City of Tallahassee
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Electric Utility | 400 E. Van Buren St. Tallahassee, FL 32301 | 850.891.4YOU (4968)

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September 28, 2018

Office of Commission Clerk
State of Florida Public Service Commission
2540 Shumard Oak Blvd.
Tallahassee, FL 32399-0850

Dear Sir/Madam:

Attached please find the City of Tallahassee's (TAL) response to the Florida Public Service Commission's fourth request for supplemental information regarding TAL's 2018 Ten Year Site Plan report provided pursuant to Section 366.05(7), F.S., Docket Number 20180000-OT. If you should have any questions regarding this information, please feel free to contact me at (850) 891-3130 or paul.clark@talgov.com. Thank you.

Sincerely,

Paul D. Clark, II
Principal Engineer

Attachment

1. With respect to the forecasting methodology, procedures, and models developed associated with Winter and Summer Peak Demand, please specify all the differences/ modifications/ improvements, if any, between what used in Tallahassee's 2017 and 2018 Ten-Year Site Plans (TYSP).

   The City of Tallahassee, Electric Utility's (TAL) annual load and energy forecast is produced by a consultant. To get different perspectives for its 2018 forecast, TAL contracted with a different consultant than had been used in previous years.

   On the following page is a summary comparison of TAL's 2017 and 2018 forecasts for Winter and Summer Peak Demand.

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

   Each year, TAL's consultant creates an "ex post" projection of the prior year's peak demands using the actual values for the model's independent variable inputs. This ex post projection is then compared to the actual peak demands observed. If the percent difference between the actual and ex post projection of Winter and Summer Peak Demand exceeds the consultant's expectation, the consultant examines independent variables that could be added or removed to improve upon the previous forecast model.

   In developing a new forecast model, the consultant examines measures that give indications of the statistical significance of independent variables and "goodness of fit" of models used to forecast Winter, Summer and monthly Peak Demand values. Measures of statistical significance include but are not necessarily limited to the "p-value"(the probability that a statistical result occurred by chance or due to a sampling error) and "t-statistic" (the ratio of the departure of the estimated value of a parameter from its hypothesized value to its standard error); measures of the model's "goodness of fit" includes but are not necessarily limited to the "R-squared" (a measure of how close the sample data are to the fitted regression formula) and "F-statistic" (value obtained from an analysis of variables (ANOVA) or regression analysis that indicates if a group of variables are jointly significant). Care is taken to ensure that these measures are within their respective bounds consistent with generally accepted statistical analysis practice.

	2017 Forecast	*2018 Forecast*
General Methodology	• *Perform regression analysis to create separate forecasts of annual load factor relative to Winter and Summer Peak Demand*	• *Perform regression analysis to create separate forecasts of monthly load factor relative to monthly Peak Demand*
	• *Multiply forecast seasonal load factor by forecast annual net energy for load (NEL) to obtain base forecasts of Winter and Summer Peak Demand*	• *Multiply forecast monthly load factor by forecast monthly net energy for load (NEL) to obtain base forecasts of monthly Peak Demand*
	• *Subtract separately forecast seasonal Peak Demand reductions attributable to demand-side management (DSM) energy efficiency (EE) and demand response (DR) measures.*	• *Subtract monthly allocation of separately forecast seasonal Peak Demand reductions attributable to demand-side management (DSM) energy efficiency (EE) and demand response (DR) measures.*
Independent Variables	*Winter* • *Minimum temperature on day of Winter Peak Demand* • *Prior day heating degree days (HDD) versus 45º base* • *Degrees peak day minimum temperature is less than 22º* • *Calendar year cooling degree days (CDD)*	• *Monthly heating (HDD) and cooling degree days (CDD)* • *Peak day and prior day high and low temperatures versus various base temperatures* • *Binary terms to capture peak occurrences on Sundays, holidays and days with snowfall* • *Other seasonal binary terms*
	Summer • *Maximum temperature on day of Summer Peak Demand* • *Prior day maximum temperature* • *Calendar year cooling degree days (CDD)* • *Average fiscal year residential real price of electricity*	

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

TAL's base forecasts of Winter and Summer Peak Demand rely on assumptions of expected future conditions. However, these assumptions are unlikely to exactly match actual experience. Though not a new practice, TAL's consultant annually produces high and low forecasts to address the uncertainty in the forecasts' driving variables.

To capture the range of possible forecast outcomes, the high and low forecasts are developed by varying the base input assumptions. The range between the high and low forecasts is intended to represent an 80% confidence interval, implying only a 10% chance each of the actual outcome being higher or lower than the resulting bounds.

4. Please provide the Historical Forecast Accuracy associated with Tallahassee's Winter Peak Demand for the period 2012-2013 through 2016-2017 and Summer Peak Demand for the period 2013 through 2017.

Table 1. Accuracy of Winter Peak Demand Forecasts

Forecast / Actual	Winter Peak Demand Forecast Error Rate (%) Forecasting Period Prior					Average
	5	4	3	2	1	
480	2008 TYSP	2009 TYSP	2010 TYSP	2011 TYSP	2012 TYSP	–
2013	13.2%	5.5%	4.0%	11.0%	12.3%	9.2%
574	2009 TYSP	2010 TYSP	2011 TYSP	2012 TYSP	2013 TYSP	–
2014	-13.7%	-16.6%	-7.1%	-5.8%	-6.2%	-9.9%
556	2010 TYSP	2011 TYSP	2012 TYSP	2013 TYSP	2014 TYSP	–
2015	-15.2%	-4.4%	-3.0%	-2.2%	-8.7%	-6.7%
511	2011 TYSP	2012 TYSP	2013 TYSP	2014 TYSP	2015 TYSP	–
2016	3.5%	4.7%	6.4%	0.6%	7.6%	4.6%
533	2012 TYSP	2013 TYSP	2014 TYSP	2015 TYSP	2016 TYSP	–
2017	-0.5%	2.6%	-3.2%	4.2%	2.9%	1.2%

Table 2. Accuracy of Summer Peak Demand Forecasts

Forecast / Actual	Summer Peak Demand Forecast Error Rate (%) Forecasting Period Prior					Average
	5	4	3	2	1	
543	2008 TYSP	2009 TYSP	2010 TYSP	2011 TYSP	2012 TYSP	–
2013	11.3%	7.0%	5.1%	3.3%	5.7%	6.5%
565	2009 TYSP	2010 TYSP	2011 TYSP	2012 TYSP	2013 TYSP	–
2014	2.8%	-0.7%	-1.6%	-0.6%	1.5%	0.3%
600	2010 TYSP	2011 TYSP	2012 TYSP	2013 TYSP	2014 TYSP	–
2015	-8.1%	-9.1%	-9.1%	-5.0%	-6.6%	-7.6%
597	2011 TYSP	2012 TYSP	2013 TYSP	2014 TYSP	2015 TYSP	–
2016	-9.2%	-10.5%	-5.2%	-6.4%	-5.4%	-7.4%
598	2012 TYSP	2013 TYSP	2014 TYSP	2015 TYSP	2016 TYSP	–
2017	-12.3%	-6.0%	-7.3%	-6.9%	0.1%	-6.5%