

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In re: Joint petition for determination of need
for Shady Hills combined cycle facility in
Pasco County, by Seminole Electric
Cooperative, Inc. and Shady Hills Energy
Center, LLC.

DOCKET NO. 20170267-EC
ORDER NO. PSC-2018-0263-FOF-EC
ISSUED: May 25, 2018

The following Commissioners participated in the disposition of this matter:

ART GRAHAM, Chairman
DONALD J. POLMANN
GARY F. CLARK

FINAL ORDER GRANTING SEMINOLE ELECTRIC COOPERATIVE, INC.'S
AND SHADY HILLS ENERGY CENTER, LLC'S
JOINT PETITION FOR DETERMINATION OF NEED
FOR SHADY HILLS COMBINED CYCLE FACILITY IN PASCO COUNTY

Pursuant to Notice and in accordance with Rule 28-106.208, Florida Administrative Code (F.A.C.), a Hearing was held on March 21 and 22, 2018, in Tallahassee, Florida.

APPEARANCES:

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LIST OF ABBREVIATIONS & ACRONYMS

AE/Tierra	Advance Energy and Tierra Resource Consultants
CAGR	Compound Annual Growth Rate
Commission	Florida Public Service Commission
CPP/CC Portfolio	Clean Power Plan/Combined Cycle Portfolio
CPVRR	Cumulative Present Value Revenue Requirement
CTG	Combustion Turbine Generators
DEF	Duke Energy Florida, LLC
DSM	Demand-Side Management
EIA	Energy Information Administration
F.A.C.	Florida Administrative Code
FEECA	Florida Energy Efficiency and Conservation Act
FPL	Florida Power & Light
F.S.	Florida Statutes
GWh	Gigawatt hour
HRSG	Heat Recovery Steam Generator
Intervenors	Michael Tulk, Patrick Daly, and Quantum Pasco Power, L.P.
LFS	Load Forecast Study
Limited Build Portfolio	Limited Build Risk: Shady Hills Portfolio

MW	Megawatt
NEL	Net Energy Load
NO _x	Nitrogen Oxide
NPV	Net Present Value
NYMEX	New York Mercantile Exchange
PPA	Power Purchase Agreement
PV	Photovoltaic
Quantum	Quantum Pasco Power, L.P.
RFP	Request for Proposals
Seminole	Seminole Electric Cooperative, Inc.
Seminole Facility	Seminole Combined Cycle Facility
SGS	Seminole Generating Station
Shady Hills	Shady Hills Energy Center, LLC
Shady Hills Facility	Shady Hills Combined Cycle Facility
STG	Steam Turbine Generator
TECO	Tampa Electric Company

BY THE COMMISSION:

CASE BACKGROUND

On December 21, 2017, Seminole Electric Cooperative, Inc. (Seminole) filed a Petition for Determination of Need for the Seminole Combined Cycle Facility (Seminole Facility) with the Florida Public Service Commission (Commission). On the same day, Seminole and Shady Hills Energy Center, LLC (Shady Hills) also filed a Joint Petition for Determination of Need for the Shady Hills Combined Cycle Facility (Shady Hills Facility) with the Commission.¹ The Seminole Facility is a proposed 1,122 megawatt (MW) (winter capacity) new natural gas fired 2x1 combined cycle generating unit, to be constructed at Seminole's existing Seminole Generating Station (SGS) in Putnam County, Florida. This electrical power plant would use the existing transmission lines and SGS infrastructure. The Shady Hills Facility is a proposed 573 MW (winter capacity) new natural gas fired 1x1 combined cycle facility, to be constructed, owned, and operated by Shady Hills in Shady Hills, Florida, adjacent to the existing Shady Hills electrical power plant. This plant would provide all of its generating capacity to Seminole pursuant to a tolling agreement between Seminole and Shady Hills. The petitions were filed pursuant to Section 403.519, Florida Statutes (F.S.), and Rules 25-22.080, 25-22.081 and 28-106.201, Florida Administrative Code (F.A.C.).

Docket Nos. 20170266-EC and 20170267-EC were consolidated for hearing purposes by Order No. PSC-2018-0018-PCO-EC, issued on January 5, 2018. On January 17, 2018, Michael Tulk and Patrick Daly filed a Motion to Intervene in both dockets. Quantum Pasco Power, L.P. (Quantum) also filed a Motion to Intervene in both dockets on January 17, 2018. On January 24, 2018, Order No. PSC-2018-0062-PCO-EC was issued granting Michael Tulk and Patrick Daly intervention. By Order No. PSC-2018-0063-PCO-EC, also issued on January 24, 2018, Quantum was granted intervention. (Michael Tulk, Patrick Daly, and Quantum Pasco Power, L.P. are collectively referred to as Intervenors.) On March 12, 2018, a prehearing conference was held. The hearing was held on March 21 through 22, 2018.

The proposed facilities are subject to the Florida Electrical Power Plant Siting Act.² Pursuant to Section 403.519(3), F.S., this Commission is the sole forum for the determination of need for an electrical power plant subject to the Electrical Power Plant Siting Act. Section 403.519, F.S., sets forth the matters that this Commission must consider in determining the need for an electrical power plant, and states, in pertinent part:

In making its determination, the commission shall take into account the need for electric system reliability and integrity, the need for adequate electricity at a reasonable cost, the need for fuel diversity and supply reliability, whether the proposed plant is the most cost-effective alternative available, and whether

¹Seminole is an electric utility pursuant to 366.02(2), F.S., while Shady Hills is not. In all instances relevant to this docket, it is Seminole's need that is at issue. As such, Seminole primarily conducted the analysis and provided the supporting documentation for the need determination in this docket. Thus, references in this Order to Seminole's positions, arguments, and data are intended to include Shady Hills in its role as a joint petitioner for the need determination for the Shady Hills Facility.

²See Sections 403.501- 403.518, F.S.

renewable energy sources and technologies, as well as conservation measures, are utilized to the extent reasonably available. The commission shall also expressly consider the conservation measures taken by or reasonably available to the applicant or its members which might mitigate the need for the proposed plant and other matters within its jurisdiction which it deems relevant.

This Order pertains to the need determination for the Shady Hills Facility. However, due to the intertwined portfolio chosen by Seminole, and the consolidation of the dockets for purposes of hearing, there are necessarily references to the Seminole Facility throughout this Order.

ANALYSIS AND DECISION

I. Electric System Reliability and Integrity

A. *Positions of the Parties*

1. Seminole

Seminole argues that its gap analysis, used to identify deficiencies between forecasted requirements and current available capacity, shows that it will need 901 MW of generation by the end of 2021 to meet Seminole's members' energy needs and its reserve margin requirements. Seminole further argues that its future capacity need results primarily from the expiration of multiple power purchase agreements (PPAs), and that this need will grow to a total of 1,265 MW in 2022 due to the expiration of an additional PPA and expected load growth. Seminole contends that the construction of the Seminole Facility and Shady Hills Facility will displace higher cost coal-fired generation.

Seminole asserts that its current load forecast is reasonable for the purposes of this proceeding, and that this is evidenced by the significant improvements to Seminole's load forecast – beginning with its 2014 Load Forecast Study (LFS), and continuing through the study that produced the load forecast supporting Seminole's petition in this proceeding, the 2017 LFS. Seminole contends that the improvements to its load forecast models show that it has maintained a reasonable level of forecast error since 2015 through a technique of isolating forecast model error called ex-post analysis.³

In response to the Intervenors' argument that Peninsular Florida reserve margins are projected to be adequate to meet Seminole's need through at least 2026, Seminole argues that it tested the marketplace through a request for proposals (RFP) process, and developed a balanced portfolio that includes capacity resources located within Peninsular Florida. Seminole also argues that the Intervenors can cite to no Commission precedent for the proposition that Seminole must

³Seminole described ex-post forecast error analyses as an "after-the-event" evaluation of model error with observed (actual) explanatory variable data, which removes the error associated with long-term forecasts of weather and economy, thereby allowing insight into model improvements.

rely on excess Peninsular Florida capacity, in lieu of new generation resources, without regard to cost-effectiveness or other relevant considerations such as transmission impacts.

2. Intervenors

The Intervenors argue that Seminole's need forecasts are not reliable, and have been historically biased toward significantly overstating forecast values as compared to actual values observed. The Intervenors maintain that Seminole has consistently and significantly overstated its projected winter and summer peak demand, as well as its net energy for load (NEL), as demonstrated by the Intervenors' forecast error calculations (units and rates) which were based on Seminole's 2005 through 2012 forecasts. The Intervenors assert that Seminole's winter peak forecasting errors five-years out have averaged 1,381 MW (39 percent), which is more than Seminole's projected "Winter Need Gap" of 1,336 MW for 2024. The Intervenors argue that Seminole's current forecasts cannot be used as a basis for supporting Seminole's purported need for the combined capacity of the Seminole Facility and the Shady Hills Facility.

The Intervenors further maintain that, while Seminole's forecasting methodology has been updated, it is at best unproven in any comparison of forecast to actual values. The Intervenors assert that Seminole's load forecasts expose a bias toward overforecasting load requirements three to five years into the future over the last decade, and thus are a cause for "extreme doubt" as to Seminole's need for the Seminole Facility and the Shady Hills Facility for system reliability and integrity. The Intervenors also contend that even if Seminole's need forecasts were accurate, Seminole can more cost-effectively meet the "probably overstated" needs by using PPAs through 2027, as shown by Seminole's No Build Portfolio,⁴ followed by lower cumulative present value revenue requirement (CPVRRs) additions properly evaluated in the mid-2020s. Moreover, the Intervenors assert that Peninsular Florida's reserve margins are projected to be adequate to meet all reliability criteria through at least 2026, without the Seminole Facility or the Shady Hills Facility. The Intervenors argue that the additional flexibility of shorter-term PPAs through the No Build Portfolio will allow Seminole to better match resources with needs.

