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May 18, 2020

VIA: ELECTRONIC FILING

Mr. Adam J. Teitzman
Commission Clerk
Florida Public Service Commission
2540 Shumard Oak Boulevard
Tallahassee, FL 32399-0850

Re: Review of Tampa Electric Company's 2020 Ten-Year Site Plan
Supplemental Data Request #1 (Nos. 3-80)
Undocketed 20200000-OT

Dear Mr. Teitzman:

Attached for filing on behalf of Tampa Electric Company is the company's responses to Staff's First Supplemental Data Request #1 (Nos. 3-80) regarding the company's 2020 Ten-Year Site Plan filed with the Commission on April 1, 2020.

Thank you for your assistance in connection with this matter.

Sincerely,

James D. Beasley

JDB/bmp
Attachment

cc: Doug Wright (w/o enc.)
Donald Phillips (w/o enc.)

General Items

3. Please refer to the Microsoft Excel document accompanying this data request titled "Data Request #1 – Excel Tables," (Excel Tables Spreadsheet). Please provide, in Microsoft Excel format, all data requested in the Excel Tables Spreadsheet for those sheets/tabs identified as associated with this question. If any of the requested data is already included in the Company's current planning period TYSP, state so on the appropriate form.

A. The requested data is provided in the tabs labeled 'Q3 – Unit Performance, Q3-Firm Purchases, Q3-Financial Assumptions, Q3-Financial Escalation, and Q3-LOLP 'in the provided Excel, "2020 TYSP Data Request #1- Excel Tables. xls".

Environmental Compliance Costs

4. Please explain if the Company assumes CO2 compliance costs in the resource planning process used to generate the resource plan presented in the Company's current planning period TYSP. If the response is affirmative:

a. Please identify the year during the current planning period in which CO2 compliance costs are first assumed to have a non-zero value.

b. [**Investor-Owned Utilities Only**] Please explain if the exclusion of CO2 compliance costs would result in a different resource plan than that presented in the Company's current planning period TYSP.

c. [**Investor-Owned Utilities Only**] Please provide a revised resource plan assuming no CO2 compliance costs.

A. The Company does not assume CO2 compliance costs in our resource planning process used to generate the resource plan presented in the Company's current planning period TYSP. Nonetheless, the Company does evaluate its plan under various levels of CO2 compliance costs since many customers, investors, societal groups, and regulatory agencies encourage reduced air and water emissions and the Company acknowledges its responsibility as a good steward of the environment.

a. Not applicable.

b. Not applicable.

c. Not applicable.

Flood Mitigation

5. Please explain the Company's planning process for flood mitigation for current and proposed power plant sites and transmission/distribution substations.

A. Substations: All new substations that are built require permitting through the appropriate governmental agencies. This ensures that all state and local storm water requirements are met. Depending on the flood zone where a new substation is built, the elevation of the substation may be built above normal grade. Foundations and control houses may be elevated to mitigate water intrusion on lower elevation parcels.

For existing substations, Tampa Electric keeps current elevation above sea level and evacuation zone category data. For a few substations where past flooding has been an issue during a major storm event, mitigating efforts have been made such as building a wall around critical equipment, cameras to watch water levels in the stations, and installing sandbags around control house entry doors.

Power Plants: Tampa Electric uses a combination of strategies to mitigate the impact of flooding on new power plants. These strategies are primarily use of flood walls to prevent flood waters from reaching critical equipment, raising site elevation, and elevating critical equipment which is outside the flood wall to a height not anticipated to be affected by flooding. The Big Bend Modernization Project has incorporated mitigating actions such as site elevation and a 10' flood wall to protect the critical equipment.

Each existing power plant was constructed to comply with permitting and other regulations and mitigate flood risk through elevation. Each existing power plant has a storm plan that addresses potential flooding and actions taken to reduce flooding impacts to the electric system. The storm plans include the use of storm walls or doors, flood pumps, and sandbags to secure the plant, and other actions as appropriate for that plant. Polk Power Station and most solar generation sites are located inland and are not prone to flooding. They are designed for proper water management and a 100-year rain event.

Load & Demand Forecasting

6. [**Investor-Owned Utilities Only**] Please complete and return, in Microsoft Excel format, the table associated with this question found in the Excel Tables Spreadsheet by providing, on a system-wide basis, the hourly system load in megawatts (MW) for the period January 1 through December 31 of the year prior to the current planning period. For leap years, please include load values for February 29. Otherwise, leave that row blank. Please also describe how loads are calculated for those hours just prior to and following Daylight Savings Time.

A. Please refer to the tab labeled 'Q6 – Hourly System Load' in the provided Excel, "2020 TYSP Data Request #1- Excel Tables. xls".

Tampa Electric's Forecasting team receives Hourly System data that has already been shifted for Daylight Savings Time. For logistical purposes, Tampa Electric's Forecasting team manually adjust Hour Ending 24 for the day in which Daylight Savings Time begins. The adjustment avoids a zero hour by taking an average of the previous hour and the following hour. Tampa Electric's Forecasting team receives already adjusted and complete data for the day in which Daylight Savings Time ends.

7. Please complete and return, in Microsoft Excel format, the table associated with this question found in the Excel Tables Spreadsheet by providing information on the monthly peak demand experienced during the three-year period prior to the current planning period, including the actual peak demand experienced, the amount of demand response activated during the peak, and the estimated total peak if demand response had not been activated. Please also provide the day, hour, and system-average temperature at the time of each monthly peak.

A. Please refer to the tab labeled 'Q7 – Historic Peak Demand' in the provided Excel, "2020 TYSP Data Request #1- Excel Tables. xls".

8. Please identify the weather station(s) used for calculation of the system-wide temperature for the Company's service territory. If more than one weather station is utilized, please describe how a system-wide average is calculated.

A. Tampa Electric Company is presently using Tampa International Airport weather station for calculation of the system-wide temperature for the utility's service territory.

9. Please explain, to the extent not addressed in the Company's current planning period TYSP, how the reported forecasts of the number of customers, demand, and total retail energy sales were developed. In your response, please include the following information: methodology, assumptions, data sources, third-party consultant(s) involved, anticipated forecast accuracy, and any difference/improvement made compared with those forecasts used in the Company's most recent prior TYSP.

A. The company's customer, demand and energy forecast methodology, as well as assumptions and sources, are explained in detail in Chapter 2 of the 2020 Ten-Year Site Plan (TYSP) on pages 7 through 21. Appliance efficiencies are based on data provided by the U.S. Energy Information Administration (EIA). The economic assumptions used in the forecast models are derived from Moody's Analytics and the University of Florida's Bureau of Economic and Business Research (BEBR). A third-party consultant was not involved in the development of the forecasts reported in the 2020 TYSP. There were no significant differences or improvements made within the 2020 TYSP compared to the 2019 TYSP. As for anticipated forecast accuracy, the target is to be within +/- 1 percent, however with the current COVID-19 situation we anticipate loads will be below projections. How much lower is still unknown, we plan to monitor this situation closely during this period of great uncertainty.

10. Please identify all closed and open Florida Public Service Commission (FPSC) dockets and all non-docketed FPSC matters which were/are based on the same load forecast used in the Company's current planning period TYSP.

A. 20190001-EI
20190002-EG
20190007-EI
20190136-EI
20200092-EI

11. Please explain if your Company evaluates the accuracy of its forecasts of customer growth and annual retail energy sales presented in its past TYSPs by comparing the actual data for a given year to the data forecasted one, two, three, four, five, or six years prior.

a. If your response is affirmative, please explain the method used in your evaluation, and provide the corresponding results, including work papers, in Microsoft Excel format for the analysis of each forecast presented in the TYSPs filed with the Commission during the 20-year period prior to the current planning period. If your Company limits its analysis to a period shorter than 20 years prior to the current planning period, please provide what analysis you have and a narrative explaining why your Company limits its analysis period.

b. If your response is negative, please explain why.

A. Yes, Tampa Electric does review the accuracy of customers and retail energy sales forecasts.

a. The method used to review the accuracy of forecasts throughout time is referred to as an error fan. This approach is also used by the Florida Reliability Coordinating Council (FRCC) in reviewing state forecast accuracy. Please refer to the provided Excel, "Accuracy2020.xlsx".

b. Not applicable.

12. Please explain if your Company evaluates the accuracy of its forecasts of Summer/Winter Peak Energy Demand presented in its past TYSPs by comparing the actual data for a given year to the data forecasted one, two, three, four, five, or six years prior.

a. If your response is affirmative, please explain the method used in your evaluation, and provide the corresponding results, including work papers, in Microsoft Excel format for the analysis of each forecast presented in the TYSPs filed with the Commission during the 20-year period prior to the current planning period. If your Company limits its analysis to a period shorter than 20 years prior to the current planning period, please provide what analysis you have and a narrative explaining why your Company limits its analysis period.

b. If your response is negative, please explain why.

