DUKE ENERGY
FLORIDA

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September 5, 2018

VIA ELECTRONIC MAIL

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

Re: *2018 TYSP Supplemental Data Request #2*

Dear Ms. Stauffer:

Please find attached for filing on behalf of Duke Energy Florida, LLC its response to questions 1-14 of the 2018 TYSP Supplemental Data Request #2 issued on August 9, 2018.

Thank you for your assistance in this matter. Please feel free to call me at (727) 820-4692 should you have any questions concerning this matter.

Respectfully,

/s/ Dianne M. Triplett

Dianne M. Triplett

DMT/cmk
Attachment
cc: Takira Thompson

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Duke Energy Florida, LLC's Response to Staff's
Supplemental Data Request #2 (Nos. 1-14)

1. Please refer to Duke Energy Florida's (DEF) responses to staff's Supplemental Data Request #1, No. 70.

   a. Please identify the specific sources and dates of the 2018-2027 fuel price forecast presented in this response.
   b. Please discuss the decreases in fuel prices of coal, natural gas, and distillate oil (of -38 percent, -25 percent, and -25 percent respectively) from 2017 actuals, to the 2018 projected values. As in, what are/were the drivers of the price differences.

<u>RESPONSE</u>:

a. Please identify the specific sources and dates of the 2018-2027 fuel price forecast presented in this response.

   DEF's fuel price forecasts for use in the 2018 Ten-Year Site Plan were developed in the fall of 2017. As discussed in the plan and in the response to Question 2 below, DEF uses data from the fundamental fuel price forecast provided by our fuel price vendor and from the NYMEX forecast of contract prices. For this forecast, the NYMEX prices, which are updated weekly, were sampled on September 18, 2017. The fundamental forecast was developed in the late summer of 2017 and delivered by the vendor in October 2017. DEF blends these two forecasts together over the ten year period.

b. Please discuss the decreases in fuel prices of coal, natural gas, and distillate oil (of -38 percent, -25 percent, and -25 percent respectively) from 2017 actuals, to the 2018 projected values. As in, what are/were the drivers of the price differences.

Most of these discrepancies are due to factors driven by near term circumstances and modeling techniques rather than significant factors in the markets.

In the case of natural gas, the actual cost reflected in DEF's A-4 schedules and in the response to SDR #1 Question 70 includes the cost of fixed pipeline charges, that is the fixed cost natural gas transportation. In the development of the Ten-Year Site Plan, and as reflected in the forecast prices shown in the Question 70 response, DEF uses incremental new costs to evaluate the selection of new resources and system dispatch. Thus the forecast price shown represents the forecast incremental price of the natural gas commodity plus variable delivery charges, but excludes non-incremental fixed charges such as the costs of long term gas pipeline transportation contracts.

In the case of coal, the largest driver of this year over year discrepancy is that the 2017 actual costs include the cost of the more expensive environmental compliance coal burned in Crystal River Units 1 and 2. DEF's projections for 2018 assumed that these units would operate at a very low capacity factor as they moved toward retirement later in 2018 and that the 2019 price would be based solely on the less expensive coal burned in units 4 and 5.

In the case of oil there is also some difference in the way that the cost is calculated. Again, the forecast is based on a spot price for the future purchase of oil associated with the operation of oil fired units. This provides our production cost model the best estimate of the future incremental dispatch of the oil fired generating units. In the reporting of the actual cost through the A-4 schedules, the cost is based on the inventory value of the oil. Since DEF burns relatively little oil in a typical year, the inventory value may deviate significantly from the spot price.

2. Please refer to DEF's 2018-2027 Ten-Year Site Plan (TYSP), pages 3-35. Please further elaborate on the methodology used in developing DEF's forecasted fuel prices.