B. Analysis

1. Seminole's Load Model Forecasting Overview

The load forecasts relied upon by Seminole are aggregates of the forecasts Seminole prepares for each of its nine members, and include forecasts of consumers (i.e. number of customers), winter and summer peak demand, and NEL. Seminole maintains that it creates econometric models to prepare forecasts by using model assumptions that are collected from Seminole's members, government agencies, universities, and third party providers. The annualized load forecasts for the years 2017 through 2027, which were used to support Seminole's petition in this proceeding, appear in Seminole's December 2017 Need Study. In addition to the base forecasts, Seminole includes both high-case and low-case projections of

⁴The Intervenors refer to Seminole's No Build Portfolio (comprised of all PPAs) as the NO BUILD RISK Portfolio.

demand based on the 10th and 90th percentile ranks of temperature distribution that is derived from past temperatures.

Seminole’s forecast of winter peak demand is of particular importance when evaluating its need for the proposed generating plant additions because Seminole is a winter peaking utility. Seminole asserts that its winter peak demand models regress independent variables, with the highest peak during November through March, while the summer peak demand models regress independent variables, with the highest peak during April through September. Seminole’s member-specific winter peak demand models include variables such as: member forecasted consumer growth or population projections; heating degree days interacting with heating end-use equipment/appliance forecasts; load factor; and, in most cases, Seminole’s wholesale electricity price (in real terms).

A key consideration is whether the additional capacity associated with the Seminole Facility and Shady Hills Facility is needed to meet Seminole’s winter peak demand, and if so, when. Below, we consider whether Seminole’s winter peak demand forecast is reasonable prior to evaluating the generation and purchase power aspects of Seminole’s need proposal.

i. History and Forecast of Seminole’s Winter Peak Demand

Presented in Table 1 below is an overview of Seminole’s actual and projected peak demand and NEL requirements for the period 2012 through 2027.

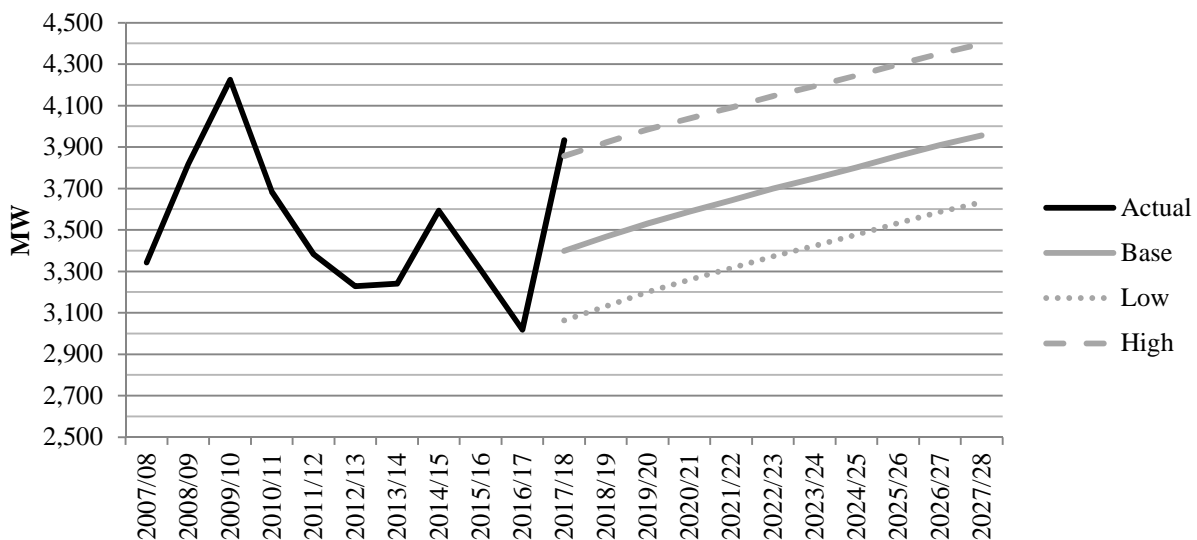
**Table 1
Seminole Historical and Projected Peak Demand
and Net Energy for Load Requirements**

Year	Winter Peak (MW)	Summer Peak (MW)	Net Energy for Load (GWh)
2012 (actual)	3,229	2,890	13,256
2017 (actual)	3,932	3,114	14,325
2018 (projected)	3,466	3,140	14,601
2022 (projected)	3,699	3,297	15,306
2027 (projected)	3,955	3,516	16,437
Actual Growth (2012-2017)	703	224	1,069
Projected Growth (2018-2022)	233	156	705
Projected Growth (2018-2027)	490	375	1,836
CAGR, 2012-2017*	4.02%	1.50%	1.56%
CAGR, 2018-2022*	1.64%	1.22%	1.19%
CAGR, 2018-2027*	1.48%	1.26%	1.32%
*CAGR = ((Ending Value / Beginning Value) ^ (1/Number of Periods)) – 1			
Note: Growth figures may not compute due to rounding.			

The 2018 through 2022 compound annual growth rates (CAGR) of Seminole’s forecasted winter peak, summer peak, and NEL are less than the actual CAGRs over the recent period of 2012 through 2017. The CAGR of winter-peak requirements for the period of 2012 through 2017 were skewed by a colder-than-projected 2017-2018 winter season. Seminole presented a forecasted 2017-2018 winter peak requirement of 3,398 MW in its December 2017 Need Study, when its actual 2017-2018 winter peak demand was 3,932 MW – an underforecast of 534 MW. Seminole’s winter-peak growth for the 2018 through 2022 period is projected to be approximately 233 MW.

A graphical representation of Seminole’s winter demand beginning in 2007, including actual data showing the 2017-2018 winter, and forecasted data through 2027, with Seminole’s alternative high and low forecasts, is set forth below in Figure 1.

Figure 1
Winter Peak Demand



ii. Seminole’s Historical Load Forecast Error

The Intervenors’ contend that Seminole’s historical winter demand forecast errors indicate an overforecasting bias, and are evidence that Seminole’s current load forecast cannot be used as a basis for establishing a need for either the Seminole Facility or the Shady Hills Facility. Seminole argues that the Intervenors’ assessment of Seminole’s load forecast errors is incorrect for the following reasons:

1. Forecast Process Improvements – Seminole has implemented a series of improvements to its load forecasting process and methodology from 2014 through 2017 that are relevant to this case. Such improvements included: various changes to its end use model; transitioning to forecasting total energy requirements rather than usage per customer using hourly delivery point data; transitioning to “SAS on Windows PC” software in place of “SAS on Mainframe” software for modeling and

forecasting; expanding its weather stations from 8 to 25 while enhancing its weather station selection process; and replacing saturation and efficiency variables with Itron, Inc. energy intensity variables.

2. Incorrect Forecast Error Calculations - Seminole presented a “corrected” analysis of the Intervenor’s calculation of Seminole’s historic forecast errors three, four, and five years out. Seminole’s “corrected” analysis indicated that the error rates were significantly lower than the error rates presented by the Intervenor, albeit still high (e.g., a 21 percent error rate for winter peak demand forecasts five years out, as opposed to 39 percent asserted by the Intervenor).
3. Other Florida Utilities Had High Forecast Errors – Seminole asserts that the Intervenor’s approach yields a similar magnitude of historical forecast errors for Seminole, Duke Energy Florida, LLC (DEF), and Tampa Electric Company (TECO), and that many utilities during the period in question (2005 through 2013) had high forecast errors due to the effects of the Great Recession.
4. Reasonably Low Ex-Post Forecast Errors – Seminole argues that it has been conducting ex-post forecast error analyses of its annual load since 2015. Seminole contends that its 2017 ex-post forecast error analysis ranged from 2.3 to 3.5 percent for the winter demand model, and that such error rates were “reasonably low.”

We reviewed Seminole’s changes to its load model and forecast process. The following model changes were adopted by Seminole beginning in 2015, which were expected to improve Seminole’s winter peak demand model, forecast methodologies, and data accuracy:

- Weather Data – Seminole expanded the number of weather stations from 8 to 25, increased the types of weather data used, and improved its weather station selection methodology to reduce forecast error.
- Load Data – Seminole used hourly delivery point data to model and forecast total energy and demand requirements, rather than continuing to rely upon forecasts of consumer meters, usage per meter, and extrapolated loss and load factors.
- Appliance Saturation and Efficiencies – By joining Itron, Inc.’s Energy Forecasting Group, Seminole enhanced its ability to account for trends in structural changes, end-use appliance saturation, and efficiencies, thereby taking advantage of the latest trends and indices, adapted to Seminole’s member data.
- Forecast Technology – Seminole converted to “SAS on Windows PC” from “SAS on the Mainframe,” which allowed Seminole to include new data and make its modeling and forecasting process more flexible and robust.

These changes in methodology and data are broad-based modifications to the methodology and data used in Seminole’s prior load models and forecasts. The changes appear

to be improvements, offering a higher level of precision, a greater level of detail, and a more flexible and robust forecasting software platform for modeling and forecasting.

We reviewed Seminole's response to the intervenors' assessment of Seminole's historical load forecast error rate. Seminole's "corrections" to the intervenors' assessment included the following: (1) the graduated removal of Lee County Electric Cooperative's load forecast data from Seminole's load forecasts shown in the 2005, 2006, and 2007 Ten-Year Site Plans;⁵ (2) the recognition that Seminole's LFSs are prepared in the year prior to the Ten-Year Site Plan in which they appear; and (3) the recognition of the biennial production of load forecast studies before 2008.⁶ We note that the intervenors neither refuted Seminole's "corrections," nor amended their forecast error analysis to incorporate Seminole's "corrections." Upon review, we find that Seminole's "corrections" appear to be well-supported.