A. Yes, Tampa Electric does review the accuracy of Summer/Winter peak demand forecasts.

a. The method used to review the accuracy of forecasts throughout time is referred to as an error fan. This approach is also used by the Florida Reliability Coordinating Council (FRCC) in reviewing state forecast accuracy. Please refer to the provided Excel, "Accuracy2020.xlsx".

b. Not applicable.

13. Please explain any historic and forecasted trends in:

a. **Growth of customers**, by customer type (residential, commercial, industrial) as well as Total Customers, and identify the major factors (historically, currently, and in the forecasted period) that contribute to the growth/decline of the trends.

b. **Average KWh consumption per customer**, by customer type (residential, commercial, industrial), and identify the major factors (historically, currently, and in the forecasted period) that contribute to the growth/decline of the trends.

c. **Total Billed Retail Energy Sales** (GWh) [**for FPL**], or
Net Energy for Load (GWh) [**for other companies**], identify the major factors (historically, currently, and in the forecasted period) that contribute to the growth/decline of the trends. Please include a detailed discussion of how the Company's demand management program(s) and conservation/energy-efficiency program(s) impact the growth/decline of the trends.

A. a. **RESIDENTIAL**: The residential sector's growth averaged 2.2 percent in 2019. Growth in 2020 is expected to be 1.9 percent. Customer growth is expected to increase at an annual average growth rate of 1.6 percent over the next ten years. The primary driver of customer growth will be new construction and increasing net in-migration to the service area.
COMMERCIAL: Commercial customer growth has been increasing on average by approximately 1.0 percent. However, in 2019, growth was 1.5 percent due to the reclassification of some governmental and industrial accounts to commercial. Customers are expected to increase at an annual average growth rate of 0.6 percent over the next ten years.
GOVERNMENTAL: Governmental customer growth increased by 0.3 percent in 2019. The lower growth rate is due to over 100 customers being reclassified to the commercial sector. Growth in the governmental sector is projected to increase at a rate of 0.9 percent over the next ten years.
INDUSTRIAL: Industrial customer growth continued to decline in 2019. The decline is primarily in the smaller manufacturing segment, as well as some migration to the commercial sector. The number of industrial accounts is anticipated to increase at an average annual rate of 0.2 percent over the next ten years.
TOTAL: Total customer growth in 2019 averaged 2.1 percent with the residential class being the engine behind the growth. Over the next ten

years customer growth is expected to increase at an average rate of 1.5 percent annually.

b. **RESIDENTIAL**: Average consumption per customer decreased slightly in 2019. Even though it was a hotter than normal year, it was slightly milder than 2018. On a weather normalized basis, the downward trend seems to be stabilizing. This trend is expected to decline at an average annual decline of 0.1 percent over the next ten years. The primary drivers behind the declining per customer usage are increases in appliance/lighting efficiencies, lighting efficiencies, energy efficiency of new homes, conservation efforts and housing mix.
COMMERCIAL: Commercial consumption per customer decreased in 2019 for the same weather-related reasons discussed above in the residential sector. It is projected to increase slightly over the ten-year forecast horizon at a rate of 0.1 percent.
GOVERNMENTAL: Average per customer usage in 2019 was at the same level as 2018. Over the forecast horizon, usage is expected to remain relatively flat over the short-term and then increase slightly.
INDUSTRIAL: Industrial per customer usage increased in 2019. The increase is primarily due to the Phosphate sector which had a significant increase due to serving new load for a temporary period of time extending from late 2018 into 2020. After this temporary increased load goes away, average per customer usage is expected to decline in 2020 due to the phosphate sectors closure of plant/mine facilities and increased on-site transmission and generation capacity. After 2020, per customer usage is expected to remain flat at 2020 levels.

c. **TOTAL RETAIL NET ENERGY FOR LOAD (NEL):** Usage in 2019 was slightly higher (0.5 percent) than in 2018. This was primarily due to the additional Phosphate load being served in 2019. Over the forecast horizon, NEL is expected to increase by 1.0 percent a year. This is below the customer growth rate of 1.5 percent primarily due to continued per-customer declines in the Residential sector (see discussion in B. above), as well as declines in the phosphate sector as mining continues to move south and out of Tampa Electric's service territory.

14. Please explain any historic and forecasted trends in each of the following components of Summer/Winter Peak Demand:

a. **Demand Reduction due to Conservation and Self Service**, by customer type (residential, commercial, industrial) as well as Total Customers, and identify the major factors (historically, currently, and in the forecasted period) that contribute to the growth/decline in the trends.

b. **Demand Reduction due to Demand Response**, by customer type (residential, commercial, industrial), and identify the major factors (historically, currently, and in the forecasted period) that contribute to the growth/decline of the trends.

c. **Total Demand**, and identify the major factors (historically, currently, and in the forecasted period) that contribute to the growth/decline in the trends.

d. **Net Firm Demand**, by the sources of peak demand appearing in Schedule 3.1 and Schedule 3.2 of the current planning period TYSP, and identify the major factors (historically, currently, and in the forecasted period) that contribute to the growth/decline in the trends.

A. a. **<u>CONSERVATION AND SELF SERVICE:</u>**

Residential conservation at the time of the summer peak has historically increased by an average of 8 MW a year. In 2019 and over the forecast horizon it is increasing by an average of 6 MW a year. At the time of the winter peak, residential conservation historically increased by an average of 9 MW a year and is projected to increase by an average of 8 MW a year. The primary driver of this growth is the increasing number of participants in Tampa Electric's conservation programs.

Commercial and Industrial conservation at the time of the summer peak has increased by an average of 5 MW a year, and over the forecast horizon it is increasing by an average of 3 MW a year. At the time of the winter peak, it historically increased by an average of 4 MW a year and is projected to increase by 3 MW a year on average. The primary driver of this growth is the increasing number of participants in Tampa Electric's conservation programs.

Self-service is assumed to follow historical trends. If changes in self-service are known, forecasts will be adjusted for up or down.

b. **DEMAND RESPONSE / LOAD MANAGEMENT**:
Since 2015, there have not been any residential load management or demand response programs.
Commercial and Industrial load management and demand response at the time of the summer and winter peaks has been relatively flat over the past five years and is projected to increase by 1 MW or less over the forecast horizon. This trend is primarily due to no changes in the number of customers participating in the Standby Generator program and no expected contractual changes in the Demand Response program.

c. **TOTAL DEMAND**:
Summer retail peaks historically increased on average by 45 MW a year and are expected to increase by an average of 48 MW (1.1%) a year over the forecast horizon. The 2019 summer peak increase by over 200 MW due to the above normal temperatures on the peak day and days prior.

Historically, winter retail peaks vary significantly due to very mild winters and an occasional cold winter. Winter peaks are expected to increase by an average of 57 MW (1.2%) a year over the forecast horizon. The 2019 winter peak was extremely low due to a very mild winter. Winter peaks increase at a slightly faster rate due to minimal impacts from rooftop solar at the time of winter peaks.

Customer growth is the primary driver behind the growth in summer and winter total peak demands.

d. **NET FIRM DEMAND**:
Summer firm peaks historically increased on average by 41 MW a year and are expected to increase by an average of 48 MW (1.2%) a year over the forecast horizon. The 2019 summer firm peak increase by over 200 MW due to the above normal temperatures on the peak day and days prior.

Historical peaks increased at a slower rate than forecasted peaks due to the declining loads in the Phosphate (Interruptible rate) sector. This decline in Phosphate load stabilizes over the forecast horizon.

Historically, winter firm peaks vary significantly due to very mild winters and an occasional cold winter. Winter firm peaks are expected to increase by an average of 57 MW (1.3%) a year over the forecast horizon.

Customer growth is the primary driver behind the growth in summer and winter firm peak demands.

15. Please explain any anomalies caused by non-weather events with regard to annual historical data points for the period 10 years prior to the current planning period that have contributed to the Company's Summer/Winter Peak Energy Demand.

A. Upon review of the company's summer and winter peak demand for the ten years prior to the current planning period, there have been no anomalies caused by non-weather events.

16. Please refer to the Company's respective Utility Perspective section in the Commission's "Review of the 2019 Ten-Year Site Plans of Florida's Electric Utilities." Please answer your Company's respective questions below regarding the growth of customers and retail energy sales, of which the associated figure in the Utility Perspective section is based on the values reported on Schedule 2 of your respective Company's 2019 TYSP:

a. Please explain, in general, why the Company's growth rate of retail energy sales lags the growth rate of customers.

b. Please explain why the divergence in the growth rates of customers and retail energy sales increases during the forecast period.

c. Please identify the drivers which contribute to the sharp fall in the growth rate of retail energy in 2011.