RESPONSE:

DEF's fuel forecasts used in the production of the TYSP are developed from the use of short term spot market prices available from spot price based on the NYMEX futures index for natural gas and distillate oil. For each fuel, these indices are blended in later years with spot market forecast prices available from DEF's industry recognized fuel price consultant. The methodology for the coal price forecast is similar except that the early year prices are based on DEF's existing coal delivery contracts. DEF contracts with an industry recognized consultant to prepare a forecast of the future spot prices for key fuels including natural gas, distillate oil, and a variety of coal types based on quality and mine location. The fundamental forecast is a long term proprietary forecast prepared by a nationally recognized third party consulting company. General market forces applicable to each fuel are discussed in detail in DEF's response to SDR #1 Question 72. DEF's fuel purchase and planning teams work with these forecasts to blend the forecasts to account for current market behavior and expected future trends driven by market fundamentals including expected future impacts of such forces as shifts in the national generation mix, development of natural gas export capacity and the potential for carbon emissions regulation. The current DEF forecast relies on the market projection in the initial years and blends the market value with the fundamental forecast over a multi-year period so that the projected prices reach alignment with the fundamental forecast toward the end of the ten year period. Under current market conditions, NYMEX contracts (upon which the NYMEX index is based) are being made at essentially constant (flat) prices over the next several years. This reflects current and expected market conditions including a relative surplus of gas supply compared to the demand. As a result, the DEF forecast shows almost no price escalation over the first 4 - 5 years of the period. Beyond this point, DEF recognizes a likely move toward a market in greater equilibrium between supply and demand as well as one reflecting increased effects of natural gas export. This is reflected in the higher price trend in the second half of the forecast. DEF's long term fundamental price beginning beyond year 10 shows a similar escalation rate to that found in the EIA AEO 2018 reference case.

3. Please refer to DEF's response to staff's Supplemental Data Request #1, No. 2 (Excel files). Please explain why DEF did not develop high and low case scenarios of forecasted fuel prices.

RESPONSE:

In preliminary work prior to the development of the TYSP, DEF concluded that variation in the fuel price over the range that DEF believed likely was not a significant factor in the development of the 2018 – 2027 base expansion plan. DEF did subsequently develop high and low case sensitivities for the fuel prices for use in the specific evaluation of contract and new unit cost effectiveness as shown in the recently filed Ridge Generating contract termination proceeding (Docket number 20180152-EI) and the Solar Base Rate Adjustment proceeding (20180149-EI). Delay in development of these scenarios allowed DEF to use the more contemporary data from the EIA's AEO 2018 scenarios.

4. Please refer to DEF's 2018 TYSP, Schedules 2.1.1-3, 2.2.1-3, located on pages 2-4 through 2-9 and page 2-31.

a. Please explain, with specificity, how DEF forecasts its expected (base case) population and number of customers by class for 2018-2027.
b. Please explain, with specificity, how DEF developed its high and low case scenarios of expected population and number of customers by class for 2018-2027

RESPONSE:

a. Please explain, with specificity, how DEF forecasts its expected (base case) population and number of customers by class for 2018-2027.

DEF begins the Customer forecast by developing a service area population projection using historical & projected county level projections supplied by the University of Florida's Bureau of Economic & Business Research (BEBR) Florida Population Studies (See page 2-31 "General Assumption" #2.). DEF serves power to residential households (all or in part) in twenty-nine of the sixty-seven Florida counties. The projected series for each county is in 5-year increments which is interpolated to create the missing years. Next, the resulting annual service area population is converted to monthly periodicity using a centered moving average function. This results in the historical and projected "independent" variable used a linear regression model.

