sufficient lodging accommodations are available in the event a storm threatens or impacts FPUC's service areas.

National Electrical Safety Code Compliance

FPUC distribution and transmission facilities have been installed in accordance with NESC requirements in effect at the time of installation. Specifications have been developed that will allow for all future installations to meet NESC EWL standards. FPUC's 2019-2021 storm hardening plan includes a provision that all remaining wood transmission poles will be replaced with concrete poles that will meet or exceed the NESC EWL standards. FPUC uses construction Grade B for its distribution and transmission facilities. The grades of construction are specified in the NESC on the basis of the required strengths for safety. The relative order of Grades is B, C and N, with Grade B being the highest.

Extreme Wind Loading Standards

FPUC incorporates EWL standards as specified in NESC Rule 250C EWL and in Figure 25-2(d) of the 2017 NESC. FPUC will use these standards to design new construction and major planned projects. In some cases FPUC exceeded the EWL standards. For example, FPUC's structures and facilities in Fernandina Beach were designed to withstand wind loading of 130 mph instead of the 120 mph required by the NESC Rule 250C EWL.

New Construction

FPUC designs new construction to comply with the NESC Rule 250C EWL utilizing construction Grade B. FPUC uses PoleForeman software to design its distribution poles to assure compliance with all NESC loading requirements. FPUC's transmission poles are designed by outside engineering companies that use PLS-CADD and PLS-Pole softwares.

Major Planned Work

As addressed above, FPUC designs new construction and major planned work to comply with the NESC Rule 250C EWL utilizing construction Grade B for new construction and replacements of distribution and transmission facilities.

Critical Infrastructure (CIF)

Critical infrastructures such as hospitals, storm shelters, water plants, sewer treatment plants, and distribution facilities along major highways are the primary focus in FPUC's 2019-2021 storm hardening plan. During FPUC's review of its lessons learned from the hurricane restoration activities of the last three years, additional critical loads locations were identified. The distribution lines serving those locations were added to FPUC's storm hardening project list. In addition, FPUC is replacing fused cutouts on those critical infrastructure distribution lines with new technology trip savers that reclose after faults, improving reliability.

Mitigation of Flooding and Storm Surge Damage

FPUC provides electric service to more than 28,000 customers in two non-contiguous service territories: the Northeast Division and the Northwest Division. FPUC's transmission facilities are located only in the Northeast Division. The transmission lines are constructed near and across coastal waterways. Foundations and castings were used to stabilize the structures due to the soil conditions. Overhead distribution lines are located in both divisions and are subject to storm surges and flooding. If needed, additional supporting mechanisms, such as storm guys or pole

bracing, will be installed. Reclosers, capacitors, and regulators that require electronic controls will be mounted above the maximum surge or flood levels. FPUC's underground distribution lines that are subject to storm surges and flooding are mainly located in the Northeast Division. When selecting underground projects, FPUC always considers the terrain characteristics, especially where nearby trees are located. FPUC underground projects have not experienced any flooding issues during the recent hurricanes.

Facility Placement

FPUC's facilities are located in areas that are easily accessible. The facilities will be placed along public right-of-ways or located on private easements that are readily accessible from public streets. FPUC reports that these requirements are necessary to efficiently and safely perform installation and maintenance on the facilities. FPUC notes that facilities placed along rear lot lines will only be constructed as a "last resort."

Deployment Strategies

FPUC's plan contains its deployment of its storm hardening strategy that will have an impact on future storm restoration activities.

Facilities Affected, Including Specifications and Standards

The significant areas of implementation from the deployment of FPUC's storm hardening strategy are:

- Wooden poles will be inspected at least every eight years.
- Vegetation management activities will ensure that feeders are trimmed every three years and laterals are trimmed every six years.
- Joint-use audits will be conducted every five years to identify pole loading issues.
- Detailed climbing inspections on all transmission facilities will be conducted every six years.
- FPUC will continue to replace wood transmission structures with concrete.
- FPUC will continue to rebuild its CIF to EWL.
- FPUC will use techniques to mitigate damage from storm surges and floods.
- FPUC will continue to place facilities on public right-of-ways.

Areas of Infrastructure Improvements

Most of the items listed above will affect all areas of FPUC's service territory. However, the transmission inspection and replacement of transmission structures will only affect the Northeast Division. The Northwest Division does not have any transmission facilities. The rebuilding of CIF to EWL will equally benefit both divisions. Below is a list of FPUC's proposed projects for 2019 through 2021.

- NW Division, Kelson Ave, 2019: Health facilities and wastewater lift stations.
- NW Division, Wastewater Plant, 2019: Critical wastewater treatment plant in Marianna.