A. a. The company's growth rate of retail energy sales lags the growth rate of customers due to improved efficiencies of new homes and federally mandated appliance efficiency standards which continue to put downward pressure on average per-customer consumption, as well as voluntary conservation efforts.

b. The primary drivers behind the declining per customer usage are increases in appliance efficiencies, lighting efficiencies, energy efficiency of new homes, conservation efforts, housing mix and reduced phosphate load as phosphate mining continues to migrate south out of our service territory. These trends are expected to continue going forward, explaining the increasing divergence in growth rates of customers and retail energy sales over the forecast period.

c. The primary driver for the sharp fall in retail energy sales in 2011 was the extreme weather in 2010 which resulted in significantly higher retail energy sales for 2010. Therefore, when comparing a rather normal 2011 to the high energy sales in 2010, it results in a decline in the growth rate for 2011.

17. [**Investor-Owned Utilities Only**] If not included in the Company's current planning period TYSP, please provide load forecast sensitivities (high band, low band) to account for the uncertainty inherent in the base case forecasts in the following TYSP schedules, as well as the methodology used to prepare each forecast:

a. Schedule 2.1 – History and Forecast of Energy Consumption and Number of Customers by Customer Class.

b. Schedule 2.2 - History and Forecast of Energy Consumption and Number of Customers by Customer Class.

c. Schedule 2.3 - History and Forecast of Energy Consumption and Number of Customers by Customer Class.

d. Schedule 3.1 - History and Forecast of Summer Peak Demand.

e. Schedule 3.2 - History and Forecast of Winter Peak Demand.

f. Schedule 3.3 - History and Forecast of Annual Net Energy for Load.

g. Schedule 4 - Previous Year and 2-Year Forecast of Peak Demand and Net Energy for Load by Month.

A. The high and low band sensitivities are included in the current planning period TYSP, within pages 33 through 52. The methodology used to prepare load forecast sensitivities (high band, low band) for Schedules 2.1,2.2,2.3,3.1,3.2,3.3 and 4 is listed with the 2020 TYSP, Chapter2, page 20 under "High and Low Scenario Forecast Assumptions".

18. Please discuss whether the Company included plug-in electric vehicle (PEV) loads in its demand and energy forecasts for its current planning period TYSP. If so, how were these impacts accounted for in the modeling and forecasting process?

A. Tampa Electric developed estimates of the number of plug-in electric vehicles and their impacts on the demand and energy forecasts. These estimates were incorporated into the forecast results reported in the 2020 TYSP.

19. Please discuss the methodology and the assumptions (or, if applicable, the source(s) of the data) used to estimate the number of PEVs operating in the Company's service territory and the methodology used to estimate the cumulative impact on system demand and energy consumption.

A. The electric vehicle forecast process begins with an estimate of the number of EVs operating in Tampa Electric's service area using the most recent data provided by an independent third-party analyst. Future penetration levels of EVs are based on assumptions used by the Energy Information Administration's (EIA) for the South Atlantic region. The demand and energy consumption associated with EV charging is based on a number of assumptions including the average number of miles driven in a year, the weighted average battery size of four common EV models sold within the service area and the number of charges per year.

20. Please complete and return, in Microsoft Excel format, the table associated with this question found in the Excel Tables Spreadsheet by providing estimates of the requested information within the Company's service territory for the current planning period. "Quick-charge" PEV charging stations are those that require a service drop greater than 240 volts and/or use three-phase power.

A. Please refer to the tab labeled 'Q20 – Electric Vehicle Charging' in the provided Excel, "2020 TYSP Data Request #1- Excel Tables. xls".

21. Please describe any Company programs or tariffs currently offered to customers relating to PEVs and describe whether any new or additional programs or tariffs relating to PEVs will be offered to customers within the current planning period.

a. Of these programs or tariffs, are any designed for or do they include educating customers on electricity as a transportation fuel?

b. Does the Company have any programs where customers can express their interest or expectations for electric vehicle infrastructure as provided for by the Utility, and if so, please describe in detail.

A. a. Tampa Electric continues to be active on several activities and potential offerings of future programs or tariffs with plug-in electric vehicles.

b. In May 2017, Tampa Electric received Commission approval to enhance the Energy Education, Awareness and Agency Outreach DSM Program by partnering with high schools' driver's education in the classroom. This portion of the program focuses on providing opportunities to encourage the conservation of energy and promote energy efficiency through local school systems by partnering with high schools' driver's education classes. All three selected high schools began offering the program in the 2019 school year.

Tampa Electric has also been working with The University of South Florida ("USF") and their Center for Urban Transportation Research ("CUTR") on a Research and Development ("R&D") Project. The research portion of the project was concluded in 2019, and Tampa Electric expects to review the findings by summer of 2020. The main R&D research objectives included:

a. Research benefits of electric vehicles to utility companies and the public.
b. Document the impacts of EV usage on energy conservation, energy security, emissions and cost of electricity production for the utility company.
c. Research cost-effectiveness of electric vehicle technologies.
d. If warranted, assist with the design of an effective vehicle rebate program to encourage EV purchases and higher EV usage in Tampa Bay.

Tampa Electric also recently received Commission approval for a variance to the traditional method for calculating contribution-in-aid-of-construction (CIAC) as described in Rule 25-6.064 Florida Administrative Code and as

it applies to new primary line extensions to serve high-voltage EV chargers. As Company revenues from these new stations are likely to be very low until the EV market further matures, a minimal credit against what is often a substantial line extension cost presents a barrier to developing these EV charging sites. During a five-year pilot period, the revenue estimation period is extended from five years to ten years. During the pilot period, Tampa Electric will gather information to determine whether it has a beneficial impact on the EV market and provide annual reporting to the Commission.

22. Please describe how the Company monitors the installation of PEV public charging stations in its service area.

A. Tampa Electric does not have a specific process capable of monitoring the installation of third-party public charging stations. Relationships established with equipment installers and EV charging network operators provide reliable data on existing and planned public charging stations. Tampa Electric also leverages relationships with local developers for large projects where public charging may, or could be, included. For "quick-charge" electric vehicle stations requiring greater than 240-volt services, internal collaboration amongst various work teams ensures that new installations are properly identified.

23. Please describe any instances since January 1 of the year prior to the current planning period in which upgrades to the distribution system were made where PEVs were a contributing factor.

A. Tampa Electric is not aware of any instances since January 1, 2019, in which electric vehicles were a contributing factor to upgrades required on the company's distribution system.

24. Has the Company conducted or contracted any research to determine demographic and regional factors that influence the adoption of PEVs applicable to its service territory? If so, please describe in detail the methodology and findings.

A. Tampa Electric has not conducted or contracted any research to determine demographic and regional factors that influence EV adoption in the company's service territory.

25. What processes or technologies, if any, are in place that allow the Company to be notified when a customer has installed a PEV charging station in their home?

A. Tampa Electric does not have a process or technology in place that allows for company notification when a home EV charging stations has been installed.

26. [**FEECA Utilities Only**] For each source of demand response, please complete and return, in Microsoft Excel format, the table associated with this question found in the Excel Tables Spreadsheet by providing annual customer participation information for 10 years prior to the current planning period. Please also provide a summary of all sources of demand response using the table.

A. Please refer to the tab labeled 'Q26 – DSM Customer Participation' in the provided Excel, "2020 TYSP Data Request #1- Excel Tables. xls".

27. [**FEECA Utilities Only**] For each source of demand response, please complete and return, in Microsoft Excel format, the table associated with this question found in the Excel Tables Spreadsheet by providing annual usage information for 10 years prior to the current planning period. Please also provide a summary of all demand response using the table.

A. Please refer to the tab labeled 'Q27 – DSM Annual Use' in the provided Excel, "2020 TYSP Data Request #1- Excel Tables. xls".

28. [**FEECA Utilities Only**] For each source of demand response, please complete and return, in Microsoft Excel format, the table associated with this question found in the Excel Tables Spreadsheet by providing annual seasonal peak activation information for 10 years prior to the current planning period. Please also provide a summary of all demand response using the table.

A. Please refer to the tab labeled 'Q28 – DSM Seasonal Peak Act' in the provided Excel, "2020 TYSP Data Request #1- Excel Tables. xls".

Generation & Transmission

29. Please complete and return, in Microsoft Excel format, the table associated with this question found in the Excel Tables Spreadsheet by providing information on each utility-owned traditional generation resource in service as of December 31 of the year prior to the current planning period. For multiple small (<250 kW per installation) distributed resources of the same type and fuel source, please include a single combined entry. For capacity factor, use the net capacity as a basis.

A. Please refer to the tab labeled 'Q29 – Utility Exist Traditional' in the provided Excel, "2020 TYSP Data Request #1- Excel Tables. xls".

30. Please complete and return, in Microsoft Excel format, the table associated with this question found in the Excel Tables Spreadsheet by providing information on each utility-owned traditional generation resource planned for in-service within the current planning period. For multiple small (<250 kW per installation) distributed resources of the same type and fuel source, please include a single combined entry. For projected capacity factor, use the net capacity as a basis.

a. For each planned utility-owned traditional generation resource in the table, provide a narrative response discussing the current status of the project.