We reviewed Seminole's argument that other utilities with similar size and geographic characteristics also experienced high load forecast errors during the historical forecast period included in the intervenors' testimony. We agree that the historical load forecast errors for forecasts prepared through 2012 were similarly high for the two other utilities Seminole selected for comparison purposes (DEF and TECO). Seminole argues that, as a point of comparison, many utilities in Florida struggled with load forecast errors beginning with the onset of the Great Recession in 2008. Seminole contends that "the majority of [Seminole's] error was caused by the [G]reat [R]ecession and the onset of federally implemented energy efficiency codes and standards," but Seminole acknowledges that the absence of the load modeling and forecasting enhancements that Seminole adopted later also contributed to the high error rates. Upon review, it may be reasonable to expect that the Great Recession initially had a negative impact on forecast accuracy; however, we find that the record does not contain metrics identifying the specific causes of Seminole's load forecast errors.

Seminole's analysis of its, DEF's, and TECO's comparative load forecast errors does not include a comparison of 2013 load forecast errors.⁷ We note that Seminole continued to report high winter peak demand forecast error rates as late as the 2013 LFS (e.g., 16.9 percent error rate for its forecasts prepared three-years out, which was the 2015-2016 winter season). This is an indication that the issue of high historical load forecast errors for Seminole may not be fully attributed to the impacts of the Great Recession, which ended in approximately June 2009. Based on Seminole's high historical average forecast error rates (overforecasts) contained in Seminole's load forecast studies through 2013, it appears that significant improvements in Seminole's load forecast process and methods were necessary to improve the accuracy of Seminole's load forecasts. As discussed above, Seminole launched a series of changes to its load

⁵Reflects removal of Lee County Electric Cooperative data for forecasts appearing in the 2005-2007 Ten-Year Site Plans for forecast periods beginning in 2008, when reductions in load to that utility became known and recognized.

⁶Seminole's 2005 Ten-Year Site Plan reflects the 2003 LFS; Seminole's 2006 and 2007 Ten-Year Site Plans both reflect the 2005 LFS. Thus, new forecasts were not produced in the 2005 and the 2007 Ten-Year Site Plans.

⁷Seminole provided data through the 2013 Ten-Year Site Plans, but the 2013 Ten-Year Site Plan is based on forecasts prepared in 2012, not 2013, consistent with Seminole's assertion that forecasts are prepared the year prior to the Ten-Year Site Plan in which they appear.

model and forecast process in its 2014, 2015, 2016, and 2017 LFSs designed to improve load forecast accuracy.

We also reviewed Seminole's contention that its load forecast process has resulted in more accurate forecasts. Beginning in 2015, Seminole initiated its ex-post forecast analysis for demand and energy. This analysis is an error-estimating procedure that is based on replacing the original estimated weather and economic data with actual weather and economic data in the forecast model to generate an "after the fact," or ex-post, forecast devoid of weather and economic errors. The difference in the actual demand and the ex-post demand forecast is the remaining error rate, which is meant to be an indicator of the magnitude of the error in Seminole's model. The ex-post forecast error for Seminole's 2017 winter peak demand based on the 2016 LFS (two-years out) was 3.5 percent. Seminole's ex-post forecast for Seminole's 2016 winter peak forecast error (one-year out) was 2.3 percent. Seminole asserts that this level of error rate is reasonably low for a period of one and two years out. However, we note that the error rates of most interest in this proceeding are for the forecasts that are five and six-years out.

We must also examine whether Seminole adequately addressed the high historical forecast errors in its more recent load forecasts. First, we reviewed Seminole's recent ex-ante forecast error, which is forecast error without adjustments for weather and economic data. Seminole's 2014 through 2017 winter demand forecasts, conducted during the period of modeling/forecasting method changes, may or may not produce error rates that would follow the pattern of the overforecasts that came before. In reviewing such error rates, consideration may be given to significant impacts due to weather or other volatile and uncontrollable factors which may have been present. The related ex-ante analysis appears below in Table 2.

Table 2
Seminole Winter Peak Demand Ex-ante Forecast Error Rates,
2011-15 Load Forecast Studies

Actual Winter Peak Demand Period	Actual Demand	Load Forecast Study Year	"3-Years Out" MW	Percent Error	Load Forecast Study Year	"4-Years Out" MW	Percent Error
2014-15	3,593	2012	3,949	9.91%	2011	4,054	12.83%
2015-16	3,307	2013	3,866	16.90%	2012	4,022	21.62%
2016-17	3,018	2014	3,516	16.50%	2013	3,978	31.81%
2017-18	3,932	2015	3,539	-9.99%	2014	3,588	-8.75%

Note: Bolded entries denote results beginning with Seminole's 2014 LFS.

As reflected in Table 2, the three available data points for three and four-year out winter peak demand error since the initiation of load forecast process changes in 2014 were: (1) the three-year out forecast for the 2016-2017 winter season; (2) the three-year out forecast for the 2017-2018 winter season; and (3) the four-year out forecast for the 2017-2018 winter season. Two of these three error rates are negative, indicating underforecasts had occurred, which is not unexpected since winter peak temperatures were lower than normal for the 2017-2018 winter

season. The three-year error rate for 2016-2017 was strongly positive at 16.50 percent, but that occurred in a year when the actual temperatures in January and February of 2017 were very mild (higher than normal). From the available data, these forecast data points suggest Seminole's recent winter peak demand forecasts are less prone to being overforecasts at three and four years out than they were historically.

Next, we reviewed whether Seminole's 2014 through 2017 load forecasts show significant decreases in demand and energy compared to the 2013 load forecasts for the relevant years in this proceeding (i.e., 2021 through 2023). If Seminole's load modeling/forecasting changes were effective in making Seminole's forecast more accurate, the forecast amounts would be expected to decrease significantly, based on Seminole's history of high overforecasts. The related data for Seminole's winter peak demand is shown below in Table 3.

Table 3
Year over Year Percent Change in Winter Peak Demand Forecasts

Load Forecast Study	Winter Season			
	2021-22		2022-23	
	MWs	Percent Change	MWs	Percent Change
2013	4,540	-	4,651	-
2014	3,831	-15.6%	3,887	-16.4%
2015	3,744	-2.3%	3,787	-2.6%
2016	3,750	0.2%	3,803	0.4%
2017	3,643	-2.9%	3,699	-2.7%
2017-2013	-897	-19.8%	-952	-20.5%

The data indicates that significant reductions occurred in Seminole's 2014 winter peak demand forecast relative to Seminole's 2013 winter peak demand forecast, and that additional, albeit smaller, reductions occurred in the 2015 and 2017 winter peak forecasts. The overall reduction in winter peak demand forecasted from Seminole's 2017 LFS for the projected in-service year of the Shady Hills Facility is 897 MW, or 19.8 percent, relative to the forecast from Seminole's 2013 LFS. We have reviewed Seminole's load models and forecast methods, assumptions, data, data sources, statistics, and error rates, and find Seminole's load models and forecasts to be reasonable. We also note that no other alternative load forecasts were presented in this proceeding.

iii. Summary of Load Forecasting

The Intervenors question the accuracy of Seminole's load forecasts because Seminole has historically experienced high load forecast error rates, and contend that its new forecasting methodology and new inputs remain unproven. However, we find the Intervenors are not persuasive based on the following reasons: (1) Seminole's broad-based load modeling and forecasting changes; (2) Seminole's reasonable levels of winter peak demand ex-ante and ex-post forecast errors in recent years; and (3) Seminole's significantly reduced winter peak demand forecasts beginning in 2014 and extending through 2017. Based upon our quantitative and

qualitative review of the record, we find that Seminole's changes to its load modeling/forecasting methods and processes have improved its forecasting accuracy. In sum, we find that Seminole's models and forecasts of customers, winter and summer peak demand, and net energy for load are reasonable for purposes of determining the need for the Seminole Facility and the Shady Hills Facility.

2. Reserve Margin

Seminole avers that it has two principal reliability criteria: (1) a 15 percent reserve margin; and (2) a loss of load probability of one day in ten years. Seminole maintains that its forecasted load and winter peak reserve margin are significant factors that contribute to its asserted need. As shown in Table 4 below, beginning in the 2021/22 timeframe, Seminole's winter reserve margin is expected to be below its 15 percent reserve margin criterion if no capacity is added. The expiration of multiple PPAs will cause a drop of 947 MW in available capacity, and load growth is projected to increase Seminole's winter peak demand by 229 MW by 2023. Seminole asserts that this could leave Seminole's members and member-consumers⁸ at a high risk of service interruptions.

Table 4
Winter Reserve Margin with No Additional Capacity

Year	Capacity Available (MW)	System Firm Peak Demand (MW)	Reserve Margin
2018/19	4,496	3,470	30%
2019/20	4,746	3,537	34%
2020/21	4,595	3,595	28%
2021/22	3,849	3,643	6%
2022/23	3,549	3,699	-4%

Seminole proposes to meet its need with what it has denoted as the Clean Power Plan/Combined Cycle (CPP/CC) Portfolio. As further discussed in Section V below, this portfolio includes adding the Shady Hills Facility in 2021, the Seminole Facility in 2022, retiring one of the two SGS coal units in 2022, and the addition of multiple PPAs. As shown in Table 5 below, Seminole's projected winter reserve margin with the CPP/CC Portfolio is expected to satisfy Seminole's 15 percent reserve margin criterion.

