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September 5, 2018

VIA: ELECTRONIC FILING

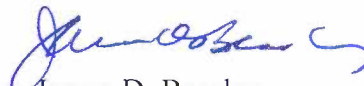
Ms. Carlotta S. Stauffer
Commission Clerk
Florida Public Service Commission
2540 Shumard Oak Boulevard
Tallahassee, FL 32399-0850

Re: Review of 2018 Ten-Year Site Plans
Supplemental Data Request #2 (Nos. 1-9)

Dear Mr. Wooten:

Pursuant to an email from Takira Thompson to Mr. Billy Stiles dated August 9, 2018, attached are Tampa Electric Company's responses to Staff's Second Supplemental Data Request #2 (Nos. 1-9) for supplemental information on the company's generation expansion plans which will be used to supplement Tampa Electric's Company's 2018 Ten-Year Site Plan filed with the Commission on April 1, 2018.

Sincerely,



James D. Beasley

JDB/pp
Attachment

cc: Takira Thompson (w/attachment)
Billy J. Stiles, II (w/o attachment)

**TAMPA ELECTRIC COMPANY
UNDOCKETED: REVIEW OF TYSP'S
2nd SUPPLEMENTAL DATA REQUEST
REQUEST NO. 1
PAGE 1 OF 1
FILED: SEPTEMBER 5, 2018**

1. Please refer to Schedule 1 of Tampa Electric Company's (TECO) 2018-2027 Ten-Year Site Plan (2018 TYSP). Please explain why Big Bend Units 3 and 4 will have their net capabilities limited effective January 2023.
 - A. The combined net capability being limited effective January 2023 for Big Bend Units 3 and 4 coincides with the completion of the Big Bend Modernization project. Although Unit 1 is being modernized and Unit 2 is being retired, the addition of Big Bend CT 5, CT 6, and the Modernization of ST 1 will result in a net increase of generation capacity at the Big Bend site. Due to transmission constraints under certain conditions, the net increase in capacity cannot be considered firm generation until further studies are completed.

**TAMPA ELECTRIC COMPANY
 UNDOCKETED: REVIEW OF TYSP'S
 2nd SUPPLEMENTAL DATA REQUEST
 REQUEST NO. 2
 PAGE 1 OF 2
 FILED: SEPTEMBER 5, 2018**

2. Please refer to page 13 of TECO's 2018 TYSP where a demand side management rebate program offered by TECO called "Energy Star for New Multi-Family Residences" is defined. This program is not mentioned in TECO's 2017 TYSP. Please describe the magnitude of the impact, if any, of TECO's incorporation of the rebate program "Energy Star for New Multi-Family Residences" on TECO's energy demand estimation models and forecasts.
- A. Tampa Electric received approval of the company's new demand side management ("DSM") program, ENERGY STAR for New Multi-Family Residences through the Florida Public Service Commission Order No. PSC-2017-0207-PAA-EI that was issued on May 24, 2017. The projected magnitude of impact from this program is listed below as was provided as an inclusion to the program's petition as Exhibit "E" when it was filed to the Commission for approval on January 10, 2017.

PROGRAM NAME: ENERGY STAR FOR NEW MULTI-FAMILY RESIDENCES

Year	(a) Total Number of Customers	(b) Total Number of Eligible Customers	(c) Annual Number of Program Participants	(d) Cumulative Penetration Level %	(e) Cumulative Number of Program Participants
2017	201,074	3,820	600	15.7%	600
2018	204,894	3,893	600	15.6%	1,200
2019	208,787	3,967	800	17.1%	2,000
2020	212,754	4,042	800	17.8%	2,800
2021	216,797	4,119	800	18.1%	3,600
2022	220,916	4,197	1,000	19.1%	4,600
2023	225,113	4,277	1,000	19.8%	5,600
2024	229,390	4,358	1,000	20.2%	6,600

**TAMPA ELECTRIC COMPANY
 UNDOCKETED: REVIEW OF TYSP'S
 2nd SUPPLEMENTAL DATA REQUEST
 REQUEST NO. 2
 PAGE 2 OF 2
 FILED: SEPTEMBER 5, 2018**