- NE Division, South Fletcher Phase 2, 2019: Distribution line on Amelia Island along a highly populated area immediately adjacent to the Atlantic Ocean that experiences salt spray which causes corrosion on line hardware.
- NE Division, 69 kV Replacement Poles, 2019: Wood to concrete pole replacement.
- NW Division, Industrial Park Backup Feed, 2020: Backup feed to critical loads including new school (storm shelter), airport, Health department and fire station in Marianna.
- NW Division, Cottondale, 2020: Service critical loads including police station, city offices, high school and fire station.
- NE Division, 69 kV Replacement Poles, 2020: Wood to concrete pole replacement.
- NW Division, Hospital, 2021: Backup feeder for Jackson Hospital in Marianna.
- NE Division, Baptist Hospital, 2021: Storm hardened backup feeder to Baptist hospital in Fernandina Beach.
- NE Division, 69 kV Replacement Poles, 2020: Wood to concrete pole replacement.

Joint-Use Facilities

FPUC's joint-use pole procedures follow processes found in the language of current contracts FPUC has with joint-use entities. When a non-electric utility pole is determined to be dangerous to public safety, FPUC replaces the pole. After completion of the work, FPUC informs the non-electric utility that the pole was replaced and the circumstances that necessitated the replacement. If a non-electric utility company is found to not be performing inspections of its company-owned poles, FPUC has the option to perform the inspection in addition to the eight-year pole inspection cycle. If a pole is then identified as needing replacement, FPUC notifies the non-electric utility company of the need to replace the pole or FPUC performs the replacement of the pole. As of year-end 2017, FPUC had a total of 26,548 utility distribution poles and was attached to 513 non-electric utility distribution poles. FPUC completed the joint-use pole attachment audit during the last quarter of 2016. FPUC's next joint-use audit is scheduled to take place in 2021.

Utility Cost/Benefit Estimates

FPUC's updated plan includes estimates of costs to be incurred in connection with its updated plan for 2019 through 2021. This includes pole replacements, inspections of distribution and transmission facilities, vegetation management, and other projects. For 2016 through 2018, FPUC spent a total of \$14,529,663 on its storm hardening plan. FPUC estimates it will spend \$9,328,657 for 2019 through 2021. FPUC did not estimate an amount for its forensic data collection as it is dependent on the storm damage. In addition, there are no third-party joint audits scheduled for 2019, 2020, and 2021. Attachment F shows a comparison of cost associated with implementation of FPUC's current and updated Wooden Pole Inspection Program and Ten Initiatives.

One benefit to FPUC and its customers is the critical factors that are included in the analysis to identify storm hardening projects. FPUC will consider whether the facilities provide electrical service to critical customers and to areas that historically have the highest number of customer outages. In addition, FPUC considers whether the facilities provide electrical service to areas that are physically located near the ocean or can be impacted by floodwaters. Facilities that provide

service to businesses that affect the overall economy (such as grocery stores and gas stations) and are inaccessible or have heavy vegetation are also considered. FPUC weighs the options for certain storm hardening projects on a case-by-case basis. The alternatives considered include factors such as cost, storm damage that could happen, restoration efforts, and location of the projects.

Attachers Cost/Benefit Estimates

Other than ongoing dialogue and negotiation on language in the joint-use agreements, no specific costs or benefits to third-party attachers were reported by FPUC.

Attachment Standards and Procedures

FPUC's updated plan includes the current Joint-Use Attachment Specifications addressing safety, reliability, and pole loading capacity. The current contracts with third-party attachers continue to govern attachment standards and procedures. If additional specifications are developed, third-party attachers will have the ability to provide input on new specifications.

Conclusion

FPUC's updated plan is largely a continuation of its current Commission-approved plan. Based on the review above, FPUC's plan has the information required by the Commission's rule and orders and staff recommends it should be approved. Staff notes that approval of FPUC's plan does not mean approval for cost recovery.

Issue 6: Should these dockets be closed?

Recommendation: Yes. At the conclusion of the protest period, if no protest is filed these dockets should be closed upon the issuance of the consummating orders. Separate orders will be issued for each docket to reflect the Commission's vote. For each such order, if no person whose substantial interests are affected by the proposed agency action files a protest within 21 days of the issuance of the respective docket's order, that docket should be closed upon issuance of a separate consummating order. A protest by an affected person in a docket will not preclude the non-protested dockets from closing. (Trierweiler)

Staff Analysis: At the conclusion of the protest period, if no protest is filed these dockets should be closed upon the issuance of the consummating orders. Separate orders will be issued for each docket to reflect the Commission's vote. For each such order, if no person whose substantial interests are affected by the proposed agency action files a protest within 21 days of the issuance of the respective docket's order, that docket should be closed upon issuance of a separate consummating order. A protest by an affected person in a docket will not preclude the non-protested dockets from closing.

