March 30, 2018

-VIA ELECTRONIC DELIVERY-

Director, Office of Commission Clerk
Florida Public Service Commission
2540 Shumard Oak Boulevard
Tallahassee, Florida 32399-0850
Attn: Carlotta Stauffer

Re: 2018 Ten Year Site Plan

Dear Ms. Stauffer,

Pursuant to Section 186.801, Florida Statutes and Rules 25-22.070-072 of Florida Administrative Code, Lakeland Electric hereby submits 5 printed copies of its 2018 Ten Year Site Plan.

If you have any questions please do not hesitate to contact me at 863-834-6612.

Sincerely,

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Energy Production – Power Resources
Lakeland Electric
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Enclosure

Ten-Year Site Plan 2018-2027

Submitted to:

Florida Public Service Commission

April, 2018

Lakeland Electric

501 E Lemon Street

Lakeland, FL 33801

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1.0 Introduction

This report contains the 2018 Lakeland Electric Ten-Year Site Plan (TYSP) pursuant to Florida Statutes and as adopted by Order No. PSC-97-1373-FOF-EU on October 30, 1997. The Lakeland TYSP reports the status of the utility's existing resources and identify any new resources that needs to be added after December 31, 2017. TYSP is non-binding in Florida, but it provides state, regional, and local agencies a notice of proposed power plants and transmission facilities in near future.

The TYSP 2018 is divided into the following nine sections: Introduction, General Description of the Utility, Forecast of Electric Demand and Energy Requirement, Energy Conservation & Management Programs, Forecasting Methods and Procedures, Forecast of Facilities Requirements, Generation Expansion Analysis Results and Conclusions, Environmental and Land Use Information, and Ten-Year Site Plan Schedules. The contents of each section are summarized briefly in the remainder of this section.

1.1 General Description of the Utility

Section 2.0 of the TYSP discusses a historical overview of Lakeland's Electrical System, and a description of the existing power generating and transmission system. This section includes tables which show the source of the utility's current 890 MW of net winter generating capacity and 844 MW of net summer generating capacity (as of the end of year 2017). This also includes the description on various customer types, demand and energy forecasts of various customers, and Lakeland Electric as a whole and presents the assessment on existing resources to meet the forecasted load and energy requirement of its entire customers.

1.2 Forecast of Electric Demand and Energy Requirement

Section 3.0 of the TYSP provides a summary of Lakeland's load and energy forecast. Lakeland is projected to remain a winter peaking system throughout the planning period. The forecasts included in this section are on population, customer classes, energy sales, net energy requirement, and system peak demand in an hourly basis in its service territory. In addition, sensitivity cases are developed for customers, energy sales, system net energy for peak load.

1.3 Energy Conservation & Management Programs

Section 4.0 provides the description of the existing energy conservation & management programs as adopted by Lakeland Electric. Additional details regarding Lakeland's energy conservation & management programs are on file with the Florida Public Service Commission (FPSC).

Lakeland's existing energy conservation & management programs include the following programs which promote cost-effective measures for both electric demand and energy savings, especially during peak hours:

- Residential Programs:
  - Energy Audit Program.
  - Public Awareness Program.
  - Informational Bill Inserts.
- Commercial Programs:
  - Commercial Audit Program.
  - High efficiency lighting
  - Thermal Energy Storage Devices

Lakeland Electric offers rebates to its residential customers who participates on eligible energy efficiency improvement programs in their homes. Lakeland Electric strongly believes energy efficiency or demand-side management program is the cost-effective way to reduce electric demand and energy during peak hours which can reduce the need for costly investments in transmission networks/power plants in future.

In addition to Lake Electric's retail conservation programs, the utility promotes various types of technological programs as a part of Energy Efficiency & Conservation Programs from 2018 and onwards :

- Insulation rebate
- Energy Saving Kits
- HVAC Maintenance Incentive
- Heat Pump Rebate
- LED Lighting (Street)
- On-line Energy Audit
- Energy Star Appliance Rebate

Section 4.0 also contains discussions on Lakeland Electric's solar programs. While these types of programs are not traditionally considered as DSM, they have the same effect of conserving energy normally generated by fossil fuels as DSM programs do by virtue of their avoidance of fossil fuels through the use of renewable energy. Lakeland Electric has the capability to generate more than 14 MW of power from solar, sufficient to supply power for more than 7000 households during a sunny day in the summer. Lakeland Electric is determined to continuously look at the opportunities for solar power for its customers with additional solar farms and customer's PV roof top program when possible/feasible.