A. a. The Big Bend unit 1 modernization project is underway. The work on the CTs is approximately 10% complete. The CTs are expected to be placed into service in November 2021. The ST is expected to be placed into service in January 2023.

Please refer to the tab labeled 'Q30 – Utility Planned Traditional' in the provided Excel, "2020 TYSP Data Request #1- Excel Tables. xls".

31. Please complete and return, in Microsoft Excel format, the table associated with this question found in the Excel Tables Spreadsheet by providing information on each utility-owned renewable generation resource in service as of December 31 of the year prior to the current planning period. For multiple small (<250 kW per installation) distributed resources of the same type and fuel source, please include a single combined entry. For capacity factor, use the net capacity as a basis.

A. Please refer to the tab labeled 'Q31 – Utility Existing Renewable' in the provided Excel, "2020 TYSP Data Request #1- Excel Tables. xls".

32. Please complete and return, in Microsoft Excel format, the table associated with this question found in the Excel Tables Spreadsheet by providing information on each utility-owned renewable generation resource planned for in-service within the current planning period. For multiple small (<250 kW per installation) distributed resources of the same type and fuel source, please include a single combined entry. For projected capacity factor, use the net capacity as a basis.

a. For each planned utility-owned renewable resource in the table, provide a narrative response discussing the current status of the project.

A. a. The Company, through our voluntary renewable block program, Sun to Go, is adding additional 7.2 KW ac at the Museum of Science and Industry. This project is currently in permitting and design.

The Epperson Ranch Solar Light project is a collaboration between Withlacoochee River Electric Cooperative, Inc., and Tampa Electric to install 200 LED streetlight with top of pole mounted solar collectors that will feed directly to the grid. Tampa Electric's portion is 20 lights that will add 2.5 KW ac to the Company's existing Sun to Go solar portfolio. The project is currently in the design and construction phase and is expected be energized in 2020.

Tampa Electric plans to completely replace the existing 3.4 KW ac PV system at Walker Middle School in 2020 through our renewable block program Sun to Go. This aging system went online in 2004 and the PV inverters and batteries have failed. The low efficiency panels will be replaced, and the system increased to a planned 8.5 KW ac.

Please refer to the tab labeled 'Q32 – Utility Planned Renewable' in the provided Excel, "2020 TYSP Data Request #1- Excel Tables. xls".

33. Please list and discuss any planned utility-owned renewable resources that have, within the past year, been cancelled, delayed, or reduced in scope. What was the primary reason for the changes? What, if any, were the secondary reasons?

A. The Epperson Ranch Solar Light project is delayed due to the designing of the solar panel rack on the streetlights.

34. Please complete and return, in Microsoft Excel format, the table associated with this question found in the Excel Tables Spreadsheet by providing information on each purchased power agreement with a traditional generator still in effect by December 31 of the year prior to the current planning period pursuant to which energy was delivered to the Company during said year.

A. Tampa Electric had two (2) purchases in effect to serve customers in 2019. Those purchases were from Duke Energy Florida (DEF) and the Florida Municipal Power Agency (FMPA). The DEF purchase was a non-firm energy product with a monthly schedule of up to 360 MW, and the FMPA purchase was a 112 MW firm call option. Both purchases remained in effect through February 2020.

Please refer to the tab labeled 'Q34 – PPA Existing Traditional' in the provided Excel, "2020 TYSP Data Request #1- Excel Tables. xls".

35. Please complete and return, in Microsoft Excel format, the table associated with this question found in the Excel Tables Spreadsheet by providing information on each purchased power agreement with a traditional generator pursuant to which energy will begin to be delivered to the Company during the current planning period.

a. For each purchased power agreement in the table, provide a narrative response discussing the current status of the project.

A. a. Tampa Electric had six (6) purchases in effect by December 31, 2019 that are available to deliver energy during the current planning period. One (1) of the purchases is the up to 360 MW non-firm purchase from DEF (February 2019-February 2020) mentioned in Response No. 34. The other five (5) are firm, peaking call options: three (3) from the Florida Municipal Power Agency (FMPA) and one (1) each from Florida Power & Light (FPL) and the Orlando Utilities Commission (OUC). The FMPA purchases are the 112 MW (December 2019-February 2020) mentioned in Response No. 34, 74 MW (July-September 2020) and 150 MW (December 2020-February 2021). Both the FPL and OUC purchases cover the period December 2020 through February 2021 and are 160 MW and 100 MW, respectively.

Please refer to the tab labeled 'Q35 – PPA Planned Traditional' in the provided Excel, "2020 TYSP Data Request #1- Excel Tables. xls".

36. Please complete and return, in Microsoft Excel format, the table associated with this question found in the Excel Tables Spreadsheet by providing information on each purchased power agreement with a renewable generator still in effect by December 31 of the year prior to the current planning period pursuant to which energy was delivered to the Company during said year.

A. Tampa Electric had no purchased power agreements with renewable generators during 2019.

Please refer to the tab labeled 'Q36 – PPA Existing Renewable' in the provided Excel, "2020 TYSP Data Request #1- Excel Tables. xls".

37. Please complete and return, in Microsoft Excel format, the table associated with this question found in the Excel Tables Spreadsheet by providing information on each purchased power agreement with a renewable generator pursuant to which energy will begin to be delivered to the Company during the current planning period.

a. For each purchased power agreement in the table, provide a narrative response discussing the current status of the project.

A. a. Tampa Electric has no purchased power agreements with renewable generators anticipated to begin delivering renewable energy to the company during the current planning period.

Please refer to the tab labeled 'Q37 – PPA Planned Renewable' in the provided Excel, "2020 TYSP Data Request #1- Excel Tables. xls".

38. Please list and discuss any purchased power agreements with a renewable generator that have, within the past year, been cancelled, delayed, or reduced in scope. What was the primary reason for the change? What, if any, were the secondary reasons?

A. Tampa Electric has no purchased power agreements with a renewable generator that has, within the past year, been cancelled, delayed, or reduced in scope.

39. Please complete and return, in Microsoft Excel format, the table associated with this question found in the Excel Tables Spreadsheet by providing information on each power sale agreement still in effect by December 31 of the year prior to the current planning period pursuant to which energy was delivered from the Company to a third-party during said year.

A. As of December 31, 2019, Tampa Electric had one sale, and it is a sale of non-firm energy to Seminole Electric Cooperative. That is also Tampa Electric's only planned sale for the current planning period.

Please refer to the tab labeled 'Q39 – PSA Existing' in the provided Excel, "2020 TYSP Data Request #1- Excel Tables. xls".

40. Please complete and return, in Microsoft Excel format, the table associated with this question found in the Excel Tables Spreadsheet by providing information on each power sale agreement pursuant to which energy will begin to be delivered from the Company to a third-party during the current planning period.

a. For each power sale agreement in the table, provide a narrative response discussing the current status of the agreement.

A. a. As noted in the response to Request No. 39, the existing non-firm energy to Seminole Electric Cooperative is Tampa Electric's only planned sale for the current planning period. This transaction has been in place since 1991.

Please refer to the tab labeled 'Q40 – PSA Planned' in the provided Excel, "2020 TYSP Data Request #1- Excel Tables. xls".

41. Please list and discuss any long-term power sale agreements within the past year that were cancelled, expired, or modified.

A. Tampa Electric had no long-term power sale agreements within the past year that were cancelled, expired, or modified.

42. Please complete and return, in Microsoft Excel format, the table associated with this question found in the Excel Tables Spreadsheet by providing the actual and projected annual energy output of all renewable resources on the Company's system, by source, for the 11-year period beginning one year prior to the current planning period.

A. Please refer to the tab labeled 'Q42 – Annual Renewable Generation' in the provided Excel, "2020 TYSP Data Request #1- Excel Tables. xls".

43. [**Investor-Owned Utilities Only]** Please complete and return, in Microsoft Excel format, the table associated with this question found in the Excel Tables Spreadsheet by providing information on all of the Company's plant sites that are potential candidates for utility-scale (>2 MW) solar installations.

A. Please refer to the tab labeled 'Q43 – Potential Solar Sites' in the provided Excel, "2020 TYSP Data Request #1- Excel Tables. xls".

44. Please describe any actions the Company engages in to encourage production of renewable energy within its service territory.

A. As market conditions continue to change and technology improves, renewable alternatives, such as solar, become more attractive to our customers. Between December 2018 and December 2019, with tax incentives and the incentive provided by the FPSC's net metering rule, over 2,000 customers installed solar panels on their homes or businesses, indicating the increasing acceptance of customer owned renewable generation. Through December 2019, more than 5,000 customers installed PV systems on their homes or businesses, accounting for more than 46 MWAC of net metered, distributed solar generation interconnected on Tampa Electric's grid. In October 2018, the company streamlined the interconnection application process for the customer/contractor from a manual process to an easy to use online application system.