Storm Hardening Requirements: Wooden Pole Inspection Program & Ten Initiatives

Eight-Year Wooden Pole Inspection Program
1. Implement an eight-year wooden pole inspection cycle by Order Nos. PSC-06-0144-PAA-EI and PSC-07-0078-PAA-EU.
2. File an annual report with the Commission.
3. Provide cost estimates.

Initiative 1 – A Three-Year Vegetation Management Cycle for Distribution Circuits
1. Three-year tree trim cycle for primary feeders (minimum).
2. Three-year cycle for laterals as well, if not cost-prohibitive.
3. Provide cost estimate.

Initiative 2 – Audit of Joint-Use Attachment Agreements
1. (a) Each investor-owned electric utility shall develop a plan for auditing joint-use agreements that includes pole strength assessments.
(b) These audits shall include both poles owned by the electric utility poles owned by other utilities to which the electric utility has attached its electrical equipment.
2. The location of each pole, the type and ownership of the facilities attached, and the age of the pole and the attachments to it should be identified.
3. Each investor-owned utility shall verify that such attachments have been made pursuant to a current joint-use agreement.
4. Stress calculations shall be made to ensure that each joint-use pole is not overloaded or approaching overloading for instances not already addressed by Order No. PSC-06-0144-PAA-EI.
5. Provide compliance cost estimate and cost estimate for alternative action, if any.

Initiative 3 – Six-Year Transmission Inspection Program
1. Develop a plan to fully inspect all transmission towers and other transmission supporting equipment (such as insulators, guying, grounding, splices, cross-braces, bolts, etc.).
2. Develop a plan to fully inspect all substations (including relay, capacitor, and switching stations).
3. Provide compliance cost estimate and cost estimate for alternative actions, if any.

Initiative 4 – Hardening of Existing Transmission Structures
1. Develop a plan to upgrade and replace existing transmission structures. Provide a scope of activity, limiting factors, and criteria for selecting structure to upgrade and replace.
2. Provide a timeline for implementation.
3. Provide compliance cost estimate and cost estimate for alternative actions, if any.

Initiative 5 – Transmission and Distribution Geographic Information System
1. To conduct forensic review.
2. To assess the performance of underground systems relative to overhead systems.
3. To determine whether appropriate maintenance has been performed.
4. To evaluate storm hardening options.
5. Provide a timeline for implementation.
The utilities have the flexibility to propose a methodology that is efficient and cost-effective.

Initiative 6 – Post-Storm Data Collection and Forensic Analysis
1. Develop a program that collects post-storm information for performing forensic analyses.
2. Provide a timeline for implementation.
The utilities have the flexibility to propose a methodology that is efficient and cost-effective.

Initiative 7 – Collection of Detailed Outage Data Differentiating between the Reliability Performance of Overhead and Underground Systems
1. Collect specific storm performance data that differentiates between overhead and underground systems, to determine the percentage of storm-caused outages that occur on overhead and underground systems, and to assess the performance and failure mode of competing technologies, such as direct bury cable versus cable-in-conduit, concrete poles versus wooden poles, location factors such as front-lot versus back-lot, and pad-mounted versus vault.
2. Provide a timeline for implementation.
The utilities have the flexibility to propose a methodology that is efficient and cost-effective.

Initiative 8 – Increased Coordination with Local Governments
1. Each utility should actively work with local communities year-round to identify and address issues of common concern, including the period following a severe storm like a hurricane and also ongoing, multi-hazard infrastructure issues such as flood zones, area prone to wind damage, development trends in land use and coastal development, joint-use of public right-of-way, undergrounding facilities, tree trimming, and long-range planning and coordination.
2. Incremental plan costs.

Initiative 9 – Collaborative Research
1. Must establish a plan that increases collaborative research.
2. Must identify collaborative research objective.
3. Must solicit municipals, cooperatives, educational and research institutions.
4. Must establish a timeline for implementation.
5. Must identify the incremental costs necessary to fund the organization and perform the research.

Initiative 10 – A Natural Disaster Preparedness and Recovery Program
1. Develop a formal Natural Disaster Preparedness and Recovery Plan that outlines the utility’s disaster recovery procedures if the utility does not already have one.

Florida Power and Light Company
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Eight-Year Wooden Pole Inspection Program	
Current Plan	Updated Plan
1. Implement an eight-year wooden pole inspection cycle for distribution poles.	1. No change
2. File the progress of this inspection in the Annual Reliability Report.	2. No change
3. Costs for 2016-2018 were \$164,000,000.	3. Costs for 2019 are estimated to be between \$45,000,000 - \$55,000,000.