1.4 Forecasting Methods and Procedures

Forecasting long-term electric load and energy is the first step in planning and developing for future generation for an electric utility. Based on the future energy requirements, Lakeland Electric coordinates and manages its existing resources to meet the future energy requirement at the lowest cost possible for its customers.

Section 5.0 discusses the forecasting methods used for the TYSP and outlines the assumptions applied for system planning. This section also summarizes the Integrated Resource Plan (IRP) for Lakeland and provides planning criteria based on combined economic dispatch of its generating units with the Florida Municipal Power Pool (FMPP), of which Lakeland is a member. Future fuel supply and demand for Lakeland's thermal units are evaluated based on the existing pipeline infrastructure and other transportation facilities in Florida. This section provides various economic and financial parameters for the economic model used to estimate the future capacity and energy requirements.

1.5 Forecast of New Capacity Requirements

Section 6.0 integrates the electrical demand and energy forecast with the energy conservation & management forecast to determine Lakeland's future generation resources requirements for the ten-year planning horizon. Application of the reserve margin criteria indicates no need for additional capacity during the current ten-year reporting period with the existing generation resources in its portfolio.

1.6 Generation Expansion

Section 7.0 addresses the current status of supply-side resources and reliability evaluation being undertaken by Lakeland to identify the other contingency options during forced outage period. It presents the various Power Exchange Agreements with neighboring utilities during the emergency conditions when there is unexpected outage on local generating units. It also explains about the Florida Reserve Sharing Group (FRSG) for which Lakeland Electric is a member and shares its allocated contingency share with other neighboring utilities in the state.

1.7 Environmental and Land Use Information

The existing generation fleet within Lakeland Electric will be greatly impacted by both existing and new environmental regulations. Proposed new environmental regulations may require changes in existing units dispatch, fuel switching or installation of additional control equipment. This may cause additional economic and operational implications for the Lakeland Electric.

Section 8.0 presents an overview of the land and environmental features of Lakeland Electric's generating system. It gives an overview of various environmental regulations Lakeland Electric is subjected to be responsible for each generating unit to operate under environmental compliance as required by the Environmental Protection Agency (EPA).

1.8 Ten-Year Site Plan Schedules

Section 9.0 presents the schedules required by the Florida Public Service Commission (FPSC) for the TYSP.

Table 9-1 summarizes the detailed information on existing generating units owned by Lakeland Electric. Whereas, Tables 9.2-9.8 presents the information on historical and future energy mix by different generating units for entire Lakeland Electric Customers. It also presents the fuel requirements for each generating unit to produce the required amounts of energy.

2.0 General Description of the Utility

2.1 City of Lakeland Historical Background

2.1.1 Generation

The City of Lakeland was incorporated on January 1, 1885, when 27 citizens approved and signed the city charter. Shortly, thereafter, the original light plant was built by Lakeland Light and Power Company at the corner of Cedar Street and Massachusetts Avenue. This plant had an original capacity of 50 kW. On May 26, 1891, plant manager Harry Sloan threw the switch to light Lakeland by electricity for the first time with five arc lamps. Incandescent lights were first installed in 1903.

Public power in Lakeland was established in 1904, when foresighted citizens and municipal officials purchased the small private 50 kW electric light plant from owner Bruce Neff for $7,500. The need for an expansion led to the construction of a new power plant on the north side of Lake Mirror in 1916. The initial capacity of the Lake Mirror Power Plant was 500 kW. The plant was expanded three times. The first expansion occurred in 1922 with the addition of 2,500 kW; in 1925, 5,000 kW additional capacity was added, followed by another 5,000 kW in 1938. With the final expansion, the removal of the initial 500 kW unit was required to make room for the addition of the 5,000 kW generating unit, resulting in a total peak plant capacity of 12,500 kW.

As the community continued to grow, the need for a new power plant emerged and the Charles Larsen Memorial Power Plant was constructed on the south-east shore of Lake Parker in 1949. The initial capacity of the Larsen Plant Steam was Unit No. 4 (20,000kW) and it was completed in 1950. The first addition to the Larsen Plant was Steam Unit No. 5 (1956) which had a capacity of 25,000 kW. In 1959, Steam Unit No. 6 was added and increased the plant capacity by another 25,000 kW. Three gas turbines, each with a nominal rating of 11,250 kW, were installed as peaking units in 1962. In 1966, a third steam unit capacity addition was made to the Larsen Plant. This was Steam Unit No.7 having a nominal 44,000 kW capacity and an estimated cost of $9.6 million. This brought the total Larsen Plant nameplate capacity up to a nominal 147,750 kW.