For over thirteen (13) years, Tampa Electric's Renewable Energy Program has offered residential, commercial and industrial customers the opportunity to purchase 200 kWh renewable energy "blocks" for their home or business. The program also allows residential, commercial and industrial customers the opportunity to purchase renewable energy to power a specific event. This program enables a family, business or venue to make a statement about their commitment to the environment and to renewable energy. The funds from this program build small, community-sited PV arrays at highly visible locations. These demonstration arrays are designed to educate students and the public on the benefits of renewable energy.

Through December 2019, TEC's Renewable Energy Program has 1,394 customers purchasing over 2,277 blocks of renewable energy each month. The company's renewable-generation portfolio is a mix of various technologies and renewable generating sources, including smaller, company-owned photovoltaic (PV) arrays throughout the community and an increasing number of large-scale PV systems that provide ample solar kWh for the Renewable Energy Block Program. The smaller, community-sited PV arrays are installed at the Museum of Science and Industry, Walker Middle and Middleton High schools, Tampa Electric's Manatee Viewing Center, Tampa's Lowry Park Zoo, the Florida Aquarium, LEGOLAND Florida's Imagination Zone, and at the Florida Conservation and Technology Center (FCTC), an environmental and energy education facility located in Apollo Beach.

The Renewable Energy Program installations are strategically located throughout the community and are designed to educate students and the public on the

benefits of renewable energy. Educational signage touts the advantages of solar energy and interactive displays provide hands-on experience to engage visitors' interest in clean, renewable technologies.

In 2020, the Renewable Energy Program, marketed as Sun to Go, is projecting to install 30 solar powered streetlights in a newly built community. In addition to these lights, the company will install two small arrays that will provide solar powered charging stations for small electronics (cell phones, tablets) at the Museum of Science and Industry.

Looking forward, Super Bowl LV is scheduled to be played in Tampa, Florida on February 7th, 2021. TEC is planning partnerships with Sports and Visitor Groups and Venues to engage customers and visitors. A presence to promote solar and sustainability at pop-up education stations is one activity planned.

In mid-2019, TEC launched a 17.5 MWAC Shared Solar Program, called Sun Select, providing another choice for customers unable to install rooftop solar but prefer their energy generated from solar. Residential and small business customers can purchase locally generated solar power to match 25%, 50% or 100% of the electricity they use. Business and commercial customers can purchase solar in increments of 1,000 kWh. Sun Select participants pay a locked-in solar rate for the solar energy they purchase instead of paying the fuel charge for that portion of participants' electricity use. The energy is generated at Lake Hancock Solar, a portion of which was specifically built to support the new shared solar program.

In September 2017, TEC announced the Company's plans to install an additional 600 MWAC at ten new sites by January 2021, which is enough electricity to power more than 100,000 homes. When the projects are complete, TEC will have 827 watts per customer of solar capacity and over 7 percent of TEC's generation will come from the sun. The first two project sites went into service in September 2018 with the ability to generate 144.7 MWAC of clean, renewable energy for more than 22,000 homes. An additional 277.8 MWAC went into service at five more project sites that year. With the recent completion of two more 75 MWAC projects, in early 2020, and one more being constructed in 2020, the most recent solar additions, totaling more than 600 MWAC, will significantly reduce Tampa Electric's carbon dioxide emissions and give customers the benefit of zero fuel-cost solar generation for years to come.

45. [**Investor-Owned Utilities Only**] Please discuss whether the Company has been approached by renewable energy generators during the year prior to the current planning period regarding constructing new renewable energy resources. If so, please provide the number and a description of the type of renewable generation represented.

A. Tampa Electric received offers from 4 companies in 2019 proposing to construct new renewable energy resources. Three companies proposed ground mounted solar facilities and one company proposed a floating solar project. The range of potential sizes was 60-74.5 MWAC.

46. Does the Company consider solar PV to contribute to one or both seasonal peaks for reliability purposes? If so, please provide the percentage contribution and explain how the Company developed the value.

A. For the 2019 TYSP, TEC used 38 percent for summer reserve margin at the fixed PV sites at Legoland and TIA and 56 percent for summer reserve margin at the single axis tracking sites at Big Bend Solar and approved SoBRA sites and 0.0 percent during the winter. For future tracking PV, TEC estimates 56 percent as firm generating capacity for TEC's summer reserve margin and 0.0 percent during the winter. These capacity values are calculated using hourly projections from vendor data and will be updated once TEC has gathered enough historical data.

47. Please identify whether a declining trend in costs of energy storage technologies has been observed by the Company.

A. Yes, multiple industry forecasts show a declining cost trend through 2030.

48. Briefly discuss any progress in the development and commercialization of non-lithium battery storage technology the Company has observed in recent years.

A. Tampa Electric continuously monitors and evaluates developing technologies including various battery storage technologies. While lithium batteries remain the most mature and widely adopted battery technology, other battery technologies such as flow batteries show great potential. Their ability to accommodate repeated cycles with minimal degradation is appealing. However, their higher round trip efficiency losses and initial capital installation costs remain a challenge.

49. Briefly discuss any considerations reviewed in determining the optimal positioning of energy storage technology in the Company's system (e.g., Closer to/further from sources of load, generation, or transmission/distribution capabilities).

A. There are a variety of factors that can influence the optimal positioning of an energy storage facility within Tampa Electric's system. Placing energy storage closer to the load can improve customer resiliency, effectively shave the peak, and defer or avoid transmission and/or distribution system upgrades. Energy storage systems can also be used to address possible voltage support and frequency regulation issues. Placing energy storage systems at an existing generating facility can provide black start capability. In addition, the availability of land to place energy storage in densely developed areas remains a consideration.

50. Please explain whether ratepayers have expressed interest in energy storage technologies. If so, how have their interests been addressed?

A. In March 2018, Tampa Electric began interconnecting customer-owned battery systems through the Standard Interconnection Agreement for Interconnected Customer-Owned Battery Subsystems of 1 kW or More. As of 12/31/2019, 162 customers interconnected with one to eight batteries per installation. Ten percent purchased and installed greater than three battery systems, fifty-seven percent installed two batteries, single batteries installed account for the remaining thirty percent. Almost seventy percent of the battery subsystems are installed in tandem with PV systems. Over forty customers added battery storage to an existing PV array, while six customers have only battery storage. Tampa Electric anticipates a continued increase in battery sub-system interconnections.

Account Management continues to have on-going discussions with Key Accounts on battery technology. Many accounts have been asked to be considered if any pilot opportunities arise that would allow both parties to learn more about the technology.

51. Please complete and return, in Microsoft Excel format, the table associated with this question found in the Excel Tables Spreadsheet by providing information on all energy storage technologies that are currently either part of the Company's system portfolio or are part of a pilot program sponsored by the Company.

A. Please refer to the tab labeled 'Q51 – Existing Energy Storage' in the provided Excel, "2020 TYSP Data Request #1- Excel Tables. xls".

52. Please complete and return, in Microsoft Excel format, the table associated with this question found in the Excel Tables Spreadsheet by providing information on all energy storage technologies planned for in-service during the current planning period either as part of the Company's system portfolio or as part of a pilot program sponsored by the Company.

A. Please refer to the tab labeled 'Q52 – Planned Energy Storage' in the provided Excel, "2020 TYSP Data Request #1- Excel Tables. xls".

53. Please identify and describe the objectives and methodologies of all energy storage pilot programs currently running or in development with an anticipated launch date within the current planning period. If the Company is not currently participating in or developing energy storage pilot programs, has it considered doing so? If not, please explain.

a. Please discuss any pilot program results, addressing all anticipated benefits, risks, and operational limitations when such energy storage technology is applied on a utility scale (> 2 MW) to provide for either firm or non-firm capacity and energy.

b. Please provide a brief assessment of how these benefits, risks, and operational limitations may change over the current planning period.

c. Please identify and describe any plans to periodically update the Commission on the status of your energy storage pilot programs.

A. Demand Side Management: As part of the company's petition to establish the 2020-2029 DSM Plan to meet the DSM goals recently prescribed by the Commission in Docket No. 20190021-EG, Tampa Electric proposed the Integrated Renewable Energy System (Pilot) Program to study and understand the potential opportunities and interactions of a fully integrated renewable energy system that contains a photovoltaic system, batteries, car charging and industrial truck charging. The integrated renewable energy system will include an approximate 800 kW photovoltaic array, two-250 kW batteries, and several electric vehicle charging systems to charge electric vehicles, industrial vehicles and auxiliary industrial vehicle batteries. The pilot program will have two main purposes. The first main purpose is to evaluate the capability to perform demand response from the main batteries and each vehicle battery and to determine the preferred operating characteristics of a fully integrated renewable and energy storage system to leverage DSM opportunities. The second main purpose is to use the installation and its associated operational information as an education platform for commercial and industrial customers seeking information on this type of system and its benefits, concerns and capabilities. The company will provide updates on the pilot program through the annual filings of the Energy Conservation Cost Recovery Clause (ECCR) docket.