⁸ Member-consumers are Seminole's members' retail customers.

Table 5
CPP/CC Portfolio Winter Reserve Margin

Year	Capacity Available (MW)	System Firm Peak Demand (MW)	Reserve Margin
2018/19	4,496	3,470	30%
2019/20	4,746	3,537	34%
2020/21	4,595	3,595	28%
2021/22	4,200	3,643	15%
2022/23	4,264	3,699	15%

The Intervenors argue that Seminole can meet its need more cost-effectively through 2027 with PPAs. Cost-effectiveness will be addressed in Section V below. The Intervenors also argue that Peninsular Florida reserve margins are projected to be adequate to meet all reliability criteria through at least 2026 without constructing the Seminole Facility or the Shady Hills Facility. However, Seminole argues that the Intervenors can cite to no Commission precedent for the proposition that Seminole must rely on excess Peninsular Florida capacity, in lieu of new generation resources, without regard to cost-effectiveness or other relevant considerations such as transmission impacts. Also, Seminole asserts that approximately 80 percent of Seminole's member load is located in the DEF balancing area, and that having excessive generation resources outside of that balancing area would require wheeling power through multiple areas. Based on the foregoing, we find that Seminole does have a reliability need, and the record demonstrates that the portfolio including the Seminole Facility and the Shady Hills facility will reasonably address this need.

C. Decision

We find that Seminole's models and forecasts of seasonal peak demand and net energy for load through 2027 are reasonable. With the expiration of existing PPAs, we find that Seminole has demonstrated a need for the Shady Hills Facility in 2021 to maintain its system reliability and integrity.

II. Renewable Energy Sources and Technologies or Conservation Measures to Mitigate Need

A. Positions of the Parties

1. Seminole

Seminole argues that as a winter-peaking utility, its highest demand occurs when solar energy is not a viable capacity source. As such, Seminole asserts that additional renewable energy is not reasonably available to mitigate Seminole's need. Seminole also contends that the results of its RFP process show that additional renewable energy resources would not be cost-effective compared to the Seminole Facility or the Shady Hills Facility.

Seminole avers that, as a wholesale supplier of electric energy to its members, it is not directly responsible for demand-side management (DSM) programs, but that its wholesale rate structure provides price signals to its members that encourage conservation. Seminole further asserts that its generating mix already includes reasonably available renewable resources. Seminole notes that it assists its members in evaluating and implementing DSM measures, and that it engaged Advanced Energy and Tierra Resource Consultants (AE/Tierra) to identify potential new conservation programs and evaluate their cost-effectiveness. Seminole states that none of the potential measures evaluated by AE/Tierra satisfied the Rate Impact Measure test. Nevertheless, Seminole included 40 MW (summer) of solar capacity in the selected resource plan.

2. Intervenors

The Intervenors argue that there is more than 3,000 MW of solar generating capacity available to meet Seminole's needs. Further, the Intervenors contend that solar costs and solar-with-storage costs are declining, and that Seminole failed to adequately examine these important options. The Intervenors also assert that there is likely significant additional conservation potential to help mitigate the need for either the Seminole Facility or the Shady Hills Facility. The Intervenors assert that, through 2016, utilities subject to the Florida Energy Efficiency Conservation Act (FEECA) have achieved winter peak demand reductions totaling 17 percent of the Florida Reliability Coordinating Council's projected 2017 firm winter peak demand. The Intervenors maintain that Seminole, by comparison, has achieved 5.8 percent of its firm winter peak as winter-peak demand reductions. Therefore, the Intervenors contend that if such winter-peak demand reductions have been achieved by Florida's FEECA utilities, these reductions are at least reasonably attainable by Seminole and its members.

B. Analysis

1. Renewable Energy Sources and Technologies

Seminole argues that its generation portfolio currently incorporates various renewable generation resources. In terms of winter capacity, biomass facilities account for 13 MW, landfill gas-to-energy facilities for 16.8 MW, and waste-to-energy facilities for 58 MW, in addition to 2.2 MW of summer solar photovoltaic (PV) capacity from the Cooperative Solar facility. A provision in Seminole's Member Wholesale Power Contract gives Seminole's members the flexibility to install distributed renewable generation with capacity amounts up to five percent of each member's three-year average peak demand.

Seminole recently added 40 MW of summer capacity from the Tillman Solar Center, a solar PV facility. When evaluating responses to its March 2016 RFP, Seminole had concerns with the viability of solar capacity sources to offset its winter peak demands. Seminole attests that Coronal, the bidder associated with the Tillman Solar Center, provided the lowest-priced offer, and would honor this price for a project within the 40 MW to 75 MW range. Seminole opted for the 40 MW size to evaluate the effects of a mid-size solar facility on its system.

Seminole argues that, while the renewable resource responses to Seminole's RFP largely consisted of solar facility proposals, a number of non-solar proposals were also received. These covered a wide-range of renewable technologies including landfill gas, waste-to-energy, wind, and battery storage. Seminole noted that it ultimately rejected all of the non-solar proposals because they were not as economical as the traditional generating proposals received. Sedway Consulting, Seminole's contracted independent evaluator, performed a parallel RFP analysis, and the results corroborated Seminole's decisions. We discuss other aspects of the RFP process in Section V below.

Seminole asserts that it received RFP responses totaling approximately 3,000 MW of solar generating capacity. The Intervenor argue that these proposals demonstrate that there are "significant amounts" of renewables reasonably available to Seminole. Through its RFP process, Seminole sought input from the wholesale power markets in identifying viable commercial alternatives to serve the energy demands of its members' systems. Thus, solar and solar-with-storage providers were given an opportunity to compete on equal terms with more traditional generation facilities. As discussed above, Seminole chose a mid-size solar facility to add 40 MW of summer capacity to its system, and Sedway Consulting confirmed its decision.

Seminole further asserts that the cost of solar and solar-with-storage facilities are declining. The Intervenor argue that Seminole should use a portfolio comprised of all PPAs for the next 7-10 years, as this would give Seminole an opportunity to observe whether there are additional improvements in renewable technologies, such as solar-with-storage. We do not find the Intervenor's argument persuasive because Seminole retains the opportunity to observe advances in renewable technology. Based on the forgoing, we find that renewable energy resources are incorporated into Seminole's system planning to the extent reasonably available.

2. Conservation Measures

Seminole asserts that it is a not-for-profit rural electric cooperative organized under Chapter 425, F.S. Seminole is not subject to FEECA's conservation requirements.⁹ Nevertheless, Seminole argues that it has implemented a number of programs within its system that promote the use of DSM or conservation to its members.

Seminole maintains that its wholesale rate structure includes charges that are meant to reflect its cost of supplying power in the aggregate and to encourage energy conservation, for example: (1) a production demand charge during certain months of the year, designed to encourage member conservation during heavy-demand seasons; (2) monthly member demand charges calculated relative to Seminole's peak in that month, discouraging coincident peaking with Seminole; and (3) Time-Of-Use fuel rates, including on-peak/off-peak energy charges meant to encourage members to minimize their systems' energy use during certain times of the day.

Seminole also states that it supplements its wholesale rate structure by administering a coordinated load management demand reduction strategy that provides real-time notification to

⁹See Sections 366.80-366.83 and 403.519, F.S.

its members, signaling when Seminole's monthly peak is expected to occur. Seminole, with its members, also participates in an Energy Efficiency Working Group which was formed in 2008 to coordinate and promote energy conservation and DSM programs. The working group meets at least two times a year, and Seminole argues that its participation facilitates program implementation training, technical assistance, and promotion of consumer educational material with its members. Also, as part of the Energy Efficiency Working Group, Seminole conducts cost-effectiveness studies on proposed DSM and conservation measures, provides this information to its members, and, based on member requests, assists in program implementation. Moreover, as discussed previously, Seminole engaged AE/Tierra to identify additional DSM and conservation measures to mitigate its asserted need, but found none which satisfy the Rate Impact Measure test.

The Intervenors assert that there are likely conservation measures, at least reasonably available to Seminole, to help mitigate the need for either the Seminole Facility or the Shady Hills Facility; and that this is evident when Seminole's winter peak demand reductions are compared to the reductions achieved by Florida's utilities that are subject to FEECA. As discussed above, Seminole is a wholesale provider of electricity, and provides pricing signals to its members to encourage DSM and conservation measures. FEECA utilities, on the other hand, sell directly to retail customers. We find that the differences between Seminole and FEECA utilities likely contribute to the disparity in the effectiveness of conservation measures. As such, we find that this disparity is not, in and of itself, indicative that there are additional conservation measures available to Seminole. Upon review, we find that Seminole currently incorporates a number of conservation measures into its system, and that there are no significant additional conservation measures reasonably available to Seminole which might mitigate the need for the proposed Seminole Facility or the Shady Hills Facility.

C. Decision

Based on the forgoing, we find that there are no renewable energy sources and technologies or conservation measures reasonably available to Seminole which might mitigate the need for the proposed Shady Hills Facility. We also find that renewable energy resources and conservation measures are incorporated into Seminole's system planning to the extent reasonably available, including the recent addition of 40 MW of summer solar PV capacity, and that Seminole provides appropriate price signals to its members to encourage conservation.