Initiative 1 – A Three-Year Vegetation Management Cycle for Distribution Circuits	
Current Plan	Updated Plan
1. Average three-year trim cycle for feeders.	1. No change
2. Average six-year trim cycle for laterals. Targeted trimming is also achieved through its “mid-cycle” program that addresses critical circuits.	2. No change
3. Costs for 2016-2018 were \$189,000,000.	3. Costs for 2019-2021 are estimated to be between \$196,000,000 - \$206,000,000.

Initiative 2 – Audit of Joint-Use Attachment Agreements	
Current Plan	Updated Plan
1. (a) Includes auditing 20% of its joint-use facilities annually.	1. (a) No change
(b) Includes auditing all FPL-owned and third-party poles during the eight-year wooden pole inspection cycle.	(b) No change
2. All required data will be collected during inspections and stored in the attachment information database.	2. No change
3. Verify attachments have been made pursuant to current joint-use agreements through a five-year system wide pole attachment survey.	3. No change
4. Stress calculations will be performed during eight-year wooden pole inspection cycle.	4. No change

Initiative 3 – Six-Year transmission Inspection Program	
Current Plan	Updated Plan
1. Wooden pole inspection activities (PSC-06-0144-PAA-EI, Docket No. 060078-EI). Structures on either annually, six-year cycle or ten-year cycle.	1. No change.
2. Substations are fully inspected quarterly.	2. No change
3. Costs for 2016-2018 were \$112,000,000.	3. Costs for 2019-2021 are estimated to be between \$93,000,000 - \$113,000,000.

Initiative 4 – Hardening of Existing Transmission Structures	
Current Plan	Updated Plan
1. Incremental upgrades during relocations and other maintenance. Upgrade un-guyed single wooden pole structures. Ceramic post line insulator replacements.	1. No change
2. In 2008, FPL enhanced its hardening initiative to include replacement of all wooden transmission structures over the next 25 to 30 years.	2. No change
3. Costs for 2016-2018 were \$136,000,000.	3. Costs for 2019-2021 are estimated to be between \$105,000,000 - \$150,000,000.

Initiative 5 – Transmission and Distribution Geographic Information System	
Current Plan	Updated Plan
1. FPL’s plan includes forensic reviews.	1. No change
2. FPL’s plan includes underground versus overhead.	2. No change
3. Plan includes determination of appropriate maintenance.	3. No change
4. Plan includes evaluation of storm hardening options.	4. No change
5. Currently being implemented.	5. No change

Initiative 6 – Post-Storm Data Collection and Forensic Analysis	
Current Plan	Updated Plan
1. Divide a sample of damaged poles among forensics teams; observations will be made on all damaged samples. Capture information such as location, attachments, and area wind speed.	1. No change
2. Data is dependent upon storm events in FPL’s service area.	2. No change

Initiative 7 – Collection of Detailed Outage Data Differentiating between the Reliability Performance of Overhead and Underground Systems	
Current Plan	Updated Plan
1. FPL’s distribution feeders are hybrids, i.e., they contain both overhead and underground facilities. FPL will utilize laterals as a proxy for assessing overhead versus underground system performance.	1. No change
2. Implementation is ongoing and storm performance results are obtained from forensics and available storm work tickets.	2. No change

Initiative 8 – Increased Coordination with Local Governments	
Current Plan	Updated Plan
1. FPL focuses on storm preparation coordination and communication with External Affairs representatives working with county planners and post-storm communications. In addition, FPL implements ongoing planning with External Affairs representative, special e-mail program, government websites, and Community Outreach Teams.	1. No change

Initiative 9 – Collaborative Research	
Current Plan	Updated Plan
1. Collaborative research efforts, led by PURC, which began in 2007.	1. No change
2. Research vegetation management during storm and non-storm times, wind during storm and non-storm events, hurricane and damage modeling towards further understanding the costs and benefits of undergrounding.	2. No change
3. FPL will solicit participation from other utilities and organizations.	3. No change
4. Implementation is ongoing	4. FPL has entered into a Memorandum of Understanding with the University of Florida’s PURC, which extends research through December 31, 2018.

Initiative 10 – A Natural Disaster Preparedness and Recovery Program	
Current Plan	Updated Plan
1. Disaster Preparedness/Recovery Plan has been developed and filed.	1. Continue to refine.

Tampa Electric Company

Eight-Year Wooden Pole Inspection Program	
Current Plan	Updated Plan
1. Implement an eight-year wooden pole inspection cycle for distribution poles.	1. No change
2. File the progress of this inspection in the Annual Reliability Report.	2. No change
3. Costs for 2016-2018 were \$3,290,000.	3. Costs for 2019-2021 are estimated to be \$3,349,000.