Tampa Electric's objective is to identify the most promising applications for batteries within our system and to gain experience with battery installation and operation. This enables the company to take advantage of battery storage for the benefit of our customers as the economics of the technology continue to improve.

a. Although not a PSC approved pilot program, the Big Bend Battery Energy Storage facility was recently placed in service. The anticipated benefits of this project will be the experience gained with battery installation, operation, degradation, economic life, and various grid support cases. The battery could be utilized to shift energy generation to off-peak times (energy arbitrage and peak shaving), for voltage support and frequency regulation, and to contribute to contingency reserves. As part of the battery storage placed in service at Big Bend, TEC plans to learn about the opportunities and operational limitations provided by battery storage systems.

b. Energy storage technology is expected to continue its advances over the next 10 years. Declining costs and improving technology may enable more and larger batteries to be deployed and reduce the operating costs associated with cycling of the batteries. As intermittent renewables become a larger part of our portfolios, batteries can play a larger role in balancing our system.

c. Large utility scale battery storage projects will be reported to the Commission through the 10-Year Site Plan process, however additional reporting desired by the Commission would be provided as requested.

54. If the Company utilizes non-firm generation sources in its system portfolio, please detail whether it currently utilizes or has considered utilizing energy storage technologies to provide firm capacity from such generation sources. If not, please explain.

a. Based on the Company's operational experience, please discuss to what extent energy storage technologies can be used to provide firm capacity from non-firm generation sources. As part of your response, please discuss any operational challenges faced and potential solutions to these challenges.

A. a. While intermittent during the day, solar could be used to charge energy storage earlier in the day in order to provide a capacity benefit to serve system peak later in the day or early the next day. Thus, battery storage offers the opportunity to complement solar generation. This will be one of the key benefits of the Big Bend Energy Storage facility at the Big Bend Solar site.

55. Please identify and describe any programs the Company offers that allows its customers to contribute towards the funding of specific renewable projects, such as community solar programs.

a. Please describe any such programs in development with an anticipated launch date within the current planning period.

A. a. For thirteen years, Tampa Electric has offered a Renewable Energy Program option to customers where they can purchase blocks of renewable energy produced at or purchased from clean, renewable energy sources. This tariffed program, dubbed Sun to Go, includes an additional bill cost of $5.00 per 200 kWh block purchased. The money collected under this program, in major part, goes toward the development of new photovoltaic resources at either schools or in public places, which serves to both increase solar generation within the Tampa Electric system and educate the public on the benefits and operations of solar power generation.

In late June 2019, Tampa Electric's Shared Solar program was approved and offered to our residential, commercial and industrial customers. The Company added 17.5 MW of solar specifically for program participants. Tampa Electric will build more solar to accommodate the popularity of the Sun Select program.

56. Please identify and discuss the Company's role in the research and development of utility power technologies. As part of this response, please describe any plans to implement the results of research and development into the Company's system portfolio and discuss how any anticipated benefits will affect your customers.

A. Tampa Electric does not currently have any dedicated R&D programs. Outside of the Conservation R&D program, the company does not actively pursue R&D projects.

57. [**Investor-Owned Utilities Only**] Please complete and return, in Microsoft Excel format, the table associated with this question found in the Excel Tables Spreadsheet by providing, on a system-wide basis, the historical annual average as-available energy rate in the Company's service territory for the 10-year period prior to the current planning period. Also, provide the projected annual average as-available energy rate in the Company's service territory for the current planning period. If the Company uses multiple areas for as-available energy rates, please provide a system-average rate as well.

A. Please refer to the tab labeled 'Q57 – As-available Energy Rate' in the provided Excel, "2020 TYSP Data Request #1- Excel Tables. xls".

58. Please complete and return, in Microsoft Excel format, the table associated with this question found in the Excel Tables Spreadsheet by providing information on all planned traditional units with an in-service date within the current planning period. For each planned unit, provide the date of the Commission's Determination of Need and Power Plant Siting Act certification, if applicable.

A. Please refer to the tab labeled 'Q58 – Planned Trad Units PPSA' in the provided Excel, "2020 TYSP Data Request #1- Excel Tables. xls".

59. For each of the planned generating units, both traditional and renewable, contained in the Company's current planning period TYSP, please discuss the "drop dead" date for a decision on whether or not to construct each unit. Provide a timeline for the construction of each unit, including regulatory approval, and final decision point.

A. The Solar Base Rate Adjustment (SoBRA) projects and BB 1 Modernization (BB Mod) have all received regulatory approval and passed their final decision point. The 600 MWAC of solar being installed through 2021 identified in TEC's Ten-Year Site Plan has already procured major pieces of equipment and several of the sites are already under construction in accordance with the Solar Base Rate Adjustment (SoBRA) which was approved as part of the stipulation and settlement agreement in late 2017. Additional utility-scale solar projects are planned and would receive regulatory approval for cost recovery through a future base rate case. There are multiple projects, each less than 75 MW in capacity, planned. The construction of projects totaling 149.5, 223.5 and 223.5 MW is expected to begin construction in 2020, 2021, and 2022, respectively. The projects are expected to be in service in December 2021, December 2022 and December 2023, respectively. These projects do not require Power Plant Siting Act or Need Determination approvals.

The Big Bend Unit 1 modernization includes Big Bend CT 5, Big Bend CT 6, and Big Bend ST 1 and is already significantly underway, including site certification, permitting, engineering, procurement of major equipment, and construction. The combustion turbines and generators have been received at the site and placed on their foundations. The underground installation is almost complete and pipe rack installation is underway.

Tampa Electric estimates a final decision point for procuring and constructing a typical reciprocating internal combustion engine (RICE) to be approximately 30 months prior to the expected in-service date. The 30 months is comprised of 18 months for engineering, procurement, and permitting, which could vary depending on the site location, and 15 months for construction. The 30-month time estimate may be improved or extended based upon major equipment availability and site permitting.

Tampa Electric estimates a final decision point for procuring and constructing a typical battery energy storage system (BESS) to be approximately 15 months prior to the expected in-service date. The 15 months is comprised of 12 months for engineering, procurement, and permitting, which could vary depending on the site location, and 9 months for construction. The 15-month time estimate may be

improved or extended based upon major equipment availability and site permitting.

Tampa Electric estimates a final decision point for procuring and constructing a typical solar facility to be approximately 15 months prior to the expected in-service date. The 15 months is comprised of 12 months for engineering, procurement, and permitting, which could vary depending on the site location, and 9 months for construction. The 15-month time estimate may be improved or extended based upon major equipment availability and site permitting.

Future solar projects that are identified in Tampa Electric Company's 2020 Ten-Year Site Plan have already procured or will be procuring (in 2020) major pieces of equipment, including solar modules, inverters and tracker components. The procurement of equipment in 2020 will allow the projects to safe harbor the 26% Investment Tax Credit (ITC) to reduce the cost to our customers.

The planned solar projects will begin construction and/or development in 2020 to provide enough time to ensure safety, sufficient work force and account for schedule disruptions due to weather.

The Big Bend Unit 1 modernization includes Big Bend CT 5, Big Bend CT 6, and Big Bend ST 1 and is already significantly underway. The combustion turbines and generators have been received at the site and placed on their foundations. The underground installation is almost complete and pipe rack installation is underway.

60. Please complete and return, in Microsoft Excel format, the table associated with this question found in the Excel Tables Spreadsheet by providing the actual and projected capacity factors for each existing and planned unit on the Company's system for the 11-year period beginning one year prior to the current planning period.

A. Please refer to the tab labeled 'Q60 –Capacity Factors' in the provided Excel, "2020 TYSP Data Request #1- Excel Tables. xls".

61. [**Investor-Owned Utilities Only**] For each existing unit on the Company's system, please provide the planned retirement date. If the Company does not have a planned retirement date for a unit, please provide an estimated lifespan for units of that type and a non-binding estimate of the retirement date for the unit.

A. Refer to 2020 TYSP, Chapter 1 Schedule 1. Currently the company is depreciating its existing units in accordance with the remaining depreciable life approved in its most recent depreciation study.

62. Please complete and return, in Microsoft Excel format, the table associated with this question found in the Excel Tables Spreadsheet by providing information on all of the Company's steam units that are potential candidates for repowering to operation as Combined Cycle units.

A. Please refer to the tab labeled 'Q62 – Steam Unit CC Conversion' in the provided Excel, "2020 TYSP Data Request #1- Excel Tables. xls".

63. Please complete and return, in Microsoft Excel format, the table associated with this question found in the Excel Tables Spreadsheet by providing information on all of the Company's steam units that are potential candidates for fuel-switching.