III. Adequate Electricity at a Reasonable Cost

A. Positions of the Parties

1. Seminole

Seminole argues that the Shady Hills Facility is a highly efficient combined cycle unit, which yields lower production costs than other options. Seminole also argues that the location of the Shady Hills Facility provides substantial cost benefits by enabling the Shady Hills Facility to share existing infrastructure and operational staffing. Seminole asserts that the results of its RFP and resource planning processes show that the Shady Hills Facility, together with the Seminole

Facility and removing a coal unit from service, is the most cost-effective alternative to meet Seminole's needs, resulting in \$363 million of projected NPV savings. Seminole asserts that the Shady Hills Facility will sell its electric capacity, energy, and ancillary services to Seminole pursuant to a 30-year tolling agreement, beginning on December 1, 2021. Seminole further asserts that the Shady Hills Facility will help satisfy the need for adequate electricity at a reasonable cost.

2. Intervenors

The Intervenors argue that the Shady Hills Facility is not the most cost-effective alternative available to Seminole to meet the needs of Seminole's member-consumers who would ultimately be required to pay nearly \$4.8 billion for power from the Shady Hills Facility pursuant to the 30-year tolling agreement. The Intervenors argue that the proposed Seminole Facility and the proposed Shady Hills Facility would represent uneconomic duplication of generating facilities if constructed. The Intervenors further argue that Seminole's discount rate exceeds its projected inflation rates; therefore, delay in committing to the Seminole Facility and the Shady Hills Facility will benefit Seminole's member-consumers by reducing CPVRRs. The Intervenors also contend that there is a risk that Seminole's escalation or inflation assumptions are wrong, and that this risk should discourage moving forward with the Seminole Facility and the Shady Hills Facility. The Intervenors assert that, even if escalation in capacity costs were exactly equal to Seminole's discount rate, Seminole's member-consumers would still realize \$69 million in savings over the 2018 through 2027 period with the No Build Portfolio.

B. Analysis

As discussed in Section I above, Seminole's asserted capacity need results primarily from the scheduled expiration of PPAs. The cost-effectiveness of the proposed projects is discussed in Section V. Here we evaluate the various economic assumptions made by Seminole associated with the construction of the Shady Hills Facility, and the reasonableness of these assumptions.

1. The Shady Hills Facility

Seminole describes the proposed Shady Hills Facility as a 1x1 combined cycle facility that will use one natural gas fired combustion turbine generator (CTG), one heat recovery steam generator (HRSG), and one steam turbine generator (STG). The Shady Hills Facility will have an output of 573 MW (winter capacity), and have 30 to 35 MWs of duct firing capability for peaking capacity. The facility will tie to a new DEF substation that will connect to the DEF 230 kilovolt high voltage transmission grid in Pasco County, Florida.

Seminole asserts that the Shady Hills Facility will be located on Shady Hills' existing site in Shady Hills, Florida, allowing it to take advantage of existing transmission and water resource infrastructure. This facility is expected to begin commercial operation in December 2021. Seminole avers that the Shady Hills Facility will be supported by a 30-year tolling agreement with Seminole, allowing Seminole to have the right to schedule the dispatch of the plant, provide fuel for such scheduled operation, and receive all of the power produced. Seminole further asserts that it will make fixed payments related to the demonstrated capacity of the Shady Hills

Facility, and make variable payments when the plant is dispatched per Seminole's schedules. Seminole also maintains that the terms of the tolling agreement provide it with security of power supply at a competitive price for 30 years. Seminole maintains that General Electric Energy Financial Services has a long history of developing and investing in combined cycle power plants, and that Seminole is confident in the company's ability to meet the projected milestones and specifications of the Shady Hills Facility. We find that the Shady Hills Facility provides an economic advantage to Seminole's members by locating it at the existing Shady Hills site because the cost of developing a new site will be avoided, and existing infrastructure can be used.

2. Financial Assumptions

Seminole contends that its petitions for a determination of need for the Seminole Facility and the Shady Hills Facility are the result of a multi-stage resource planning process by which Seminole reviewed numerous options to address Seminole's forecasted need for additional capacity. Seminole notes that it used data from Moody's Economic and Consumer Credit Analytics (Moody's Analytics), the Energy Information Administration (EIA), and the University of Florida's Bureau of Economic and Business Research for its forecasting and financial modeling. For its CPVRR calculations, Seminole used a discount rate of 6.0 percent, which Seminole argues represents its cost of capital, and used data from Moody's Analytics for escalation. We note that the Intervenors did not present alternative rates. Upon review, we find that the financial assumptions made by Seminole are reasonable.

3. Fuel Costs

Seminole argues that fuel cost is one of the most significant elements of its economic analysis of generation alternatives in this proceeding. Seminole asserts that its fuel price forecasts are derived from a combination of published market indices, independent price forecasts, and necessary escalators. Seminole noted that the New York Mercantile Exchange (NYMEX) futures forward market prices were used for projecting Henry Hub natural gas prices, and that the EIA's Annual Energy Outlook was referenced for the rate of escalation embedded in deriving the price forecast beyond the availability of forward NYMEX prices. Seminole maintains that the forecast of coal price was based upon the commodity coal prices provided by Energy Research Company, LLC. Seminole further maintains that the projection of fuel transportation and other variable costs related to fuel delivery was updated based on the estimates obtained from L.E. Peabody & Associates, Inc. Seminole avers that these sources of forward energy prices are commonly accepted in the utility industry.

For scenario analysis and resource planning evaluations, Seminole maintains that a statistical based approach was used to develop alternative (i.e., high/low) natural gas price projections. Seminole states that its alternative natural gas price forecasts stem from a statistical confidence interval representing positive/negative one standard deviation around its base case forward curve.

Seminole avers that it used its fuel price forecasts and its alternative natural gas forecasts to prepare its original economic analysis, and that it then used its updated fuel price forecasts, including its updated alternative natural gas forecasts, to prepare the updated economic analysis. Seminole asserts that the use of the updated fuel price forecast, instead of the original one, did not change the preferred resource portfolio. In addition, Seminole maintains that it used its fuel price forecast across all self-build and purchased power alternatives, unless a firm fuel cost was included in an RFP proposal, to ensure fairness in evaluation.

Upon review, we find that Seminole's fuel price forecasts are reasonable for the purpose of economic evaluations of its potential resource options. We note that the Intervenor did not proffer an alternative fuel price forecast in this proceeding, and did not contest Seminole's fuel price forecasts.

4. Environmental Costs

Seminole asserts that the Seminole Facility and the Shady Hills Facility will be designed with technologies that will minimize air emissions. The CTGs will be equipped with dry low-nitrogen oxide (NOx) combustors to control NOx emissions. The HRSGs will be equipped with selective catalytic reduction systems to further reduce NOx emissions. In addition, Seminole maintains that the Seminole Facility and the Shady Hills Facility will minimize greenhouse gas emissions by using clean-burning natural gas, along with the highly efficient combined cycle electric generating technologies.

Seminole asserts that its economic sensitivity analyses include the scenarios of various Carbon Taxes based on the Minnesota Public Utilities Commission's Carbon Tax assumptions of a High, Mid, and Low Carbon Tax starting at \$34.0/ton, \$21.5/ton, and \$9.0/ton, respectively, in 2019 and escalating afterward. Seminole confirms that neither the Carbon Tax assumptions nor the Carbon Tax scenarios established based upon these assumptions were used in any of the other economic sensitivity analyses that were performed in preparation for Seminole's December 2017 Need Study, including the base case. Specifically, Seminole assumes zero Carbon Tax in deriving the portfolio evaluation results presented in its Need Study, the Summary of Updated Economic Analysis. We find that Seminole's Carbon Tax forecasts, including the underlying assumptions and the derived scenarios, are reasonable for the purpose of evaluating the proposed Seminole Facility and Shady Hills Facility resource plan. We note that no other Carbon Tax forecasts were presented in the proceeding, and the Intervenor has not challenged Seminole's assumptions/scenario or its utilization.

C. Decision

Upon review, we find that Seminole's financial, fuel, and environmental cost estimates are reasonable. Accordingly, we find that the Shady Hills Facility would provide adequate electricity at a reasonable cost.

IV. Fuel Diversity and Supply Reliability

A. Positions of the Parties

1. Seminole

Seminole argues that it seeks to maintain a diversified portfolio of owned and purchased generating assets with a variety of fuel types, sources, and delivery options, and that this enables it to manage fuel price stability and reliability. Seminole asserts that the Seminole Facility and the Shady Hills Facility will be solely fueled by natural gas, but will serve to replace expiring PPAs that are predominately natural gas-fired. Seminole maintains that adding dual-fuel capability to these units would not be cost-effective, and is not necessary to maintain fuel supply reliability. Seminole also argues that its decision to maintain the operation of one SGS coal-fired unit will provide continued diversification in its fuel portfolio, and that it is implementing a natural gas transportation plan that will enhance the diversity and reliability of its natural gas supply. Seminole avers that, consistent with past decisions, we should approve this need determination despite projected increases in Seminole's reliance on natural gas-fired generation.

2. Intervenors

The Intervenors argue that Seminole's CPP/CC Portfolio,¹⁰ which includes the proposed Seminole Facility and Shady Hills Facility, and the retirement of a coal plant, will reduce fuel diversity in Seminole's system, and increase Florida's dependence on natural gas as a generating fuel. The Intervenors also note that Seminole can address its capacity and fuel-diversity needs arising from the closing of one of its SGS coal units by acquiring additional PPAs from dual-fueled facilities like the Pasco Power Plant.

B. Analysis

1. Fuel Diversity

Fuel diversity in a generation portfolio helps to mitigate the effects of extreme price fluctuations, supply interruptions, and transportation instabilities. Seminole argues that the Seminole Facility and the Shady Hills Facility are primarily serving to replace Seminole's expiring PPAs, and that retention of one SGS coal unit will preserve Seminole's fuel diversity. Seminole avers that it subscribes to a portfolio-level review for its generating capabilities when evaluating the necessity of backup fuel in its system. We find that this portfolio-level perspective is better suited to evaluate any changes in Seminole's system's fuel mix as a whole. Table 6 below shows the effects of the CPP/CC Portfolio on the percent of Seminole's total winter net capacity generated by its two major fuel sources, natural gas and coal.