PROGRAM NAME: ENERGY STAR FOR NEW MULTI-FAMILY RESIDENCES

AT THE METER						
Year	Per Customer kWh Reduction	Per Customer Winter kW Reduction	Per Customer Summer kW Reduction	Total Annual GWh Reduction	Total Annual Winter MW Reduction	Total Annual Summer MW Reduction
2017	1,239	0.242	0.361	0.743	0.145	0.217
2018	1,239	0.242	0.361	1.487	0.290	0.433
2019	1,239	0.242	0.361	2.478	0.484	0.722
2020	1,239	0.242	0.361	3.469	0.678	1.011
2021	1,239	0.242	0.361	4.460	0.871	1.300
2022	1,239	0.242	0.361	5.699	1.113	1.661
2023	1,239	0.242	0.361	6.938	1.355	2.022
2024	1,239	0.242	0.361	8.177	1.597	2.383

PROGRAM NAME: ENERGY STAR FOR NEW MULTI-FAMILY RESIDENCES

AT THE GENERATOR						
Year	Per Customer kWh Reduction	Per Customer Winter kW Reduction	Per Customer Summer kW Reduction	Total Annual GWh Reduction	Total Annual Winter MW Reduction	Total Annual Summer MW Reduction
2017	1,313	0.258	0.385	0.788	0.155	0.231
2018	1,313	0.258	0.385	1.576	0.310	0.462
2019	1,313	0.258	0.385	2.627	0.516	0.770
2020	1,313	0.258	0.385	3.677	0.722	1.078
2021	1,313	0.258	0.385	4.728	0.929	1.385
2022	1,313	0.258	0.385	6.041	1.187	1.770
2023	1,313	0.258	0.385	7.355	1.445	2.155
2024	1,313	0.258	0.385	8.668	1.703	2.540

**TAMPA ELECTRIC COMPANY
 UNDOCKETED: REVIEW OF TYSP'S
 2nd SUPPLEMENTAL DATA REQUEST
 REQUEST NO. 3
 PAGE 1 OF 1
 FILED: SEPTEMBER 5, 2018**

3. Please refer to page 23 of TECO's 2018 TYSP. Please explain, with specificity, how TECO develops its high and low fuel price projections.

A. Natural Gas: The high-price forecast for natural gas increases the natural gas commodity by 42% based on the highest monthly volatility in the NYMEX natural gas futures forward strip in 2018. The low-price forecast for natural gas decreases the commodity by 31% based on the average monthly volatility in the NYMEX natural gas futures forward strip in 2018.

Coal: The high-price forecast for each coal type is derived by multiplying the base commodity price by the percentage of the highest annual cost above the average annual cost for the years 2010 through 2014. The low-price forecast for each coal type is derived by multiplying the base commodity price by the percentage of the lowest annual cost below the average annual cost for the years 2010 through 2014. The percentages for the high-price and the low-price coal forecast by coal type are shown below.

Type	High % Increase	Low % Decrease
Illinois Basin Standard Low	9%	-16%
Illinois Basin Standard	11%	-17%
Foreign Low Sulfur	27%	-19%
Northern Appalachian	17%	-25%
Mid-Sulfur Petroleum Coke	13%	-23%
High-Sulfur Petroleum Coke	16%	-19%

**TAMPA ELECTRIC COMPANY
UNDOCKETED: REVIEW OF TYSP'S
2nd SUPPLEMENTAL DATA REQUEST
REQUEST NO. 4
PAGE 1 OF 1
FILED: SEPTEMBER 5, 2018**

4. Please refer to Schedules 7.1 and 7.2 of TECO's 2018 TYSP. Please identify the change(s) in TECO's generation fleet that accounts for the yearly increase/decrease of installed capacity, if any, for each year included in the period covered in the schedules.
 - A. The changes to Tampa Electric's generation fleet are identified in Schedule 1 and Schedule 8.1 (Revised) of TECO's 2018 TYSP. The capacity increases are a result of the installation of the 10 new solar sites identified in Schedule 8.1 (Revised) as well as Big Bend CT 5, 6, Future CT 1, 2 and the modernization of Big Bend ST 1. The capacity decreases are a result of Big Bend 2 retiring in 2021, as well as Big Bend 1 being unavailable during the period it is being modernized, which is approximately from February 2021 through December 2022. There is also a decrease in capacity in 2023 due to the combined net capability being limited effective January 2023 on Big Bend Units 3 and 4 that coincides with Big Bend ST 1 returning to service.