Initiative 1 – A Three-Year Vegetation Management Cycle for Distribution Circuits	
Current Plan	Updated Plan
1. Average four-year trim cycle for feeders.	1. No change
2. Average four-year trim cycle for laterals. Targeted trimming is also achieved through its “mid-cycle” program that addresses critical circuits.	2. No change
3. Costs for 2016-2018 were \$26,546,000.	3. Costs for 2019-2021 are estimated to be \$38,699,000.

Initiative 2 – Audit of Joint-Use Attachment Agreements	
Current Plan	Updated Plan
1. (a) Perform pole strength assessment during eight-year wooden pole inspection cycle.	1. (a) No change
(b) Audit all TECO-owned poles and third-party poles per Joint-Use contract agreements on an eight-year cycle.	(b) No change
2. All required data will be collected during eight-year wooden pole inspection cycle and stored in GIS database.	2. No change
3. Verify attachments have been made pursuant to current joint-use agreements during the eight-year wooden pole inspection cycle.	3. No change
4. Stress calculations will be performed during eight-year wooden pole inspection cycle.	4. No change
5. Costs for 2016-2018 were \$0 due to paying the requesting third-party attacher for the analysis.	5. Costs for 2019-2021 are estimated to be \$0 due to paying the requesting third-party attacher for the analysis.

Initiative 3 – Six-Year transmission Inspection Program	
Current Plan	Updated Plan
1. Wooden pole inspection activities (PSC-06-0144-PAA-EI, Docket No. 060078-EI). Structures on a six-year cycle, all other portions of the system inspected annually.	1. Per Order No. PSC-14-0684-PAA-EI, Docket No. 140122-EI, the inspection cycle was shifted from a six-year cycle to an eight-year cycle starting in 2015.
2. Substations inspected annually.	2. No change
3. Costs for 2016-2018 were \$1,264,000.	3. Costs for 2019-2021 are estimated to be \$1,511,000.

Initiative 4 – Hardening of Existing Transmission Structures	
Current Plan	Updated Plan
1. Incremental phase out of wooden transmission structures during all new construction, relocations, and other maintenance.	1. No change
2. Plan is ongoing with no completion date.	2. No change
3. Costs for 2016-2018 were \$37,605,000.	3. Costs for 2019-2021 are estimated to be \$13,607,000.

Initiative 5 – Transmission and Distribution Geographic Information System	
Current Plan	Updated Plan
1. Forensic reviews on statistical sampled basis.	1. No change
2. Forensic review with respect to types of materials and construction, and location.	2. No change
3. Plan includes determination of appropriate maintenance.	3. No change
4. Access future preventive measures where possible.	4. No change
5. Implementation began in 2010.	5. No change

Initiative 6 – Post-Storm Data Collection and Forensic Analysis	
Current Plan	Updated Plan
1. Hire consultant to perform forensic analyses.	1. No change
2. Implementation is dependent on the severity of the weather event.	2. No change

Initiative 7 – Collection of Detailed Outage Data Differentiating between the Reliability Performance of Overhead and Underground Systems	
Current Plan	Updated Plan
1. Measures are in place should it experience a major storm.	1. No change
2. Implementation will begin when TECO experiences major storm activity.	2. No change

Initiative 8 – Increased Coordination with Local Governments	
Current Plan	Updated Plan
1. TECO’s Plan calls for building on past community involvement by including local government, fire, police and water officials in storm preparation workshops, including local government in local Emergency Operations Centers, increased vegetation management including government and consumer education, undergrounding planning and education, and damage reporting prior, during, and after storms.	1. No change
2. Costs for 2016-2018 were \$0.	2. Costs for 2019-2021 are estimated to be \$0.

Initiative 9 – Collaborative Research	
Current Plan	Updated Plan
1. Collaborative research efforts, led by PURC, which began in 2007.	1. No change
2. Research vegetation management during storm and non-storm times, wind during storm and non-storm events, hurricane and damage modeling towards further understanding the costs and benefits of undergrounding.	2. No change
3. TECO will solicit participation from other utilities and organizations.	3. No change
4. Implementation is ongoing	4. TECO has entered into a Memorandum of Understanding with the University of Florida’s PURC, which extends research through December 31, 2018.
5. Costs for 2016-2018 were \$0.	5. Costs would be determined by the research projects.

Initiative 10 – A Natural Disaster Preparedness and Recovery Program	
Current Plan	Updated Plan
1. Disaster Preparedness/Recovery Plan has been developed and filed.	1. Continue to refine.
2. Costs for 2016-2018 were \$0.	2. Costs for 2019-2021 are estimated to be \$0.