¹⁰ The Intervenors refer to Seminole's CPP/CC Portfolio as the MAX RISK Portfolio.

Table 6
Seminole's Fuel Mix Changes

	Units	Winter 2017/2018 (Pre-CPP/CC)	Winter 2022/2023 (Post-CPP/CC)
Natural Gas Fired System Net Capacity	%	67.4	81.5
Coal Fired System Net Capacity	%	29.5	15.6
Note: Numbers may differ slightly due to rounding.			

The Intervenor and Seminole agree that implementation of the CPP/CC Portfolio into Seminole's system will increase Seminole's reliance on natural gas, and we concur.

Nevertheless, Seminole supports its decision not to equip the Seminole Facility with dual-fuel capabilities by citing the Black & Veatch P2021 Single Fuel Facility Analysis. Black & Veatch estimated the cost of adding dual-fuel capability to the Seminole Facility at approximately \$20.3 million, and concluded that "[Seminole] will be adequately served without additional dual fuel capabilities at the portfolio level." However, Black & Veatch appear to draw this conclusion based on analysis of Seminole's system in a hurricane-like scenario, during which electrical transmission and distribution capabilities are also impacted, resulting in reduced load (as opposed to a cold-weather scenario like Seminole has experienced in the past). Retrofitting dual-fuel capability into the Seminole Facility was estimated by Seminole to cost approximately \$37.6 million. Seminole maintains that a similar cost analysis was not performed for the Shady Hills Facility because there are no provisions in the tolling agreement that would obligate Shady Hills to incorporate any future plant alterations for dual-fuel capabilities.

In its P2021 Single Fuel Facility Analysis, Black & Veatch notes that 77 percent of the natural gas combined cycle and combustion turbine units in the Florida Reliability Coordination Council are equipped with dual-fuel capabilities. The Intervenor argues that Seminole should acquire PPAs with such dual-fuel facilities to address Seminole's capacity needs. Upon review, we find that PPAs should be comprehensively evaluated, and that dual-fuel capability should be one of a number of considerations.

Seminole's decision neither to equip the Seminole Facility with dual-fuel capabilities, nor to negotiate for such capability in the Shady Hills Facility, may result in Seminole relying on Florida's other electricity generators to meet its needs during natural gas curtailment events.

2. Fuel Supply Reliability

Seminole argues that the Seminole Facility and the Shady Hills Facility will interconnect with the Florida Gas Transmission pipeline to receive their natural gas supplies. Seminole contends that implementation of Seminole's natural gas transportation plan will improve Seminole's fuel supply reliability. The Intervenor also acknowledges that "a shift toward more natural gas likely does not cause any [supply reliability] issues." Upon review, we find that Seminole's natural gas transportation plan will improve Seminole's fuel supply reliability because the plan includes contracts with four different parties that will diversify Seminole's delivered gas supply. In addition, Seminole plans to finalize contracts that will provide firm

transportation of natural gas from multiple geographical locations over the life of the Seminole Facility and the Shady Hills Facility.

C. Decision

We find that the proposed addition of the Seminole Facility and Shady Hills Facility, coupled with the retirement of one of the SGS coal units, will increase Seminole's natural-gas fired winter capacity from 67.4 percent to 81.5 percent. By not equipping the Seminole Facility or the Shady Hills Facility with dual-fuel capabilities, Seminole may need to rely on Florida's other electricity generators to meet their needs during natural gas curtailment events. As such, Seminole is taking measures to maintain gas supply availability to its natural-gas fired generating facilities

V. Cost Effectiveness

A. Positions of the Parties

1. Seminole

Seminole argues that, although it is not subject to our bid rule,¹¹ it issued a competitive RFP in March 2016 for potential power purchase options to meet its projected capacity needs. Seminole asserts that the results of culling the proposals, along with using modeling tools, led to its selection of the CPP/CC Portfolio, which includes the Shady Hills Facility in 2021, the Seminole Facility in 2022, and the removal of one of the SGS coal units. Seminole maintains that the CPP/CC Portfolio is the least cost portfolio with NPV savings of approximately \$363 million over the study period as compared to the next ranked portfolio. Seminole asserts that an independent evaluation conducted by Sedway Consulting, Inc. confirms that the selected resource plan that includes the Seminole Facility and the Shady Hills Facility is the most cost-effective alternative. Seminole concludes that the CPP/CC Portfolio is the most cost-effective solution for Seminole's asserted need.

2. Intervenors

The Intervenors argue that the CPP/CC Portfolio is not the most cost-effective alternative available to Seminole. The Intervenors assert that the No Build Portfolio, consisting of PPAs, is a more cost-effective alternative. The Intervenors further assert that other resource options will almost certainly be more cost-effective when properly evaluated in light of actual load growth and then-current costs for gas-fired capacity, solar, and solar with storage. The Intervenors contend that because escalation rates are projected to be significantly less than Seminole's discount rate, delay will reduce CPVRRs for Seminole's member-consumers while minimizing customer risks. The Intervenors also maintain that Seminole did not analyze an all-PPA portfolio with removal of one of its coal units, which shows bias in Seminole's analyses in favor of the CPP/CC Portfolio, and shows evidence of imprudence by Seminole. The Intervenors explain that since the CPP/CC Portfolio is not the most cost-effective alternative, no economic need has been

¹¹ See Rule 25-22.082, F.A.C.

demonstrated for the Seminole Facility and the Shady Hills Facility. The Intervenors also assert that the 121 MW of capacity from the facility operated by Quantum offers a viable, competitive option to meet the needs of Seminole's member-consumers.

B. Analysis

1. Initial Proposals

Although not required to do so by our Rules, in an effort to secure the most adequate and cost-effective options for its members, Seminole conducted an RFP, for both a self-build resource at its SGS site and market alternatives. As discussed in Section III above, for the self-build alternative, Seminole retained Black & Veatch to help evaluate numerous power generation technologies as potential future resources, and ultimately selected combined cycle technology. Seminole initiated a power island equipment purchase bidding process, followed by an engineering, procurement, and construction services bidding process, to develop accurate self-build cost estimates which would compete with market alternatives. Seminole states that it evaluated several different technologies from three different vendors: General Electric, Mitsubishi, and Siemens. In February 2016, Seminole issued an RFP to these three vendors, and only General Electric and Mitsubishi responded with compliant bids. Each vendor submitted two proposals: one for a 1x1 configuration and one for a 2x1 configuration. Seminole argues that these four proposals were evaluated along with the market alternatives and, ultimately, General Electric's proposal for the 2x1 configuration was found to be the most economic option. As discussed in Section III, Seminole received a competitive market rate from the original equipment manufacturers and engineering, procurement, and construction companies for the self-build alternative.

Seminole issued an RFP on March 31, 2016, for up to 600 MW starting in June 2021, with needs up to 1,000 MW by June 2022. Seminole's RFP was open to all parties, resulting in over 200 proposals that spread across a wide spectrum of alternatives. Seminole brought together various in-house subject matter experts to evaluate the proposals. Sedway Consulting was also retained by Seminole to provide independent monitoring and evaluation services during Seminole's RFP processes, and to oversee both the self-build and market alternative RFP processes.

Seminole used Planning and Risk and System Optimizer software tools to select which generation/PPAs provided the greatest overall economic value within an entire portfolio with varying combinations of start dates, term lengths, and MW sizes. Seminole asserts that System Optimizer and Planning and Risk are industry-recognized utility tools. According to Seminole, System Optimizer is used to develop an optimal resource mix to satisfy future needs. Seminole maintains that Planning and Risk is a detailed production cost model which commits resources in each hour over the thirty-three year study period from 2018-2051, based on costs and operational constraints. Seminole states that during the process of culling the number of proposals to a manageable shortlist, certain bids were removed from consideration for non-economic reasons such as: transmission availability, fuel accessibility and availability, build and construction risks, technological/commercial risks, environmental factors, credit capabilities, term flexibility, and scheduling flexibility.

We note that Quantum, one of the Intervenors, responded to Seminole's RFP and was included in the shortlist of alternatives, but ultimately was not selected during the evaluation process. Quantum's facility offers 121 MW of capacity, while Seminole's RFP outlined that Seminole was looking for up to 600 MW starting in June 2021, with needs up to 1,000 MW by June 2022. The Intervenors argue that Quantum offers a viable, competitive option to meet Seminole's member-consumers' needs. However, Quantum was included in Seminole's Alternate No Build Risk: All PPA Portfolio, and the record shows that the portfolio including the Quantum facility was approximately \$770 million NPV less cost-effective than the CPP/CC Portfolio over the study period. Therefore, we find that the Intervenors' argument is not persuasive.

According to Seminole, Sedway Consulting's independent evaluation consisted of overseeing both Seminole's self-build and market alternative RFP processes. With the self-build RFP, Sedway Consulting was involved in monitoring and evaluating proposals that included developing a resource that Seminole would own and operate. For the market alternatives RFP, Sedway Consulting reviewed Seminole's RFP process, and performed a parallel and independent economic evaluation of the market alternatives and self-build proposals submitted in response to both of Seminole's RFPs. As with Seminole, Sedway Consulting also considered non-economic factors. For example, proposals from one bidder were removed because the bidder's development efforts were in an early stage, which translated into greater risk and uncertainty associated with the proposed units. Ultimately, Sedway Consulting concluded that Seminole's best option for meeting its long-term capacity needs was a combination of self-build and market alternatives. This included the Seminole Facility and the Shady Hills Facility, as well as a combination of PPAs, and a decision to remove from service one of the SGS coal units. Seminole asserts that its evaluation process was conducted fairly, and that the market alternative proposals and Seminole's self-build resource were evaluated on an equal footing. Upon review, we find that Seminole's analyses of alternatives were thorough.