A. Please refer to the tab labeled 'Q63 – Steam Unit Fuel Switching' in the provided Excel, "2020 TYSP Data Request #1- Excel Tables. xls".

64. Please complete and return, in Microsoft Excel format, the table associated with this question found in the Excel Tables Spreadsheet by providing a list of all proposed transmission lines for the current planning period that require certification under the Transmission Line Siting Act. Please also include in the table transmission lines that have already been approved, but are not yet in-service.

A. Please refer to the tab labeled 'Q64 – Transmission Lines' in the provided Excel, "2020 TYSP Data Request #1- Excel Tables. xls".

Environmental

65. Provide a narrative explaining the impact of any existing environmental regulations relating to air emissions and water quality or waste issues on the Company's system during the previous year. As part of your narrative, please discuss the potential for existing environmental regulations to impact unit dispatch, curtailments, or retirements during the current planning period.

A. Air Emissions

In 2019, Tampa Electric (TEC) did not experience significant impacts from environmental regulations relating to air emissions and does not anticipate any significant impacts during the current planning period. In addition, due to grid connectivity, it is possible that air related environmental regulations may impact the operational characteristics of neighboring generating resources to the point of impacting the reliability of the company's system.

In 2017, EPA implemented an update to CSAPR that removed Florida from the CSAPR program based on updated modeling and emission reduction commitments. In December 2019, EPA proposed to approve Florida's Infrastructure State Implementation Plan (SIP) related to the 2015 ozone NAAQS, and on March 5, 2020, the Florida Department of Environmental Protection (FDEP) announced that Florida meets all of the National Ambient Air Quality Standards (NAAQS) statewide.

Tampa Electric is uniquely positioned to be able to meet the Mercury Air Toxics (MATS standards (MATS) without considerable impacts. All of Tampa Electric's conventional coal-fired units are already equipped with electrostatic precipitators, scrubbers and SCRs, and the Polk Unit 1 IGCC unit emissions are minimized in the gasification process. As a result, Tampa Electric has demonstrated compliance on all applicable units with the most stringent "Low Emitting Electric Generating Unit" classification for MATS with nominal additional capital investment, minimizing the impact of this rule.

On June 19, 2019, EPA released a final rule, named the Affordable Clean Energy (ACE) rule, to establish emission guidelines for states to address greenhouse gas (GHG) emissions from existing coal-fired electric generating units (EGUs). The rule provides emission guidelines to inform the development of state plans to reduce GHG emissions from certain coal-fired EGUs. In the guidelines, EPA determined that heat rate improvement measures are the best system of emission reduction for existing coal-fired EGUs. Tampa Electric has emission

units that are subject to this rule and has engaged in the development of a state plan that could be finalized by the end of 2020.

The outcome of expected litigation and the rule-making process and its impact on TEC's businesses is uncertain at this time; however, it could result in increased operating costs, and/or decreased operations at Tampa Electric's coal-fired plants. Depending on how the state plan could be developed and implemented, the ACE rule could cause an increase in costs or rates charged to customers, which could curtail sales.

Water Quality
Tampa Electric discharges cooling water and low volume industrial wastewater at Big Bend, Bayside and Polk Power Stations. These discharges are required to meet water quality effluent limits for both chemical and thermal components. For chemical constituents at all three stations, Tampa Electric implements a combination of control measures, including internal treatment technologies, waste-stream discharge restrictions and recycling of internal waste-streams. At Big Bend Power Station, the only low volume wastewater discharge is the blowdown from the FGD System. All other internal waste-streams are recycled continuously in a zero liquid discharge system which provides makeup water for plant processes. For compliance with thermal permit limitations at Big Bend and Bayside Power Stations, both of which employ once-through cooling technology, the only method of discharge control available is limiting unit output (derating) to reduce thermal loading. Ambient temperature conditions requiring such measures typically occur only in the hottest months (July-September) of the year. Polk Power Station employs a recirculating Cooling Reservoir for thermal control.

Waste
There were no waste issues related to existing environmental regulations affecting dispatch, curtailments or retirements during 2019. However, the Company continued to comply with specific operating requirements of the federal CCR Rule throughout the year, as further described in DR Response 64 below.

66. For the U.S. EPA's Standards of Performance for Greenhouse Gas Emissions for New Stationary Sources: Electric Utility Generating Units Rule:

a. Will your Company be materially affected by the rule?

b. What compliance strategy does the Company anticipate employing for the rule?

c. If the strategy has not been completed, what is the Company's timeline for completing the compliance strategy?

d. Will there be any regulatory approvals needed for implementing this compliance strategy? How will this affect the timeline?

e. Does the Company anticipate asking for cost recovery for any expenses related to this rule? Please complete and return, in Microsoft Excel format, the table associated with this question found in the Excel Tables Spreadsheet by providing information on the costs for the current planning period.

f. If the answer to any of the above questions is not available, please explain why.

A. a. Yes.

b. The Big Bend Unit 1 modernization project will involve the repowering of Unit 1 with a highly efficient, state of the art, natural gas-fired, combined cycle generating unit. The new units will be designed to comply with the referenced standards.

c. The new units are planned to be in commercial operation in 2023.

d. All regulatory approvals have been received.

e. Tampa Electric does not anticipate asking for cost recovery for any expenses relating to this rule. Please refer to the tab labeled 'Q66e – Emissions' in the provided Excel, "2020 TYSP Data Request #1- Excel Tables. xls".

f. Not applicable.

67. Explain any expected reliability impacts resulting from each of the EPA rules listed below. As part of your explanation, please discuss the impacts of transmission constraints and changes to units not modified by the rule that may be required to maintain reliability.

a. Mercury and Air Toxics Standards (MATS) Rule.

b. Cross-State Air Pollution Rule (CSAPR).

c. Cooling Water Intake Structures (CWIS) Rule.

d. Coal Combustion Residuals (CCR) Rule.

e. Standards of Performance for Greenhouse Gas Emissions for New Stationary Sources: Electric Utility Generating Units.

f. Affordable Clean Energy Rule.

g. Effluent Limitations Guidelines and Standards (ELGS) from the Steam Electric Power Generating Point Source Category.

A. a. None.

b. None.

c. Effects on reliability related to compliance with this rule will depend on the compliance option implemented at each facility. Installation of closed cycle cooling towers to meet the requirements would not affect reliability directly. However, the parasitic load associated with the operation of such units would reduce the net output by the facility, requiring replacement power to be generated elsewhere. Also, any malfunction of cooling tower components or related equipment could require unit derating or shutdown, depending on the specific compliance conditions in the NDPES Permit. Likewise, if unit operation is contingent on the function of intake structure modifications, then malfunction of screens or pumps could limit or prevent operation of associated generating units.

d. None.

e. None.

f. None.

g. None.

68. Please complete and return, in Microsoft Excel format, the table associated with this question found in the Excel Tables Spreadsheet by identifying, for each unit affected by one or more of EPA's rules, what the impact is for each rule, including; unit retirement, curtailment, installation of additional emissions controls, fuel switching, or other impacts identified by the Company.

A. Please refer to the tab labeled 'Q68 – EPA Operational Effects' in the provided Excel, "2020 TYSP Data Request #1- Excel Tables. xls".

69. Please complete and return, in Microsoft Excel format, the table associated with this question found in the Excel Tables Spreadsheet by identifying, for each unit impacted by one or more of the EPA's rules, what the estimated cost is for implementing each rule over the course of the planning period.

A. Please refer to the tab labeled 'Q69 – EPA Cost Effects' in the provided Excel, "2020 TYSP Data Request #1- Excel Tables. xls".

70. Please complete and return, in Microsoft Excel format, the table associated with this question found in the Excel Tables Spreadsheet by identifying, for each unit impacted by one or more of EPA's rules, when and for what duration units would be required to be offline due to retirements, curtailments, installation of additional controls, or additional maintenance related to emission controls. Include important dates relating to each rule.

A. Please refer to the tab labeled 'Q70 – EPA Unit Availability' in the provided Excel, "2020 TYSP Data Request #1- Excel Tables. xls".

71. If applicable, identify any currently approved costs for environmental compliance investments made by your Company, including but not limited to renewable energy or energy efficiency measures, which would mitigate the need for future investments to comply with recently finalized or proposed EPA regulations. Briefly describe the nature of these investments and identify which rule(s) they are intended to address.

A. Tampa Electric has not received approval for any costs for environmental compliance investments required to comply with recently finalized or proposed EPA regulations.

Fuel Supply & Transportation

72. Please complete and return, in Microsoft Excel format, the table associated with this question found in the Excel Tables Spreadsheet by providing, on a system-wide basis, the actual annual fuel usage (in GWh) and average fuel price (in nominal $/MMBTU) for each fuel type utilized by the Company in the 10-year period prior to the current planning period. Also, provide the forecasted annual fuel usage (in GWh) and forecasted annual average fuel price (in nominal $/MMBTU) for each fuel type forecasted to be used by the Company in the current planning period.