**TAMPA ELECTRIC COMPANY
 UNDOCKETED: REVIEW OF TYSP'S
 2nd SUPPLEMENTAL DATA REQUEST
 REQUEST NO. 5
 PAGE 1 OF 1
 FILED: SEPTEMBER 5, 2018**

5. Please refer to both TECO's responses to staff's Supplemental Data Request #1, Excel file titled: *Tampa Electric 2018 TYSP Supp DR Q1 Schedules 1-10.xlsx*, Schedules 2.1-2.3 High and Low, and page 19 of TECO's 2018 TYSP. Please explain how, with specificity, TECO develops its high and low population and number of customers forecasts.
- A. Tampa Electric develops its high and low population forecasts by starting with the base case population growth and increasing the annual growth rates by half a percent to calculate the high population projections. The low population projections are calculated by decreasing the annual growth rates by half a percent. See table below.

	Base Case	%Growth	High Case	%Growth	Change	Low Case	%Growth	Change
2018	1,408,464	2.1%	1,415,360	2.6%	0.5%	1,401,567	1.6%	-0.5%
2019	1,436,883	2.0%	1,450,996	2.5%	0.5%	1,422,840	1.5%	-0.5%
2020	1,465,951	2.0%	1,487,604	2.5%	0.5%	1,444,509	1.5%	-0.5%
2021	1,493,987	1.9%	1,523,492	2.4%	0.5%	1,464,913	1.4%	-0.5%
2022	1,521,576	1.8%	1,559,244	2.3%	0.5%	1,484,640	1.3%	-0.5%
2023	1,548,669	1.8%	1,594,803	2.3%	0.5%	1,503,652	1.3%	-0.5%
2024	1,575,078	1.7%	1,631,173	2.2%	0.5%	1,521,775	1.2%	-0.5%
2025	1,600,735	1.6%	1,667,145	2.1%	0.5%	1,538,955	1.1%	-0.5%
2026	1,625,683	1.6%	1,702,638	2.1%	0.5%	1,555,245	1.1%	-0.5%
2027	1,649,944	1.5%	1,737,687	2.0%	0.5%	1,570,679	1.0%	-0.5%

The high and low customer forecasts were developed following the same methodology used for the base customer forecast. See page 8 of the Ten-Year Site Plan for a detailed description of the methodology. The only difference is the high customer forecast is a function of the high population forecast and the low is a function of the low population forecast.

**TAMPA ELECTRIC COMPANY
UNDOCKETED: REVIEW OF TYSP'S
2nd SUPPLEMENTAL DATA REQUEST
REQUEST NO. 6
PAGE 1 OF 1
FILED: SEPTEMBER 5, 2018**

- 6.** Please refer to TECO's response to question 21 of staff's Supplemental Data Request #1. Why was TECO's Residential Load Management program ended during Summer 2016?
 - A.** On May 20, 2015, Tampa Electric requested Commission approval of the company's phased final closure of its DSM program, "Prime Time", for all remaining customers who were participants in the program. The company sought to complete a systematic phased final closure of the program, which was previously been found by the Commission to not be cost-effective and which was closed to new business since 2005. The company's phased final closure of the program was necessary in further recognition that, in addition to the program not being cost-effective, the obsolescence of hardware and software necessary to administer the program, the unavailability of replacement parts, the depletion of the company's inventory of replacement units and the corresponding reduction in the reliability and effectiveness of the program made its continuation even for the remaining customers who received this service untenable and the limited benefits to the non-participating customers of its continuation continued to be not justified or reasonable. Tampa Electric received Commission approval due to the reasons above in Commission Order No. PSC-2015-0389-TRF-EG that was issued on September 15, 2015.