2. Portfolio Comparison

Based on Seminole's economic and risk evaluation of all available alternatives, four portfolios of generation resources were developed to fulfill its asserted need. Seminole avers that the first scenario that was run through System Optimizer, the SGS 2x1 Portfolio, was created to develop a portfolio for the need starting in winter of 2022 with all resources available. The next portfolio developed, the Limited Build Risk: Shady Hills Portfolio (Limited Build Portfolio), included the construction of only one 1x1 combined cycle unit. The third portfolio developed, the No Build Portfolio, consisted of only PPAs. The final portfolio developed, the CPP/CC Portfolio, took into account the removal of one coal unit from service, the construction of two combined cycle units, and the use of PPAs. Seminole asserts that the removal of a coal unit from service for the CPP/CC Portfolio was evaluated for cost-effectiveness due to regulatory uncertainty and the long-term economics of coal-fired generation. Based on the record, the CPP/CC Portfolio, containing the Seminole Facility and the Shady Hills Facility, was approximately \$363 million, in NPV revenue requirement terms, less expensive than the next least cost portfolio over the study period. The record indicates that each portfolio also contained generic combined cycle and combustion turbine units in later years to backfill as PPAs expired.

Table 7 below shows a comparison of the generation resources in each of Seminole’s portfolios, beginning in 2021.

**Table 7
 Portfolios**

Year	SGS 2x1	Limited Build	No Build	CPP/CC
2021	Multiple PPAs	Shady Hills Facility Multiple PPAs	Multiple PPAs	Shady Hills Facility Multiple PPAs
2022	Seminole Facility			Seminole Facility Retire SGS Unit
2023				
2024		Additional PPA	Additional PPA	Additional PPA
2025				
2026				
2027+	Generic CCs/CTs	Generic CCs/CTs	Generic CCs/CTs	Generic CCs/CTs

3. SGS Coal Unit Removal

Seminole argues that due to regulatory uncertainty and the long-term economics of coal-fired generation, it decided to remove one of its 664 MW SGS coal units from service as part of its CPP/CC Portfolio.¹² Seminole asserts that the cost of maintaining and operating coal units make such units a less attractive option, given the high efficiencies of combined cycle generation and low natural gas price projections. Seminole asserts that coal-fired resources are fairly inflexible in some aspects, for example, their inability to be shut down at night and to be started back up in the morning. Upon review, we find Seminole to be persuasive on this point.

The Intervenors assert that Seminole did not evaluate an all-PPA portfolio with removal of a coal unit. While this is true, we note that all three remaining portfolios proposed by Seminole did not include the removal of a coal unit from the analyses, and there is no requirement to do so. Additionally, as later shown in Table 8, the No Build Portfolio advanced by the Intervenors is the most expensive alternative over the study period.

4. Board of Trustees’ Decision

Seminole is owned by its members and governed by a Board of Trustees. Each of Seminole’s members has two voting representatives and one alternate representative on the Board of Trustees. Seminole’s Board of Trustees unanimously deemed the CPP/CC Portfolio, which includes both the Seminole Facility and the Shady Hills Facility, to be the best portfolio overall to meet Seminole’s members’ needs over the study period. Seminole’s Board of Trustees also made a determination that the No Build Portfolio is not a portfolio they wished to pursue based on reliability and overall cost.

¹² We note that this docket was not initiated for approval of the removal of one of Seminole’s coal units.

5. Economic Analyses

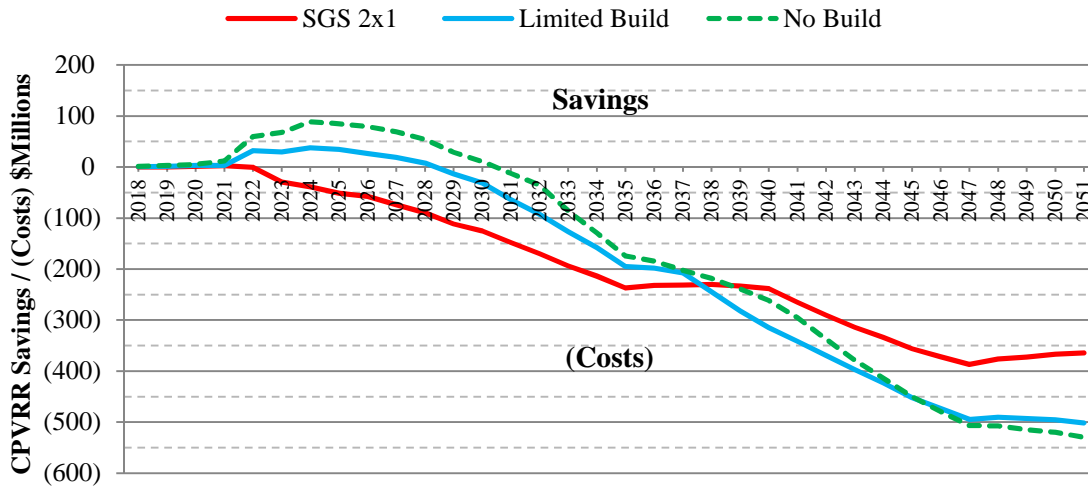
As previously discussed, Seminole's RFP process resulted in four combinations of portfolios for evaluation. Because these portfolios represent the least cost alternatives based on Seminole's economic analyses, we find that these portfolios represent reasonable alternative scenarios for cost-effectively meeting the needs of Seminole's members over the study period. Seminole's annual revenue requirement analysis provides the total cost for each portfolio over the study period from 2018 through 2051. The total cost associated with each portfolio is set forth in Table 8 below.

Table 8
Total Revenue Requirements (\$million NPV)

Portfolio	Total	Difference from the CPP/CC Portfolio
SGS 2x1 Portfolio	20,982	(363)
Limited Build Portfolio	21,120	(502)
No Build Portfolio	21,148	(530)
CPP/CC Portfolio	20,618	-
Note: Numbers may differ slightly due to rounding.		

As shown in Table 8 above, the CPP/CC Portfolio, which includes both the Seminole Facility and the Shady Hills Facility, is the least cost portfolio, and is approximately \$363 million less expensive than the SGS 2x1 Portfolio, the next least cost portfolio. We note that the SGS 2x1 Portfolio and the Limited Build Portfolio, each including both SGS coal units, are also more cost-effective than the No Build Portfolio over the study period. Due to regulatory uncertainty and the long-term economics of coal-fired generation, Seminole decided to consider a portfolio with removal of one of the coal units, the CPP/CC Portfolio. With the coal unit removed, the portfolio including the Seminole Facility and the Shady Hills Facility was identified as the most cost-effective portfolio over the study period via System Optimizer. Figure 2 below illustrates CPVRR savings and costs for each portfolio as compared to the CPP/CC Portfolio.

Figure 2
Annual CPVRR Comparison to the CPP/CC Portfolio



The No Build Portfolio is estimated to produce CPVRR savings through 2031. However, the No Build Portfolio is expected to be over \$500 million CPVRR more expensive than the CPP/CC Portfolio over the study period. The next least cost portfolio over the study period is the SGS 2x1 Portfolio.

The Intervenor's argue that the CPP/CC Portfolio is not the most cost-effective alternative available to Seminole, and that delaying the Seminole Facility or the Shady Hills Facility will reduce CPVRRs to customers. Seminole asserts that the No Build Portfolio is the least cost portfolio over approximately the first seven years of the study period. Seminole further asserts that it evaluated both the total revenue requirements for a period of 2018 through 2051, as well as a period of 2018 through 2027, and determined that the CPP/CC Portfolio was the most cost-effective, risk-managed resource plan for both periods. Although the No Build Portfolio has NPV savings of approximately \$69 million in the 2018 through 2027 time period when compared to the CPP/CC Portfolio, we do not find the Intervenor's argument to be persuasive because the No Build Portfolio has the additional risk and uncertainty associated with having to go back into the market for replacement resources as the PPAs expire. The No Build Portfolio also has potential additional transmission costs and risks associated with having to transfer energy through multiple areas for Seminole's member load.

Seminole asserts that it is an industry-standard practice to evaluate new generation facilities over a reasonable life expectancy, and that most natural gas generating facilities have a life of 30 plus years. Because Seminole evaluated new generation facilities (both owned and PPAs), we find that it is appropriate to have a study period that would cover the life expectancy of these units. Seminole stated that traditionally, revenue requirements for cooperative-owned generation decline over the life of the facility, whereas PPA pricing is usually flat or even escalating. The Intervenor's assert that delaying the in-service dates of the Seminole Facility and the tolling agreement for the Shady Hills Facility will improve the CPVRR and rate impacts to customers. However, Seminole contends that it is choosing not to delay the Seminole Facility and fulfill its needs with PPAs during the first ten years of the study period because it received a

competitive market rate from the original equipment manufacturers and engineering, procurement and construction companies to build the Seminole Facility in the 2022 timeframe. Seminole suggests that there is uncertainty whether the same cost would be available in another seven to ten years. Seminole notes that if building either of the facilities were delayed until later in the study period, such delay would not reduce the CPVRR of payments from customers. Seminole also noted that the No Build Portfolio includes generic combustion turbine units as backfill units as PPAs expire, using Seminole's two percent escalation rate, which is more costly over the study period.

