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January 18, 2018

VIA: ELECTRONIC FILING

Ms. Carlotta S. Stauffer
Commission Clerk
Florida Public Service Commission
2540 Shumard Oak Boulevard
Tallahassee, Florida 32399-0850

Re: Docket No. 20170215-EU – Review of electric utility hurricane preparedness and restoration actions

Dear Ms. Stauffer:

Attached for filing in the above docket are Tampa Electric Company's Answers to Staff's Second Data Request (Nos.1-11) dated December 18, 2017.

Sincerely,

James D. Beasley

JDB/pp
Attachment

cc: Wesley Taylor (w/attachment)

Underground Facilities

1. For each year, please complete the following tables summarizing the number of miles of transmission and distribution underground facilities by county from 2006 through 2017.

Transmission			
Year			
County	Overhead to Underground	New Construction	Total Miles

Distribution			
Year			
County	Overhead to Underground	New Construction	Total Miles

A. Tampa Electric does not track transmission and distribution underground facilities categorized by overhead to underground conversion and new construction nor does the company track wire installation by county. Tampa Electric, at the end of 2017, has approximately 5,270 circuit miles of underground transmission and distribution. The company did estimate what it believes is a close representation of the number of miles by county of underground wire miles from 2006 through 2017 in the following table.

Estimated Wire Miles of Underground Transmission and Distribution by County

Year	Hillsborough	Pinellas	Polk	Pasco	Total Underground
2006	4,948.58	116.13	672.96	226.09	5,963.76
2007	5,095.75	119.58	692.98	232.82	6,141.13
2008	5,242.93	123.04	712.99	239.54	6,318.50
2009	5,390.11	126.49	733.01	246.26	6,495.87
2010	5,537.28	129.94	753.02	252.99	6,673.24
2011	5,684.46	133.40	773.04	259.71	6,850.61
2012	5,831.64	136.85	793.05	266.44	7,027.98
2013	5,978.82	140.31	813.07	273.16	7,205.35
2014	6,125.99	143.76	833.08	279.89	7,382.72
2015	6,278.80	147.34	853.86	286.87	7,566.87
2016	6,416.84	150.58	872.63	293.17	7,733.23
2017	6,567.52	154.12	893.13	300.06	7,914.82

Forensic Data

2. For Hurricanes Hermine, Matthew, Irma, Maria, and Nate, please provide a complete copy of the utility's post-storm forensic review of damaged infrastructure. If a forensic review was not performed or not documented, please explain why.

A. Tampa Electric initiated a forensic analysis by an independent third-party contractor to determine the performance of the company's system during Hurricane Irma. At the time required for this filing, the forensic analysis is not complete. The company expects the forensic analysis to be completed around February 1, 2018 at which time the company will file a supplement to this discovery response with the forensic analysis.

Tampa Electric did not initiate a forensic analysis for Hurricane Hermine or Matthew as the wind speeds within the company's service area did not achieve Category 1 levels. Tampa Electric's service area was not affected by Hurricane Maria or Nate.

Coordination

3. For Hurricanes Hermine, Matthew, Irma, Maria, and Nate, please provide the name, frequency, and description of non-Emergency Operations Centers related coordination efforts with local governments before, during, and after restoration, including the following.

a. Storm preparation
b. Critical infrastructure
c. Tree trimming, planting or relocation of trees
d. Hardening and underground projects
e. Shared facilities
f. Other

A. The following tables provide the name, frequency and description of non-Emergency Operations Centers related coordination efforts with local governments before, during, and after restoration for Hurricane Hermine Matthew, Irma, Maria and Nate and includes the following:

a. Storm preparation
b. Critical infrastructure
c. Tree trimming, planting or relocation of trees
d. Hardening and underground projects
e. Shared facilities
f. Other

In addition, on an annual basis and prior to the start of hurricane season, representatives from Tampa Electric's Community Relations Department meet with local government and elected officials to provide updates on storm preparedness, vegetation management and storm hardening projects. These activities are listed in Appendix D of annual filing of Tampa Electric's Storm Implementation Plan & Annual Reliability Performance Reports. In addition, Tampa Electric works with local Emergency Operation Centers ("EOC") quarterly or annually to review and prioritize critical facilities for restoration.