A. Please refer to the tab labeled 'Q72 – Fuel Usage & Price' in the provided Excel, "2020 TYSP Data Request #1- Excel Tables. xls".

73. Please discuss how the Company compares its fuel price forecasts to recognized, authoritative independent forecasts.

A. Fuel commodity price forecasting is derived through analysis of historical and current prices combined with price forecasts obtained from various consultants and agencies. These sources include the New York Mercantile Exchange (NYMEX), Energy Information Administration (EIA), PIRA Energy Group (PIRA), Doyle Trading Consultants, Coal Daily and Platt's Oilgram. The company carefully examines its final fuel forecasts for trending relationships among fuels and anomalies (e.g., an unexplainable spike in natural gas prices) to eliminate elements that could impact the validity of long-term energy pricing and planning. The resulting fuel price forecasts, including high and low internal fuel forecasts, are compared to independent sources such as NYMEX, EIA and PIRA (now owned by Platts) for reasonableness.

74. Please identify and discuss expected industry trends and factors for each fuel type listed below that may affect the Company during the current planning period.

a. Coal

b. Natural Gas

c. Nuclear

d. Fuel Oil

e. Other (please specify each, if any)

A. a. **Coal**

The coal industry is expected to continue in a state of much uncertainty and reduced production during the 2020 through 2029 period. The demand for coal in the U.S. is declining due to coal unit retirements and shifts in generation to natural gas or renewables, low natural gas prices, evolving environmental regulations and slowed energy consumption. The availability and cost of coal is also uncertain due to resource constraints in labor, land access, land use, and production costs. The reduced demand and rising production cost are causing financial stress for many participants in the coal industry. The financial health of existing and potential coal producers is monitored closely by Tampa Electric. The U.S. continues to be a net exporter of coal with international demand expected to drive more price and production uncertainty. Tampa Electric's coal consumption as a percentage of system fuel mix is expected to be minimal over the current planning period.

b. **Natural Gas**

The natural gas industry will continue to be influenced by the growth in unconventional gas production (i.e., shale gas) in North America, associated gas from shale oil production, changes in pipeline flows and projects to connect new supply to changing load centers, exports to Mexico and the international market for LNG. Expectations for continued production growth keeps the forecasted price for natural gas relatively low in the foreseeable future. This low price is also encouraging exports of LNG from the U.S. and is virtually the only fuel being selected for future electric generation in the U.S. However, there are some upside price risks to consider, including restrictions on fracking and infrastructure, slowed growth in both mid-term and long-term shale production and increased

global LNG demand. Tampa Electric is affected by the evolving shale gas market since much of its gas supply is coming from Appalachia, Mid-continent and Permian, instead of the Gulf of Mexico. Tampa Electric is continually evaluating and enhancing its portfolio of natural gas assets and supply arrangements to reliably meet the increasing percentage of fuel mix supplied by natural gas over the current planning period.

Recently, we have seen extreme volatility in the oil markets as OPEC has been unable to resolve production challenges related to reduced demand. A price war erupted between Saudi Arabia and Russia reducing WTI crude oil prices from $50/barrel down to $20/barrel in a matter of weeks. There is also oil demand uncertainty related to COVID-19. Although oil related, both items could potentially impact associated gas from shale oil production, as well as global demand for U.S. LNG exports, impacts which, depending on their length, could affect the supply and price of natural gas in the current planning period.

c. **Nuclear Fuel**
Tampa Electric does not have nuclear generation facilities.

d. **Oil**
Historically, crude oil, heavy oil and distillate fuel oil prices have been volatile and are expected to remain volatile in the foreseeable future. Global tensions, global economics, weather-related supply disruptions and aging refining capacity may cause the price of crude and its related products to change dramatically. These risk factors underpin the expectation of continued price volatility. Other supply and demand drivers are electric vehicle penetration, petrochemical growth, shale oil production and cost reductions in non-shale non-OPEC production. Since Tampa Electric has a small quantity of oil-capable units and uses oil solely as a back-up fuel, its projected use of oil for energy production is less than one percent. Thus, oil price volatility will have limited impact on the company.

e. Not applicable.

75. Please identify and discuss steps that the Company has taken to ensure natural gas supply availability and transportation over the current planning period.

A. Tampa Electric continually evaluates its natural gas portfolio to ensure it has adequate natural gas assets in place to deliver reliable, low cost gas from the supply area directly to our generating facilities. In 2020, Tampa Electric procured upstream capacity on the Gulf South pipeline to minimize the risk of declining Mobile Bay offshore production and to access lower cost onshore shale supply basins. Other areas of focus include evaluating opportunities for 1) additional market area pipeline capacity or storage to meet growing gas requirements, 2) increased pipeline reliability at generating facilities, and 3) enhancing the portfolio of fuel assets to mitigate supply or transport interruptions.

76. Please identify and discuss any existing or planned natural gas pipeline expansion project(s), including new pipelines and those occurring or planned to occur outside of Florida that would affect the Company during the current planning period.

A. Numerous natural gas pipeline projects have been completed, are in the works, or are proposed to move natural gas from the Mid-continent, Appalachia, and Permian production areas, to markets across the United States. These are the primary projects that directly impact the Florida market and Tampa Electric Company:

- Alabama - Gulfstream Natural Gas Pipeline System Phase VI expansion (2022)
- Alabama - Transco's Phase 2/3 of the Hillabee expansion project; part of the Southeast Market Pipelines project (2020/2021)
- Oklahoma - Midcontinent Supply Header Interstate Pipeline (2020)
- Louisiana - Multiple gulf coast pipeline projects feeding LNG exports and other markets (various phases)
- Texas - Multiple pipeline projects from the Permian basin to Carthage or the Gulf Coast (various phases)

77. Please identify and discuss expected liquefied natural gas (LNG) industry factors and trends that will impact the Company, including the potential impact on the price and availability of natural gas, during the current planning period.

A. There are currently 6 operational LNG projects in the U.S. exporting significant amounts of LNG to world markets with several more under construction. The projects that have been approved and constructed have had little impact on Tampa Electric's natural gas supply portfolio. However, an upward pressure on natural gas prices could materialize if LNG export volumes increase and more projects are approved and constructed. Global demand for LNG in Asia and Europe could boost U.S. LNG exports, increasing the risk that the company experiences higher natural gas prices. Conversely, as was mentioned in data request #74, reduced global demand, which we are currently experiencing due to COVID-19, could suppress natural gas prices for an unknown period of time.

78. Please identify and discuss the Company's plans for the use of firm natural gas storage during the current planning period.

A. Tampa Electric currently maintains 2,000,000 MMBtu of underground natural gas storage capacity at two facilities. High-deliverable salt dome storage is a key component of Tampa Electric's natural gas supply portfolio. The storage serves both as a reliable supply source of natural gas and a key component of balancing supply and demand on a daily basis. Tampa Electric attempts to keep its storage levels close to full. Maintaining this volume allows the storage to be a reliable source of supply that provides risk mitigation against various events, such as production freeze-offs during the winter and summertime production shut-ins due to storms (e.g., hurricanes) in the Gulf of Mexico that impact Mobile Bay, Destin and other offshore facilities.

79. Please identify and discuss expected coal transportation industry trends and factors, for transportation by both rail and water that will impact the Company during the current planning period. Please include a discussion of actions taken by the Company to promote competition among coal transportation modes, as well as expected changes to terminals and port facilities that could affect coal transportation.

A. Rail transportation and inland river barge transportation are evolving rapidly as retirements of domestic coal-fired generation units cut demand. For instance, rail and barge transporters seek new opportunities to keep their transportation assets active in the marketplace. These new opportunities include transporting other commodities, in general, along with sand for shale fracturing and crude from shale production. Such opportunities change the flow of energy commodities by rail and river barge. Ocean transportation is experiencing similar dynamics. However, because of the multiple coal-fired generation retirements, the Jones Act fleet, while aging, can meet the declining demand for coal.

The coal supply chain continues to experience significant financial stress as reflected in several industry bankruptcy filings. The domestic and global coal supply markets continue to be over-supplied due to low natural gas prices, increased governmental regulations, renewables growth and limited electric load growth. These factors affect all legs of the transportation chain. The demands for inland barging, terminals and ocean transportation have all decreased rather significantly causing inordinate financial stress for these companies. Tampa Electric strives to maintain bi-modal transportation agreements to encourage market liquidity and increased reliability of supply should one source experience interruption. Due to its reduction in the amount of generation fueled by coal, Tampa Electric is currently purchasing limited amounts of delivered waterborne coal as well as utilizing its rail transportation agreements as needed.

80. Please identify and discuss any expected changes in coal handling, blending, unloading, and storage at coal generating units during the current planning period. Please discuss any planned construction projects that may be related to these changes.

A. There are no expected changes in coal handling, blending, unloading or storage facilities for the period 2020 through 2029.