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October 2, 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 #4; Undocketed 20180000-OT

Dear Ms. Stauffer:

Pursuant to an email to Mr. Billy Stiles from Takira Thompson dated September 11, 2018, attached is Tampa Electric Company's response to Staff's Supplemental Data Request #4 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
Enclosed

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

1. Please refer to Schedule 3.2 History and Forecast of Winter Peak Demand (MW) Base Case, Column (2) Total, presented in TECO's 2017 Ten-Year Site Plan (TYSP), page 44, and 2018 TYSPs, page 42, respectively. Please explain why each of the forecasted total winter peak demand levels in 2018 TYSP is higher than those forecasted in TECO's 2017 TYSP (e.g., 4,903 MW vs. 4,882 MW for Winter 2017/18), given that TECO's 2016/17 actual shows the opposite (3,749 MW actual vs. 4,818 MW forecasted in 2017 TYSP).

A. The 2016/17 actual peak of 3749 MW in the 2018 TYSP was much lower than its forecasted peak of 4818 MW (2017 TYSP) because it was a mild winter. The temperature at the time of the actual 2016/17 winter peak was 43 degrees versus the projected design temperature of 31 degrees.

A higher customer forecast is the primary driver for each of the forecasted total winter peak demand levels in the 2018 TYSP being higher than those forecasted in the 2017 TYSP.

2. With respect to the forecasting methodology, procedures, and models developed associated with Winter and Summer Peak Demand, please specify all the differences/ modifications/ improvements, if any, between what used in TECO's 2018 TYSP and TECO's 2017 TYSP.

A. Modifications to the models included the addition of more recent actual demands, energy and weather data, as well as updating the start and end dates for the model estimation period. Other than these routine changes, there were no significant differences or improvements made in the 2018 TYSP compared to the 2017 TYSP.

3. For its 2018 TYSP, please identify and explain the measures and/or criteria, if any, TECO used to ensure the models of peak demand adequately explain historical volatility and to enhance the forecasting accuracy.

A. Tampa Electric uses a variety of measures and/or criteria to ensure load forecasting models include explanatory variables that adequately explain historical variation. Measures of statistical fit are reviewed for reasonableness and significance. Some of these measures are listed below. These statistics help identify issues such as multicollinearity (variables interfering with each other), serial correlation and/or heteroscedasticity (patterns in the error which may indicate a missing explanatory variable). Models and/or variables are adjusted as needed to correct for these issues so that explanatory power is maximized.

Model Statistics:
- R-squared
- T-Statistic
- Mean Absolute Percent Errors (MAPE)
- Durbin-Watson Statistic

To enhance the accuracy of Tampa Electric's peak demand forecasts, many different measures and/or criteria are used. The first step is to understand the data being forecasted. Customer, demand and energy data are reviewed on a regular basis for changes in trends or events that are considered anomalies/outliers or structural changes in the data. When it is time to update the forecasting models, the knowledge gained from the data and forecast variance analyses are used to enhance the regression models. Binaries may be added to address anomalies or structural changes in the data being forecasted. In addition, model and explanatory variable statistics are reviewed (see previous list of Model Statistics).

In addition, to enhance forecast accuracy, the peak demand data series is stabilized. To stabilize the data, the volatility of the phosphate load is removed and the peak demand models project on a per customer basis.

To enhance the forecast accuracy of our larger interruptible customers such as phosphate accounts, account managers are in contact with these accounts on a regular or as-needed basis to discuss any changes in operations. These individual accounts are re-forecasted monthly to reflect the most current information/trends. At an aggregate level, two interruptible peak demand

regression models are used to forecast demand at the time of the retail peak, with projected energy as their primary input, one for phosphate and one for commercial and industrial load.

The non-phosphate per customer kW forecast is multiplied by the final customer forecast. This result is then aggregated with two interruptible coincident peak forecasts, phosphate interruptible and other interruptible (commercial/industrial), to arrive at the final projected peak demand.

4. Please identify and explain the new measures, if any, TECO used to address the uncertainty inherent in the process of peak demand forecasting for its 2018 TYSP.

A. Uncertainty in the load forecasting process is addressed in many different ways depending on the environment and the foreseeable risks at the time the forecasts are being developed. The more common risks that are addressed are weather and future economic growth trends.

Apart from high/low case sensitivity, which is a primary method of addressing uncertainty inherent in forecasting, economic and demographic projections from various sources are compared for consistency. In some cases when sources differ significantly, they may be blended together to reduce the uncertainty.

Weather uncertainty has been addressed by running high and low weather scenarios and estimating their impact on energy consumption.