The number of DEF residential customers is then modelled using linear regression where:

Residential Customers = Function (29 County service area Population)

The use of an "AR term" to capture a previous month's influence on the following month is included in the model. Monthly indicators are sometimes added to reduce the impact of anomalies or one-time events such as outages, rate migrations, etc. In the Commercial sector, the independent variable found to best project commercial class customers is the historical and newly projected number of residential customers. The Industrial class customer forecast is developed using the series itself lagged one-period. The stability of this series – which is downward trending – results in reasonable projections in the short and intermediate term. The SPA (governmental) class is somewhat similar nature to the Industrial class in that trended logarithmic series is fitted using the historical monthly class trend resulting projected trend that reflects increasing class growth but at a slightly declining rate of growth. Finally, the Street Lighting Class, which, like the Industrial class, has been declining over time, applied a linear trend to produce a slight but continual decline over the forecast period. The sum of these projections results in the total Retail customer count projection.

b. Please explain, with specificity, how DEF developed its high and low case scenarios of expected population and number of customers by class for 2018-2027

A high and low projection of population and thus number of customers was not incorporated in the DEF 2018 TYSP High and Low projections.

5. On page 2-34, DEF's 2018 TYSP states "this forecast does consider policies laid out in the first six months of the Trump administration, but this does not include the recently passed tax reduction plan." With regards to the national economic assumptions for the forecast, please specify which major policies are taken into account.

<u>RESPONSE</u>: This reference is in relation to literature from Moody's analytics and a lecture from Mark Zandi, Chief Economist for MA. The July 2017 forecast DEF used in this projection specifically expressed that there was not enough information around what type of tax plan was being developed, but consideration to reducing regulations on job creators could be expected.

6. On page 2-34, DEF's 2018 TYSP states that while "DEF continues to plan for the eventual regulation of GHG emissions," the current forecast excluded the projected onset of the regulations until 2025. However, in the 2017 TYSP, the forecast is said to include the "phased-in impact upon DEF electric prices from the US EPA proposed Clean Power Plan beginning in 2022." With regards to state economic forecast assumptions, do DEF's 2018 TYSP forecasts take into account the same impact upon electric prices due to the EPA proposed Clean Power Plan that was alluded to in the 2017 TYSP? Please quantify all such differences.

<u>RESPONSE</u>: This reference refers to the development of the projected electric price series which has not changed, nor the timing of the Clean Power Plan assumption you refer to. The development of the first five years of the electric price forecast comes from the DEF corporate financial model with projected costs, revenues, rate case assumptions, etc., and do not consider any additional environmental regulations. For the remainder of the forecast horizon, electric price expectations assume a "blending" of the short term trend into a projection influenced by higher energy prices created by an stricter environmental regulation placed on Greenhouse Gases. This projection is performed in conjunction with existing and planned electric generation capacity and the respective energy consumption needs.

Broadly, DEF's view of GHG regulation has changed from strict implementation of the 2015 era Clean Power Plan to a view assuming a requirement to reach a 40% reduction in emissions by 2030 and 50% by 2040. Since any specific prices do not begin until 2025 in either case, this has little or no impact on the price series in the ten year period.

7. On page 2-39, DEF's 2018 TYSP states that "the historical values of [retail monthly net peak demand] are constructed to show the size of DEF's retail net peak demand assuming no utility activated load control had ever taken place." In DEF's 2017 TYSP, the size of DEF's retail net peak demand assumes "no utility activated load control or energy efficiency reductions . . ." Why was this changed assumption in DEF's historical retail net peak demand (it appears that energy efficiency reductions are now no longer an assumption in the context of determining retail net peak demand) made and what are the impacts of the change on DEF's peak demand models and forecast?

<u>RESPONSE</u>: The change in wording simply better states what DEF has been doing for approximately four years and improving the written documentation process in the Plan. First, nothing changed in the forecast process for monthly Retail peak demand. The modeling effort still requires any direct load control at time of monthly peak get added back to the recorded value. Any regression model that fails to do this will get less than optimal results. The reason for not "adding back" the historical EE impacts before the modeling process is due to a change in applying future EE impacts. DEF applies the impacts from expected future EE programs on a "net new cumulative basis" from day 1 of the forecast horizon. This eliminated the need to apply a "gross historical level" of EE to the projected monthly demands and go with an accumulating series which allows the company to reflect what the net new impacts are upon the forecast horizon. The net impacts are technically identical.