We do not find the Intervenor's argument in favor of a short term approach to be persuasive. This viewpoint would favor building a less efficient combustion turbine facility over a more efficient combined cycle facility since the former is initially less expensive and quicker to build. Upon review, we find that the CPP/CC Portfolio, containing the Seminole Facility and the Shady Hills Facility, is the most cost-effective portfolio over the study period; accordingly, we find that the Seminole Facility and the Shady Hills Facility are the best alternatives to reliably meet Seminole's members' and member-consumers' needs.

C. Decision

The proposed CPP/CC Portfolio, containing both the Seminole Facility and the Shady Hills Facility is expected to result in NPV savings of approximately \$363 million in comparison to the next least cost portfolio over the study period. Therefore, we find that the Shady Hills Facility will provide Seminole's members with the most cost-effective alternative available.

VI. Alternative Scenarios

A. Positions of the Parties

1. Seminole

Seminole asserts that it reviewed over 200 proposals in response to its RFP, and developed reasonable portfolios for evaluation. Seminole argues that when removing a coal unit was assumed in Seminole's economic analyses, the Planning and Risk and System Optimizer software tools identified the construction of new units as components of portfolios deemed potentially cost-effective. Similarly, based upon its independent analysis, Sedway Consulting identified new units as components of the most cost-effective plan.

Seminole argues that there is no basis to suggest that an all-PPA portfolio advocated by the Intervenor would be cost-effective under any scenario, whether or not a coal unit is assumed to be taken out of service. Seminole further argues that an all-PPA Portfolio would force Seminole to rely on PPA sources in balancing areas where the power is not needed to serve Seminole's load, thereby requiring Seminole to wheel the power to a different balancing area. Seminole argues that this would increase costs and raise reliability concerns given the fact that Seminole is a transmission-dependent wholesale provider.

2. Intervenors

The Intervenors argue that Seminole did not accurately or appropriately evaluate all reasonable alternative power supply options for meeting the needs of its members and the member-consumers who depend on Seminole. The Intervenors further argue that Seminole used inflation rates (which reflect annual increases in costs to build new facilities) that are below Seminole's cost of borrowing (reflected in its discount rate of six percent). The Intervenors contend that delay will improve the CPVRRs, thus delaying the need for the Seminole Facility and the Shady Hills Facility. The Intervenors assert that even when Seminole's own analyses showed that the No Build Portfolio would save approximately \$136 Million in CPVRR from 2018 through 2027, Seminole neither attempted to negotiate for later in-service dates for the Seminole Facility or Shady Hills Facility, nor did it consider other available alternatives.

B. Analysis

As discussed in Section V above, Seminole solicited RFPs for both self-build and market alternatives for its capacity need. Seminole's subject matter experts and its independent evaluator, Sedway Consulting, assessed and culled the responses, and used modeling tools to further weigh alternatives. Seminole concluded that the CPP/CC Portfolio, including both the Seminole Facility and the Shady Hills Facility, was the best portfolio to meet Seminole's needs. We find that the portfolios presented were reasonable, and were evaluated over the relevant planning horizon.

C. Decision

Seminole solicited RFPs to fulfill its capacity need and engaged an independent evaluator to ensure that it selected the best overall alternatives. Upon review, we find that Seminole accurately and appropriately evaluated reasonable alternative scenarios for cost-effectively meeting the needs of its customers over the relevant planning horizon.

VII. Determination of Need for the Proposed Shady Hills Facility

A. Positions of the Parties

1. Seminole

Seminole argues that, for the reasons discussed in Sections I-VI above, we should grant the petitions for a determination of need for the Seminole Facility and the Shady Hills Facility. Seminole contends that the analyses presented demonstrate that these two facilities are needed to meet the electrical demands of Seminole and its members, and that Seminole has satisfied all of the criteria set forth in Section 403.519, F.S. Seminole asserts that the Seminole Facility and the Shady Hills Facility are part of a resource plan that will ensure that it can meet its members' needs at a reasonable cost. Seminole avers that the results of the RFP and resource planning processes demonstrate that the selected plan is the most cost-effective, risk-managed alternative. Seminole further asserts that both it and its members employ reasonably available renewable

resources and conservation programs; however, a significant capacity need remains, and the selected resource plan is the least-cost alternative to meet that need.

Seminole avers that non-approval of their petitions would deny Seminole's members and member-consumers the most cost-effective, risk managed power supply solution, and Seminole's reserve margin would fall below its 15 percent minimum reserve level in 2021. Seminole contends that the adverse impact of denying the Seminole Facility and Shady Hills Facility would be \$530 million of additional NPV revenue requirements, without consideration of transmission impacts, as well as continuation of service of the coal unit. Seminole states that if only the Shady Hills Facility is denied, the impact would be approximately \$363 million of additional NPV revenue requirements, along with the continuation of service of the coal unit.

2. Intervenors

The Intervenors argue that Seminole has not credibly demonstrated that it has either a reliability need or an economic need for the proposed CPP/CC Portfolio, which includes the Seminole Facility and Shady Hills Facility. The Intervenors aver that Seminole's load forecasts are unproven and questionable, and that the No Build Portfolio is the more cost-effective alternative for meeting Seminole's member-consumers' needs. The Intervenors also assert that adding the capacity represented by the Seminole Facility and the Shady Hills Facility will uneconomically duplicate capacity. The Intervenors contend that even if Seminole's load forecasts were assumed to be accurate, the CPP/CC Portfolio is not the most cost-effective alternative available, and would reduce fuel diversity. The Intervenors assert that Seminole's proposals would unnecessarily impose \$13 billion in cost risk to its customers, and that we should deny both of Seminole's petitions for the Seminole Facility and the Shady Hills Facility.

B. Analysis

Pursuant to Section 403.519, F.S., this Commission is the sole forum for the determination of need for major new power plants. In making our determination, we must take into account the need for electric system reliability and integrity, the need for adequate electricity at a reasonable cost, the need for fuel diversity and supply reliability, and whether the proposed plant is the most cost-effective alternative available. We must also expressly consider whether renewable generation or conservation measures taken by or reasonably available to the utility might mitigate the need for the proposed plant. Our decision on a need determination petition must be based on the facts as they exist at the time of the filing, with the underlying assumptions tested for reasonableness.

As discussed in Sections I-VI above, and summarized below, the record supports an overall need for the Shady Hills Facility in 2021.

- Seminole has demonstrated that it has a system need for capacity additions beginning in 2021 to meet its 15 percent reserve margin criterion.
- No cost-effective DSM or renewable resources have been identified that could mitigate the need for the Shady Hills Facility.

- The Shady Hills Facility is expected to provide adequate electricity at a reasonable cost to Seminole's members and member-consumers.
- The Seminole Facility, the Shady Hills Facility, and the retirement of one of the SGS coal units will increase Seminole's reliance on natural gas.
- The CPP/CC Portfolio containing the Shady Hills Facility is expected to result in NPV savings of approximately \$363 million in comparison to the next least cost portfolio and, therefore, is the most cost-effective alternative.

C. Decision

Upon review, we shall grant Seminole's petition to determine the need for the proposed Shady Hills Facility. This Order constitutes our final agency action and report as required by Section 403.507(4)(a), F.S., and as provided for in Section 403.519, F.S. We note that it is prudent for a utility to continue to evaluate whether it is in the best interests of its ratepayers for a utility to participate in a proposed power plant before, during, and after construction of a generating unit. If conditions change from those presented at the need determination proceeding, then a prudent utility would be expected to respond appropriately.

Based on the foregoing, it is

ORDERED by the Florida Public Service Commission that there is a need for the Shady Hills Facility in 2021. It is further

ORDERED that for the reasons set forth in the body of this Order, Seminole Electric Cooperative, Inc.'s and Shady Hills Energy Center, LLC's Joint Petition for a Determination of Need for the Shady Hills Combined Cycle Facility is hereby granted. It is further

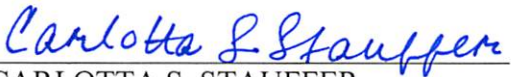
ORDERED that this docket shall be closed after the time for filing an appeal has run.

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By ORDER of the Florida Public Service Commission this 25th day of May, 2018.



CARLOTTA S. STAUFFER

Commission Clerk

Florida Public Service Commission

2540 Shumard Oak Boulevard

Tallahassee, Florida 32399

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Copies furnished: A copy of this document is provided to the parties of record at the time of issuance and, if applicable, interested persons.

RD

NOTICE OF FURTHER PROCEEDINGS OR JUDICIAL REVIEW

The Florida Public Service Commission is required by Section 120.569(1), Florida Statutes, to notify parties of any administrative hearing or judicial review of Commission orders that is available under Sections 120.57 or 120.68, Florida Statutes, as well as the procedures and time limits that apply. This notice should not be construed to mean all requests for an administrative hearing or judicial review will be granted or result in the relief sought.

Any party adversely affected by the Commission's final action in this matter may request:

- 1) reconsideration of the decision by filing a motion for reconsideration with the Office of Commission Clerk, 2540 Shumard Oak Boulevard, Tallahassee, Florida 32399-0850, within fifteen (15) days of the issuance of this order in the form prescribed by Rule 25-22.060, Florida Administrative Code; or
- 2) judicial review by the Florida Supreme Court in the case of an electric, gas or telephone utility or the First District Court of Appeal in the case of a water and/or wastewater utility by filing a notice of appeal with the Office of Commission Clerk, and filing a copy of the notice of appeal and the filing fee with the appropriate court. This filing must be completed within thirty (30) days after the issuance of this order, pursuant to Rule 9.110, Florida Rules of Appellate Procedure. The notice of appeal must be in the form specified in Rule 9.900(a), Florida Rules of Appellate Procedure.