Takira Thompson
Division of Engineering
Public Service Commission
2540 Shumard Oak Boulevard
Tallahassee, FL 32399-0850

Aug 30, 2018

Dear Takira,

Re: Response on "Supplemental Data Request on 2018 Ten-Year Site Plan - Lakeland Electric"

As per your Supplemental Data Request (**Reference # 20180000-OT)** dated Aug 09, 2018, here is a copy of the responses we have prepared. Please let me know if you have any questions or comments.

Thank you for your support.

Sincerely,

Shankar Karki

Engineer IV, SMIEEE
Energy Production – Power Resources
Phone: 863-834-6612 (O)
E-mail: shankar.karki@lakelandelectric.com

1. Please provide a comparison of Lakeland's 2017 and 2018 Ten-Year Site Plans, identifying any notable differences.

In overall, there are no noticeable differences between Lakeland Electric's 2017 and 2018 Ten Year Site Plans (TYSPs) in terms of addition/retirement of generating units.

Expected firm annual peak demand and energy sales forecast are slightly lower in 2018 TYSP Study compared to 2017. But annual peak demand and energy continues to grow over the next ten years. Installed Capacity in the Lakeland Electric System is large enough to meet the expected firm demand and planning reserve requirement during the planning horizon as per both TYSPs. Hence reliability is not a major concern in both Cases.

The minimum planning reserve margin as required by Florida Reliability Coordinating Council (FRCC) is 15%. The planning reserve margin at the end of the 2017 TYSP planning horizon (2026) was 18%, and at the end of the 2018 TYSP horizon (2027) is 20%.

Natural gas is still the dominant fuel resource for the Lakeland Electric System as more than two thirds of the energy is expected to come from Natural Gas by the end of planning horizon in both 2017 and 2018 TYSPs.

2. Please indicate whether or not Lakeland accounts for solar degradation. If so, please explain how Lakeland calculates solar degradation, discuss whether or not Lakeland accounts for solar degradation in cost-effectiveness evaluations, and identify the possible causes of solar degradation. If not, please explain.

Lakeland assumes 1% solar degradation per year to accurately predict the future power delivery from solar panels and solar farms in Lakeland Electric's territory. National Renewable Energy Laboratory in 2012 conducted an extensive study (NREL/JA-5200-51664) in which 78% of all data from more than 2000 degradation rates showed a mean degradation rate of 0.8% per year. However, the rates vary from 0.5 to 3% per year. Furthermore, the study has also concluded that the degradation rates are closer to 1% per year necessary to meet the 25-year commercial warranties. A study done in Mexico also showed that degradation rates were close to 1%/per year for several systems installed in hot and humid conditions. For conservative estimate, 1% degradation rate was chosen by the Lakeland Electric.

Predictions of rate of return on photovoltaic (PV) investment is more accurate when we can determine the decreased power output from PV panels over time. Lakeland Electric uses simple levelized energy cost comparison among various sources in order to screen out the resources for further evaluation. Hence taking into consideration of degradation rate on PV panels over the life will enhance more accurate evaluation over other conventional resources.

PV modules can degrade for different and complex reasons. Latent Cracks (hardly noticeable) in PV modules with mishandling during installation and bending of its frames due to temperature stress (high and low temperature cycling effect) on the edge of the module are some of the possible causes. Some of the failures may be caused by the solder bond failures connecting solar

modules. Degradation of antireflection coating due to water vapor ingress, especially in humid Florida Climate, is another factor for PV degradation.

Loss of solar tracker due to failure of inverters during lightning is very common for some of the Lakeland Electric's solar farms and is a major cause of performance deterioration.