**TAMPA ELECTRIC COMPANY
UNDOCKETED: REVIEW OF TYSP'S
2nd SUPPLEMENTAL DATA REQUEST
REQUEST NO. 7
PAGE 1 OF 1
FILED: SEPTEMBER 5, 2018**

7. Please refer to both TECO's response to question 70, page 2 of 2, of staff's Supplemental Data Request #1, and the United States Energy Information Administration's (EIA) Annual Energy Outlook 2018, Natural Gas Supply, Disposition, and Prices table, Reference Case, which can be located at the following web address:
<https://www.eia.gov/outlooks/aeo/data/browser/#/?id=13-EO2018&cases=ref2018&sourcekey=0>. For 2018, TECO has forecasted a natural gas price of \$4.14 per MMBTU (nominal). The EIA's 2018 forecasted price for natural gas at the Henry Hub (spot) is \$3.13 per MMBTU (nominal). While staff understands delivery costs account for a portion of the difference, please discuss other possible factors which may be leading to the difference between TECO's price forecast and the EIA's price forecast.
- A. The production cost model determined that the cost of the natural gas fuel dispatched in 2018 was \$361.5 million. The volume of natural gas consumed was 111,735,000 MMBtu. In addition, the fixed pipeline cost for natural gas is estimated to be \$100.8 million. The total delivered gas price is \$4.14/MMBtu [(\$361.5 million+\$100.8 million)/111,735,000 MMBtu]. Of this \$4.14, the Tampa Electric NYMEX based commodity price forecast averages 3.13/MMBtu, coincidentally the same price as EIA. Tampa Electric's forecast was from July 2017 while the EIA forecast was published February 2018.

**TAMPA ELECTRIC COMPANY
UNDOCKETED: REVIEW OF TYSP'S
2nd SUPPLEMENTAL DATA REQUEST
REQUEST NO. 8
PAGE 1 OF 1
FILED: SEPTEMBER 5, 2018**

- 8.** Please provide a comparison of TECO's 2017 and 2018 TYSPs, identifying any notable differences.
 - A.** The most notable differences are the additions of new solar units, modernization of Big Bend 1, and the retirement of Big Bend 2. Tampa Electric will add 144.7 MW_{AC} of solar PV across multiple sites in September 2018; that total will increase to over 400 MW_{AC} of solar PV by January 2019 and ultimately 600 MW_{AC} of solar PV by 2021. Tampa Electric will phase in a modernization of Big Bend through the repowering of unit 1 by 2023 into a highly efficient combined cycle unit and retiring unit 2. Future CT 1 and 2 have also changed commercial in-service dates from 2021 and 2024 to 2023 and 2026 respectively.

**TAMPA ELECTRIC COMPANY
UNDOCKETED: REVIEW OF TYSP'S
2nd SUPPLEMENTAL DATA REQUEST
REQUEST NO. 9
PAGE 1 OF 1
FILED: SEPTEMBER 5, 2018**

9. Has TECO taken solar capacity degradation into account in its planning process? If so, please explain how degraded capacity values are calculated, what assumptions are required for calculating degraded capacity values, if solar degradation is taken into account in TECO's cost-effectiveness evaluations, and what causes solar capacity degradation. If not, why not?
- A. Yes, Tampa Electric has applied a 0.4% degradation to the solar output after the first full year of service for each solar site. Tampa Electric's solar sites are designed with more solar panels (MW_{DC}) than the rating of the inverters (MW_{AC}) in order to optimize the cost effectiveness to customers. The output profile of the solar panels are degraded every year, creating a profile for each year. Since the degradation is applied to the output profile of the solar panels, the maximum MW_{AC} output is not degraded until the solar panels are degraded below the inverter ratings.

According to NREL, solar module performance degrades over time because of unavoidable elements like thermal cycling, damp heat, humidity freeze and UV exposure. Thermal cycling can cause solder bond failures and cracks in solar cells. Damp heat has been associated with delamination of encapsulants and corrosion of cells. Humidity freezing can cause junction box adhesion to fail. UV exposure contributes to discoloration and backsheet degradation.