Hurricane Hermine

Category	Name	Frequency	Description
Storm Preparation	Storm Updates	Daily and As Needed	Communication with City and Elected Officials regarding storm updates and preparation activities.
Storm Preparation	After Action Discussion	Once	Met with FPSC and EOC Staff after restoration was complete to discuss opportunities for improvements in coordination.
Critical Infrastructure	N/A	N/A	N/A
Tree Trimming	Vegetation Management and Debris	As Needed	Discussion with local governments on debris clearance and tree trimming.
Hardening and underground projects	N/A	N/A	N/A
Shared Facilities	N/A	N/A	N/A
Other	N/A	N/A	N/A

Hurricane Matthew

Category	Name	Frequency	Description
Storm Preparation	Storm Updates	Daily and As Needed	Communication with City and Elected Officials regarding storm updates and preparation activities.
Critical Infrastructure	N/A	N/A	N/A
Tree Trimming	N/A	N/A	N/A
Hardening and underground projects	N/A	N/A	N/A
Shared Facilities	N/A	N/A	N/A
Other	N/A	N/A	N/A

Hurricane Irma

Category	Name	Frequency	Description
Storm Preparation	Storm Updates	Daily and As Needed	Communication with City and Elected Officials regarding storm updates, preparation activities, and storm restoration.
Critical Infrastructure	Storm Updates	Daily and As Needed	Communication with local government and school board officials who operate critical infrastructure or facilities (e.g., lift stations, schools, etc.) regarding storm updates, preparation activities, and storm restoration.
Tree Trimming	Debris Clearance	Pre-Storm	Discussion with Florida Department of Transportation on coordination of roadway debris clearance.
Hardening and underground projects	N/A	N/A	N/A
Shared Facilities	Florida State Fairgrounds ("FSF")	During Storm	Communications with FSF officials regarding upcoming concert which may interfere with Tampa Electric's designated incident base location at the FSF.
Other	N/A	N/A	N/A

Hurricane Maria

Category	Name	Frequency	Description
Storm Preparation	Storm Updates	Daily and As Needed	Communication with City and Elected Officials regarding storm updates and preparation activities.
Critical Infrastructure	N/A	N/A	N/A
Tree Trimming	N/A	N/A	N/A
Hardening and underground projects	N/A	N/A	N/A
Shared Facilities	N/A	N/A	N/A
Other	N/A	N/A	N/A

Hurricane Nate

Category	Name	Frequency	Description
Storm Preparation	N/A	N/A	N/A
Critical Infrastructure	N/A	N/A	N/A
Tree Trimming	N/A	N/A	N/A
Hardening and underground projects	N/A	N/A	N/A
Shared Facilities	N/A	N/A	N/A
Other	N/A	N/A	N/A

4. Please complete the following tables on county and state Emergency Operations Centers staffing for Hurricanes Hermine, Matthew, Irma, Maria, and Nate.

Staffing for County Emergency Operations Centers		
Number of Utility Personnel	**Function**	**Total Man-Hours**

Staffing for State Emergency Operations Center		
Number of Utility Personnel	**Function**	**Total Man-Hours**

A. The following tables contain the Staffing numbers and man-hours in which Tampa Electric provided support to County and City EOC during Hurricanes Hermine, Matthew, Irma, Maria and Nate.