8. According to Schedule 2.2.1, column (8), DEF experienced a decline in total energy sales to ultimate consumers, from 38,774 gigawatt hours (GWh) in 2016, to 38,023 GWh in 2017. DEF then forecasts growth from 2018-2027.

a. Please explain the observed decline in energy sales in 2017.
b. Why does DEF not expect that decline to persist after 2017?

RESPONSE:

a. Please explain the observed decline in energy sales in 2017.

Historical values in DEF's TYSP are stated on an actual or reported basis. The primary driver of lower sales observed in 2017 was the very mild weather experienced last year.

b. Why does DEF not expect that decline to persist after 2017?

Weather sensitive classes are projected with a thirty year average weather assumption. Thus, DEF's projections for 2018 and beyond assume "normal" weather.

9. Please provide a comparison of DEF's 2017 and 2018 TYSPs, identifying any notable differences.

RESPONSE:
The two plans differ in a variety of areas both in the input construction and in the resulting base expansion plans. Key among the input assumptions is the assumption that certain solar projects meeting specific criteria for planning, interconnection, and controllability among other factors will be sufficiently reliable to receive credit for providing firm summer capacity. Based on industry accepted models, DEF reflected a summer firm capacity value equal to 57% of the nameplate (AC) capacity of these units in the plan. This provides over 600 MW of firm summer solar capacity planned over the 10 year period and results in the deferral of some projected conventional generation units. Other more modest factors included a small reduction in the load forecast, lower average gas prices and the assumption that GHG emissions requirements would be consistent with a target of 40% GHG emissions reduction by 2030 with price impacts beginning in 2025 rather than consistency with the 2015 era Clean Power Plan.

Summary level resource plans reflecting these changes in assumption are shown below.

Year	2017 TYSP Resource Plan	Firm Summer MWs
2018	Crystal River 1 Retirement (Apr '18) Crystal River 2 Retirement (Apr '18) CC2x1 G @ Citrus (May '18) CC2x1 G @ Citrus (Nov '18) Intercession City 11 Transmission (Jul '18) EcoGen Polk (Jun '18)	(324) (442) 820 820 140 60
2019		
2020	Avon Park 1-2 (May '20) Higgins 1-4 Retirement (May '20)	(48) 0
2021	Southern Company Contract (May '21)	(424)
2022		
2023	Osprey Transmission Upgrade (May '23) * Orlando Expires (Dec '23)	313 (115)
2024	Shady Hills PPA Expires (Apr '24) CT (Jun '24) Mulberry (Aug '24)	(476) 228 (115)
2025	CT (Jun '25) Orange Expires (Dec '25)	228 (104)
2026	CT (Jun '26)	228

Year	2018 TYSP Resource Plan	Firm Summer MWs
2018	Crystal River 1 Retirement (Aug '18) Crystal River 2 Retirement (Aug '18) CC2x1 G @ Citrus (Sep '18) CC2x1 G @ Citrus (Dec '18) Intercession City 11 Transmission (Jun '18) Solar 0.5 MW (Dec '18)	(324) (442) 820 820 140 0
2019	EcoGen Polk (Dec'19) Solar 74.9MW (Mar '19) Solar 119.9MW (Dec '19)	60 43 68
2020	Avon Park 1-2 (May '20) Higgins 1-4 Retirement (May '20) Solar 74.9MW (Mar '20) Solar 219.8MW (Dec '20)	(48) 0 43 125
2021	Southern Company Contract (May '21 Solar 209.8 MW (Dec '21)	(424) 120
2022	Solar 74.9MW (Dec '22)	43
2023	Orlando Expires (Dec '23) Solar 74.9MW (Dec '23)	(115) 43
2024	Shady Hills PPA Expires (Apr '24) Osprey Transmission Upgrade (May '24) * Mulberry (Aug '24) Solar 74.9MW (Dec '24)	(480) 337 (115) 43
2025	Orange Expires (Dec '25) Solar 74.9MW (Dec '25)	(104) 43
2026	Solar 74.9MW (Dec '26)	43
2027	Vandolah PPA Expires (May '27) 3 CTs (June '27) Solar 74.9MW (Dec '27)	(640) 679 43

10. Please explain why the Osprey CC Unit 1 transmission upgrades in-service year is now anticipated to be 2024 instead of 2023 as noted in DEF's 2017 TYSP.