5. Please provide the historical forecast accuracy associated with TECO's Winter Peak Demand for the period 2012/13 through 2016/17 and Summer Peak Demand for the period 2013 through 2017 using the tables below.

Table 1. Accuracy of TECO's Winter Peak Demand Forecasts

Forecast / Actual	Winter Peak Demand Forecast Error Rate (%) Forecasting Period Prior					Average
	5	4	3	2	1	
	2008 TYSP	2009 TYSP	2010 TYSP	2011 TYSP	2012 TYSP	–
2012/13						
	2009 TYSP	2010 TYSP	2011 TYSP	2012 TYSP	2013TYSP	–
2013/14						
	2010 TYSP	2011 TYSP	2012 TYSP	2013TYSP	2014 TYSP	–
2014/15						
	2011 TYSP	2012 TYSP	2013 TYSP	2014 TYSP	2015 TYSP	–
2015/16						
	2012 TYSP	2013 TYSP	2014 TYSP	2015 TYSP	2016 TYSP	–
2016/17						

Table 2. Accuracy of TECO's Summer Peak Demand Forecasts

Forecast / Actual	Summer Peak Demand Forecast Error Rate (%) Forecasting Period Prior					Average
	5	4	3	2	1	
	2008 TYSP	2009 TYSP	2010 TYSP	2011 TYSP	2012 TYSP	–
2013						
	2009 TYSP	2010 TYSP	2011 TYSP	2012 TYSP	2013TYSP	–
2014						
	2010 TYSP	2011 TYSP	2012 TYSP	2013TYSP	2014 TYSP	–
2015						
	2011 TYSP	2012 TYSP	2013 TYSP	2014 TYSP	2015 TYSP	–
2016						
	2012 TYSP	2013 TYSP	2014 TYSP	2015 TYSP	2016 TYSP	–
2017						

A.

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Forecast / Actual	Winter Peak Demand Forecast Error Rate (%) Forecasting Period Prior					Average
	5	4	3	2	1	
	2008 TYSP	2009 TYSP	2010 TYSP	2011 TYSP	2012 TYSP	–
2012/13	-33.1%	-28.0%	-21.9%	-21.4%	-19.5%	-24.8%
	2009 TYSP	2010 TYSP	2011 TYSP	2012 TYSP	2013TYSP	–
2013/14	-27.3%	-20.7%	-20.1%	-17.9%	-15.5%	-20.3%
	2010 TYSP	2011 TYSP	2012 TYSP	2013TYSP	2014 TYSP	–
2014/15	-15.2%	-14.7%	-12.1%	-9.8%	-9.3%	-12.2%
	2011 TYSP	2012 TYSP	2013 TYSP	2014 TYSP	2015 TYSP	–
2015/16	-19.3%	-16.7%	-14.7%	-14.0%	-15.9%	-16.1%
	2012 TYSP	2013 TYSP	2014 TYSP	2015 TYSP	2016 TYSP	–
2016/17	-20.7%	-19.0%	-18.4%	-20.2%	-19.6%	-19.6%

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Forecast / Actual	Summer Peak Demand Forecast Error Rate (%) Forecasting Period Prior					Average
	5	4	3	2	1	
	2008 TYSP	2009 TYSP	2010 TYSP	2011 TYSP	2012 TYSP	–
2013	-18.1%	-13.8%	-6.4%	-4.3%	-3.6%	-9.3%
	2009 TYSP	2010 TYSP	2011 TYSP	2012 TYSP	2013TYSP	–
2014	-11.5%	-3.2%	-1.1%	0.1%	2.6%	-2.6%
	2010 TYSP	2011 TYSP	2012 TYSP	2013TYSP	2014 TYSP	–
2015	-5.0%	-3.0%	-1.6%	0.6%	0.7%	-1.7%
	2011 TYSP	2012 TYSP	2013 TYSP	2014 TYSP	2015 TYSP	–
2016	-1.2%	0.4%	2.4%	2.7%	2.3%	1.3%
	2012 TYSP	2013 TYSP	2014 TYSP	2015 TYSP	2016 TYSP	–
2017	-1.3%	0.3%	0.7%	0.5%	0.7%	0.2%

6. Please refer to Schedule 3.2 History and Forecast of Winter Peak Demand (MW) Base Case, Column (2) Total, presented in TECO's 2017 TYSP, page 44, and 2018 TYSPs, page 42, respectively. Please explain why each of the forecasted total winter peak demand levels in 2018 TYSP is higher than those forecasted in TECO's 2017 TYSP (e.g., 4,903 MW vs. 4,882 MW for Winter 2017/18), given that TECO's 2016/17 actual shows the opposite (3,749 MW actual vs. 4,818 MW forecasted in 2017 TYSP).

A. See response to Request No. 1.