Hurricane Hermine

Staffing for City and County EOCs		
Number of Utility Personnel	**Function**	**Total Man-Hours**
1	EOC-Emergency Management ("EM") Coordinator	19
4	EOC (Emergency Support Function ("ESF") -12) Representative	46

Staffing for State EOC

Number of Utility Personnel	Function	Total Man-Hours
1	State EOC Liaison	60

Hurricane Matthew

Staffing for City and County EOCs

Number of Utility Personnel	Function	Total Man-Hours
5	EOC (ESF-12) Representative	34
1	EOC-EM Coordinator	7

Staffing for State EOC

Number of Utility Personnel	Function	Total Man-Hours
1	State EOC Liaison	48

Hurricane Irma

Staffing for County Emergency Operations Centers

Number of Utility Personnel	Function	Total Man-Hours
4	Community Relations Regional Manager	54
18	EOC (ESF-12) Representative	744
2	EOC-EM Coordinator	270

Staffing for State EOC

Number of Utility Personnel	Function	Total Man-Hours
2	State EOC Liaison	162

Hurricane Maria

No local (City of County) EOCs activated during Hurricane Maria, therefore, no staffing was required. In addition, Tampa Electric's State EOC Liaison was not required to staff the State EOC during this event.

Hurricane Nate

No local (City of County) EOCs activated during Hurricane Maria, therefore, no staffing was required. In addition, Tampa Electric's State EOC Liaison was not required to staff the State EOC during this event.

Solar

5. Please provide the following information for utility interconnections with customer-owned solar generation that did not operate as designed and consistent with the tariff during the extreme weather events that occurred in 2015 through 2017.

a. The number of failures.
b. A description of the cause or causes of such failures.
c. Possible failure remediation and associated cost.
d. Discuss whether the failures contributed to an increase or decrease in the utility's service restoration time and, if possible, provide an estimate of the duration impact.
e. Discuss whether the failures contributed to an increase or decrease in the utility's service restoration costs and, if possible, provide an estimate of the restoration cost impact.

A. a. Tampa Electric is not aware of any failures related to customer-owned solar generation that did not operate as designed and consistent with the tariff during the extreme weather events that occurred in 2015 through 2017.

b. Not applicable.

c. Not applicable.

d. Tampa Electric would not anticipate an increase or decrease in restoration time, from a utility perspective – i.e. the customer is able to receive power, as a result of failures related to customer-owned solar generation.

e. Tampa Electric would not anticipate an increase or decrease in restoration costs as a result of failures related to customer-owned solar.

6. Please provide the following information for utility interconnections with customer-owned solar generation that operated as designed and consistent with the tariff during the extreme weather events that occurred in 2015 through 2017.

a. Discuss whether these interconnections contributed to an increase or decrease in the utility's service restoration time and, if possible, provide an estimate of the duration impact.
b. Discuss whether these interconnections increased or decreased the utility's service restoration costs and, if possible, provide an estimate of the restoration cost impact.

A. a. Tampa Electric did not experience an increase or decrease in restoration time as a result of the interconnection between the company and the customer-owned solar generation. Tampa Electric is not aware of any failures or improper operations of interconnections between the company and customer-owned solar generation during the extreme weather events that occurred in 2015 through 2017.

b. Tampa Electric did not experience an increase or decrease in restoration costs as a result of the interconnection between Tampa Electric and the customer-owned solar generation.

7. Without compromising safety, are there changes to the utility's interconnection with customer-owned solar generation that would enable the customer's facilities to be energized by its solar generation should the utility be unable to provide electric service due to a future storm damaging utility infrastructure?

a. If yes, please provide the following information:
- Please describe the suggested changes to the utility's interconnection.
- If the utility is not pursuing the interconnection changes please explain why.

A. a. Tampa Electric is not aware of any changes necessary to the company interconnection requirements with customer-owned solar that would enable the customer's facilities to be energized by its solar generation during a power outage without compromising safety.

8. Without compromising safety, please describe potential changes to a customer's facilities that the customer can implement to enable the customer's facilities to be energized by its solar generation should the utility be unable to provide electric service due to a future storm event that damages utility infrastructure. Include in your response whether the utility makes it a practice to inform the customer of such options.