RESPONSE: Due to the size and complexity of the project, additional time was needed to perform Route Siting and ensure adequate Public Engagement activities prior to the open houses. As these were critical path activities, it pushed the in-service date from 2023 to 2024.

11. Please explain whether DEF considers the nameplate or summer firm capacity to contribute to the 700 megawatt cap for solar additions, mentioned in its settlement agreement.

a. For solar additions with planned in-service dates after 2021, please explain whether or not DEF plans to file for cost recovery with the Commission.

RESPONSE: DEF considers a solar project's "nameplate" rating in megawatts-alternating current (MWac) as the contribution to the 700 MW of maximum solar generation DEF may construct or acquire as mentioned in its Settlement Agreement.

For solar project additions with planned in-service dates that are not contemplated under the Settlement Agreement, DEF will address cost recovery at the appropriate future time.

12. Please explain why DEF plans to add solar additions beginning in 2018 although they are not necessary to meet DEF's reserve margin requirements.

RESPONSE: DEF has a system need for cost-effective generation that will dependably contribute to fuel diversity in DEF's supply-side resource portfolio. DEF's reliable large scale solar projects will diversify DEF's fuel mix with emission-free generation, while providing firm summer capacity which helps to meet future capacity and generation needs.

13. Please refer to DEF's responses to staff's Supplemental Data Request #1, No. 36. Please indicate whether or not DEF plans to pursue any of these projects. If so, please identify which and provide the status of these proposed projects.

RESPONSE: DEF has already pursued two of these projects referenced in DEF's response to staff's Supplemental Data Request #1, No. 36. The two renewable generation projects were acquired at various stages of development from third-parties from the over 4,600 MW of solar PV projects in DEF's interconnection queues. These two cost-effective solar projects are DEF's Hamilton Solar Power Plant and Columbia Solar Power Plant. These projects are currently under development and described in detail in DEF's Petition for Limited Proceeding to Approve First Solar Base Rate Adjustment under Docket No. 20180149-EI. DEF plans to continue to discuss potential project options with third-party renewable companies. Renewable and solar projects that will continue through the review process will be cost-effective, will benefit DEF customers by providing reliable and flexible renewable generation, contribute to the diversity of DEF's fuel resources, and provide long-term sustainable renewable energy.

14. Please explain how DEF calculates solar degradation.

a. Please discuss whether or not DEF accounts for solar degradation in cost-effectiveness evaluations.
b. Please identify the possible causes of solar degradation.

RESPONSE: DEF accounts for solar degradation in its solar power plant production forecasts, and thus in its cost-effectiveness modeling and evaluations.
Generally, a PV module manufacturer will warranty their solar production to an assumed linear degradation rate. DEF uses an industry accepted annual step reduction in PV module direct-current, (DC) capacity of 0.5% per year. This value is used for the expected operating life of the modules and is reflected in DEF's alternating-current, (AC) solar energy production forecasts. Once actual degradation data is collected at the DEF solar facilities, this degradation estimate will be refined as warranted.

Solar researchers and panel manufacturers recognize solar degradation as it relates to the PV modules or panels. Degradation of the PV modules has several potential causes: a phenomenon known as light-induced degradation and potential-induced degradation, module soiling (dirt, dust, and mold accumulation), gradual discoloration of materials, and small stress cracks in the silicon PV cells due to thermal cycles and wind. The extent of the degradation varies somewhat by module technology and the physical environment, including hot and humid environments where the panels are installed. Degradation rates are well-documented in the industry by researchers such as the Department of Energy's National Renewable Energy Laboratory, (NREL).