Duke Energy Florida, LLC

Eight-Year Wooden Pole Inspection Program	
Current Plan	Updated Plan
1. Implement an eight-year wooden pole inspection cycle for distribution poles.	1. No change
2. File the progress of this inspection in the Annual Reliability Report.	2. No change
3. Costs for 2016-2018 were \$12,300,000.	3. Costs for 2019-2021 are estimated to be \$12,500,000.

Initiative 1 – A Three-Year Vegetation Management Cycle for Distribution Circuits	
Current Plan	Updated Plan
1. Implement a three-year average trim cycle for feeders with targeted feeder trims based on prioritization.	1. No change
2. Implement an average five-year trim cycle for laterals.	2. No change
3. Costs for 2016-2018 were \$98,050,000.	3. Costs for 2019-2021 are estimated to be \$151,300,000.

Initiative 2 – Audit of Joint-Use Attachment Agreements	
Current Plan	Updated Plan
1. (a) Perform a Comprehensive Loading Analysis and annual partial system audits.	1. (a) No change
(b) Audit all DEF-owned and joint-use poles during eight-year wooden pole inspection cycle.	(b) No change
2. All required data collected on select poles and stored in electronic format.	2. No change
3. Verify attachments have been made pursuant to current joint-use agreements.	3. No change
4. Stress calculations performed on select poles during eight-year wooden pole inspection cycle.	4. No change
5. Cost for 2016-2018 were \$1,329,000.	5. Costs for 2019-2021 are estimated to be \$1,320,000.

Initiative 3 – Six-Year transmission Inspection Program	
Current Plan	Updated Plan
1. Inspection program is multi-pronged approach with inspection cycles of one, five, or eight years depending on the goals or requirements of the individual inspection activity.	1. No change
2. Annual substation inspections.	2. No change
3. Costs for 2016-2018 were \$22,372,000.	3. Costs for 2019 are estimated to be \$8,250,000. Estimates for 2020 and 2021 are not available.

Initiative 4 – Hardening of Existing Transmission Structures	
Current Plan	Updated Plan
1. Incremental upgrades during relocations, replacement of existing wooden transmission pole, and other maintenance.	1. No change
2. Plan completed in 10 or more years starting in 2007.	2. No change
3. Costs for 2016-2018 were \$405,916,000.	3. Costs for 2019 are estimated to be \$160,188,000. Estimates for 2020 and 2021 are not available.

Initiative 5 – Transmission and Distribution Geographic Information System	
Current Plan	Updated Plan
1. Plan includes forensic review.	1. No change
2. Plan includes underground system relative to overhead.	2. No change
3. Plan includes determination of appropriate maintenance.	3. No change
4. Plan includes evaluation of storm hardening options.	4. No change
5. Continue use of G-electric system	5. No change

Initiative 6 – Post-Storm Data Collection and Forensic Analysis	
Current Plan	Updated Plan
1. DEF has forensic teams in place and will collect and analyze samples.	1. No change
2. Plan continues to be implemented as severe weather events occur.	2. No change

Initiative 7 – Collection of Detailed Outage Data Differentiating between the Reliability Performance of Overhead and Underground Systems	
Current Plan	Updated Plan
1. DEF’s Storm Preparedness Plan has been initiated.	1. No change
2. Implement in 2007. Storm performance results are obtained from DEF’s GIS.	2. No change

Initiative 8 – Increased Coordination with Local Governments	
Current Plan	Updated Plan
1. DEF focuses on year-round communication with local governments. In addition, DEF implements meetings to discuss city and county projects.	1. No change

Initiative 9 – Collaborative Research	
Current Plan	Updated Plan
1. Collaborative research efforts, led by PURC, which began in 2007.	1. No change
2. Research vegetation management during storm and non-storm times, wind during storm and non-storm events, hurricane and damage modeling towards further understanding the costs and benefits of undergrounding.	2. No change
3. DEF will solicit participation from other utilities and organizations.	3. No change
4. Implementation is ongoing	4. DEF has entered into a Memorandum of Understanding with the University of Florida’s PURC, which extends research through December 31, 2018.

Initiative 10 – A Natural Disaster Preparedness and Recovery Program	
Current Plan	Updated Plan
Disaster Preparedness/Recovery Plan has been developed and filed.	Continue to refine.

Gulf Power Company

Eight-Year Wooden Pole Inspection Program	
Current Plan	Updated Plan
1. Implement an eight-year wooden pole inspection cycle for distribution poles.	1. No change
2. File the progress of this inspection in the Annual Reliability Report.	2. No change
3. Costs for 2016-2018 were \$6,841,000.	3. Costs for 2019-2021 are estimated to be \$8,379,000.