A. Currently, the National Electrical Code ("NEC") 690 and the Institute of Electrical and Electronics Engineers ("IEEE") Standard 1547 (Standard for Interconnecting Distributed Resources with Electric Power Systems) prohibits a solar photovoltaic ("PV") system from energizing a de-energized utility. This situation of back feeding onto a de-energized utility system is considered unintentional islanding. To enable the customer, without compromising safety, to use their PV system as standby power system during an outage, they must have a transfer switch with the ability to isolate their electrical system from the utility's electrical system. This transfer switch could be done manually or through some automated standby-system. Because stand-by systems tend to be expensive and complex, the vast majority of PV systems are "utility interactive", meaning if the utility fails, the PV disconnects and shuts down until utility power is restored.

If the customer wanted to keep the PV system operating during a utility outage, it would disconnect from the utility power upon the outage and would typically need some other generating source, often battery storage, to balance the household loads and PV output, to ensure proper voltage and frequency is served to the home's or facility's appliances and equipment. Upon power restoration, if the customer chose to do the transfer manually, the customer would de-energize their entire home or facility and reclose the transfer switch to ensure that their generating source would not be unsynchronized upon transfer back to utility power. If the customer had an automated stand-by system with paralleling capability, the automation gear would parallel the customers generating source with the utility.

Tampa Electric does not make it a common practice to educate every customer that installs a back-up generating system of all of the different methods to use the generating source or to design their electrical system. The company believes these discussions are more appropriate between the customer, the vendor supplying the back-up generating system, the electrical engineer that will design the interconnection and transfer scheme if applicable and the customer's electrician that will install and test the system. Tampa Electric does have many subject matter experts that will

assist customers with explanations, alternatives, concerns and precautions if asked.

In addition, Tampa Electric makes public service announcements regarding generator safety for the operation of home generators during power outages during hurricanes.

9. Without compromising safety, please describe any potential changes to rules or tariffs pertaining to utility interconnections with customer-owned solar generation that would enable the customer's facilities to be energized by its solar generation should the utility be unable to provide electric service due to a future storm event that damages utility infrastructure.

A. Tampa Electric is not aware of any changes to the rules or tariffs pertaining to utility interconnections with customer-owned solar that would enable the customer's facilities to be energized by its solar generation during a power outage without compromising safety.

10. Please provide the following information for utility interconnections with utility-scale solar generation that did not operate as designed during the extreme weather events that occurred in 2015 through 2017.

a. The number of failures.
b. A description of the cause or causes of such failures.
c. Possible failure remediation and associated cost.
d. Discuss whether the failures contributed to an increase or decrease in the utility's service restoration time and, if possible, provide an estimate of the duration impact.
e. Discuss whether the failures contributed to an increase or decrease in the utility's service restoration costs and, if possible, provide an estimate of the restoration cost impact.

A. Tampa Electric's utility scale solar generation facilities, supporting inverters and associated interconnection equipment operated as designed during all the extreme weather events that occurred in 2015 and 2017.

a. Zero.

b. Not applicable.

c. Not applicable.

d. Not applicable.

e. Not applicable.

11. Please provide the following information for utility interconnections with utility-scale solar generation that operated as designed during the extreme weather events that occurred in 2015 through 2017.

a. Discuss whether these interconnections contributed to an increase or decrease in the utility's service restoration time and, if possible, provide an estimate of the duration impact.

b. Discuss whether these interconnections increased or decreased the utility's service restoration costs and, if possible, provide an estimate of the restoration cost impact.

A. a. Tampa Electric's utility-scale solar generation facilities, supporting inverters and associated interconnection equipment operated as designed during all the extreme weather events that occurred in 2015 and 2017. Tampa Electric interconnections with utility-scale solar generation had no impact on the duration of Tampa Electric's outages or the time it took the company to perform restoration efforts.

b. Tampa Electric's utility-scale solar generation facilities, supporting inverters and associated interconnection equipment operated as designed during all the extreme weather events that occurred in 2015 and 2017. Tampa Electric interconnections with utility-scale solar generation had no impact on the cost of Tampa Electric's service restoration costs.