Initiative 1 – A Three-Year Vegetation Management Cycle for Distribution Circuits	
Current Plan	Updated Plan
1. Implement a three-year trim cycle on all main line feeders.	1. No change
2. Shorten the trim-cycle length on lateral lines to four years and reduce the emphasis on danger tree removal in residential areas.	2. No change
3. Costs for 2016-2018 were \$19,631,000.	3. Costs for 2019-2021 are estimated to be between \$15,000,000 - \$18,000,000.

Initiative 2 – Audit of Joint-Use Attachment Agreements	
Current Plan	Updated Plan
1. (a) Discontinue the pole strength assessment on 5% random sample.	1. (a) No change
(b) Audit all Gulf-owned poles and third-party poles per Joint-Use contract agreements on a five-year cycle.	(b) No change
2. All required data will be collected and stored during the five-year inspection cycle.	2. No change
3. Verify attachments have been made pursuant to current joint-use agreements through a five-year cycle.	3. No change
4. Discontinue the 5% random sample due to low failure rates over the three-year pilot project.	4. No change
5. Cost for 2016-2018 were \$496,000.	5. Costs for 2019-2021 are estimated to be \$500,000.

Initiative 3 – Six-Year transmission Inspection Program	
Current Plan	Updated Plan
1. Wooden pole inspection activities (PSC-06-0144-PAA-EI, Docket No. 060078-EI). All other portions of the system: Gulf does not hold itself to a rigid number of annual inspections. Period of 12 years will show that on average a six-year cycle is achieved.	1. No change
2. Substations inspected at least annually. Structures inside new substations built to withstand wind speed in excess of 150 MPH.	2. No change
3. Costs for 2016-2018 were \$769,000.	3. Costs for 2019-2021 are estimated to be \$900,000.

Initiative 4 – Hardening of Existing Transmission Structures	
Current Plan	Updated Plan
1. Install storm guy H-Frames. Replace wooden cross-arms with steel cross-arms and other activities.	1. Replace all wooden structures, not just wooden cross-arms.
2. Adhere to current design and construction standards using generally accepted engineering practices, in conjunction with the recommended six-year structure inspection program.	2. Adhere to FPL’s construction standards and best practices.
3. Costs for 2016-2018 were \$6,862,000.	3. Costs for 2019-2021 are estimated to be between \$22,000,000 - \$55,000,000.

Initiative 5 – Transmission and Distribution Geographic Information System	
Current Plan	Updated Plan
1. Gulf’s plan includes forensic reviews.	1. No change
2. Gulf’s plan includes underground versus overhead.	2. No change
3. Plan includes determination of appropriate maintenance.	3. No change
4. Plan includes evaluation of storm hardening options.	4. No change
5. Data is currently being captured.	5. No change

Initiative 6 – Post-Storm Data Collection and Forensic Analysis	
Current Plan	Updated Plan
1. Distribution & Transmission: Concurrent with storm restoration, crews of contractors to survey a sample of lines affected by the storm. Inland and coastal areas to be surveyed.	1. No change
2. Costs for 2016-2018 were \$0.	2. Costs for 2019-2021 are estimated to be \$0.

Initiative 7 – Collection of Detailed Outage Data Differentiating between the Reliability Performance of Overhead and Underground Systems	
Current Plan	Updated Plan
1. Record number of overhead and underground customers and calculate SAIDI and SAIFI for each outage. As outages occur, collect data by type of buried cable and type of pole.	1. No change
2. Implementation is ongoing.	2. No change

Initiative 8 – Increased Coordination with Local Governments	
Current Plan	Updated Plan
1. Gulf plan builds on existing programs of years round activities like workshops with community leaders, pre-hurricane planning with participation in all local government hurricane preparedness drills, exercises, information fairs by line clearing specialists, and a standing Emergency Operations Center staffed 24 hours a day.	1. No change
2. Costs for 2016-2018 were \$0.	2. Costs for 2019-2021 were estimated to be \$0.

Initiative 9 – Collaborative Research	
Current Plan	Updated Plan
1. Collaborative research efforts, led by PURC, which began in 2007.	1. No change
2. Research vegetation management during storm and non-storm times, wind during storm and non-storm events hurricane and damage modeling towards further understanding the costs and benefits of undergrounding.	2. No change
3. Gulf will solicit participation from other utilities and organizations.	3. No change
4. Implementation is ongoing	4. Gulf has entered into a Memorandum of Understanding with the University of Florida’s PURC, which extends research through December 31, 2018.
5. Costs for 2016-2018 were \$60,000.	5. Costs for 2019-2021 are estimated to be \$60,000.

Initiative 10 – A Natural Disaster Preparedness and Recovery Program	
Current Plan	Updated Plan
Disaster Preparedness/Recovery Plan has been developed and filed.	Continue to refine.

Florida Public Utilities Company

Eight-Year Wooden Pole Inspection Program	
Current Plan	Updated Plan
1. Implement an eight-year wooden pole inspection cycle for distribution poles.	1. No change
2. File the progress of this inspection in the Annual Reliability Report.	2. No change
3. Costs for 2016-2018 were \$2,032,000.	3. Costs for 2019-2021 are estimated to be \$1,305,000.

Initiative 1 – A Three-Year Vegetation Management Cycle for Distribution Circuits	
Current Plan	Updated Plan
1. All feeders are on a three-year trim cycle.	1. No change
2. Laterals are on a six-year trim cycle.	2. No change
3. Costs for 2016-2018 were \$2,933,000.	3. Costs for 2019-2021 are estimated to be \$3,285,000.

Initiative 2 – Audit of Joint-Use Attachment Agreements	
Current Plan	Updated Plan
1. (a) Perform pole strength assessment during the eight-year wooden pole inspection cycle	1. (a) No change
(b) FPUC conducts a thorough joint-use audit once every five years in addition to the eight-year pole inspection.	(b) No change
2. All required data collected during inspections and stored in a database.	2. No change
3. Verify attachments have been made pursuant to current joint-use agreements during the eight-year wooden pole inspection cycle.	3. No change
4. Stress calculations performed on select poles during eight-year wooden pole inspection cycle.	4. No change
5. Costs for 2016-2018 were \$83,000.	5. Costs for 2019-2021 are estimated to be \$0.

Initiative 3 – Six-Year transmission Inspection Program	
Current Plan	Updated Plan
1. Develop procedures for climbing inspections of Company-owned 69 and 138 kV structures.	1. No change
2. Substations are fully inspected at least once a year.	2. No change
3. Costs for 2016-2018 were \$55,000.	3. Costs for 2019-2021 are estimated to be \$51,000.

Initiative 4 – Hardening of Existing Transmission Structures	
Current Plan	Updated Plan
1. Continue to replace wooden poles on 69 kV lines.	1. No change
2. Plan is ongoing with no completion date.	2. No change
3. Costs for 2016-2018 were \$2,573,000.	3. Costs for 2019-2021 are estimated to be \$1,900,000.

Initiative 5 – Transmission and Distribution Geographic Information System	
Current Plan	Updated Plan
1. FPUC’s plan includes forensic reviews.	1. No change
2. FPUC’s plan includes underground versus overhead.	2. No change
3. Plan includes determination of appropriate maintenance.	3. No change
4. Plan includes evaluation of storm hardening options.	4. No change
5. Currently being implemented.	5. No change
6. Costs for 2016-2018 were \$299,000.	6. Costs for 2016-2018 are estimated to be \$120,000.

Initiative 6 – Post-Storm Data Collection and Forensic Analysis	
Current Plan	Updated Plan
1. FPUC has procedures developed to track all specific hurricane outages, post-storm data collection, and forensic analysis.	1. No change
2. Data is dependent upon storm events in FPUC’s service area.	2. No change

Initiative 7 – Collection of Detailed Outage Data Differentiating between the Reliability Performance of Overhead and Underground Systems	
Current Plan	Updated Plan
1. Collect outage data of overhead and underground facilities to evaluate reliability indices.	1. No change
2. Implementation is ongoing.	2. No change

Initiative 8 – Increased Coordination with Local Governments	
Current Plan	Updated Plan
1. Coordinate with local and county emergency service agencies within its service area. In addition, to provide personnel at county EOC’s, during emergencies.	1. No change
2. Costs for 2016-2018 were \$0.	2. Costs for 2019-2021 are estimated to be \$0.

Initiative 9 – Collaborative Research	
Current Plan	Updated Plan
1. Collaborative research efforts, led by PURC, which began in 2007.	1. No change
2. Research vegetation management during storm and non-storm times, wind during storm and non-storm events, hurricane and damage modeling towards further understanding the costs and benefits of undergrounding.	2. No change
3. FPUC will solicit participation from other utilities and organizations.	3. No change
4. Implementation is ongoing	4. FPUC has entered into a Memorandum of Understanding with the University of Florida’s PURC, which extends research through December 31, 2018.
5. Costs for 2016-2018 were \$3,000.	5. Costs for 2019-2021 are estimated to be \$3,000.

Initiative 10 – A Natural Disaster Preparedness and Recovery Program	
Current Plan	Updated Plan
Disaster Preparedness/Recovery Plan has been developed and filed.	Continue to refine.