In the meantime, the Lake Mirror Plant, with its old and obsolete equipment, became relatively inefficient and hence was no longer in active use. It was kept in cold standby and then retired in 1971.

As the city continued to grow during the late 1960's, the demand for power and energy grew at a rapid rate, making evident need for a new power plant (Unit 3). A site was purchased on the north side of the Lake Parker and construction commenced during 1970. Initially, two diesel units with a peaking capacity of a nominal rating 2,500 kW each were placed into commercial operation in 1970.

Steam Unit No. 1, with a nominal rating of 90,000 kW, was put into commercial operation in February 1971, for a total cost of $15.22 million. In June of 1976, Steam Unit No. 2 was placed into commercial operation, with a nominal rated capacity of 114,707 kW and at a cost of $25.77 million. This addition increased the total capacity of the Lakeland system to approximately 360,000 kW. At this time, Unit 3 was renamed the C. D. McIntosh, Jr. Power Plant in recognition of the former Electric and Water Department Director.

On January 2, 1979, construction was started on McIntosh Unit No. 3, a nominal 334 MW coal fired steam generating unit which became commercial on September 1, 1982. The unit was designed to use low sulfur oil as an alternate fuel, but this feature was later decommissioned. McIntosh Unit No. 3 was later modified so that its nominal gross output was changed to 365 MW. The unit uses a minimal amount of natural gas for flame stabilization during startups. The plant utilizes sewage effluent for cooling tower makeup water. This unit is jointly owned with the Orlando Utilities Commission (OUC) which has a 40 percent undivided interest in the unit.

As load continued to grow, Lakeland continually studied and reviewed alternatives for accommodating the additional growth. Alternatives included both demand- and supply-side resources. A wide variety of energy conservation & management programs were developed and marketed to Lakeland customers to encourage increased energy efficiency and conservation in keeping with the Florida Energy Efficiency and Conservation Act (FEECA) of 1980. Changes to the FEECA rules in 1993 exempted Lakeland from conservation requirements, but Lakeland has remained active in promoting and implementing cost-effective conservation programs. These programs are discussed in further detail in Section 4.0.

Although demand and energy savings arose from Lakeland's energy conservation & management programs, additional capacity was required in the early 1990’s. A least cost planning study resulted in the construction of Larsen Unit No. 8, a natural gas fired combined cycle unit with a nameplate generating capability of 114,000 kW. Larsen Unit No. 8 began its simple cycle operation in July 1992, and combined cycle operation in November of that year.

In 1994, Lakeland made the decision to retire the first unit at the Larsen Plant, Steam Unit No. 4. This unit, put in service in 1950 with a capacity of 20,000 kW, had reached the end of its economic life. In March of 1997, Lakeland retired Larsen Unit No. 6, a 25 MW oil fired unit that was also nearing the end of its economic life. In October of 2004, Lakeland retired Larsen Unit 7, a 50MW oil fired steam unit.

In 1999, the construction of McIntosh Unit No. 5, a simple cycle combustion turbine was completed, having a summer nominal capacity of 225MW. The unit was released for commercial operation in May, 2001. Beginning in September 2001, the unit underwent conversion to a combined cycle unit through the addition of a nominal 120 MW steam turbine generator. Construction was completed in spring 2002 with the unit being declared commercial in May 2002. The resulting combined cycle gross capacity of the unit is 345 MW summer and 360 MW winter.

During the summer of 2001, Lakeland took its first steps into the world of distributed generation with the groundbreaking of its Winston Peaking Station. The Winston Peaking Station consists of 20 quick start reciprocating engines each driving a 2.5 MW electric generator. This provides Lakeland with 50 MW of peaking capacity that can be started and put on line at full load in ten minutes. The Station was declared commercial in late December 2002.

In 2009, Lakeland Electric installed selective catalytic reduction (SCR) on the McIntosh Unit 3 for NO_x control to provide full flexibility in implementing the Federal Cap and Trade program for nitrogen oxides (NOx) required under the Clean Air Interstate Rule (CAIR).

Steam Unit No. 1 at the McIntosh Plant was retired from service on December 31, 2015. This unit had a nominal rating of 90,000 kW and had been in service since 1971.

2.1.2 Transmission

The first phase of the Lakeland 69 kV transmission system was placed in operation in 1961 with a step-down transformer at the Lake Mirror Plant to feed the 4 kV bus, nine 4 kV feeders, and a new substation in the southwest section of the town with two step-down transformers feeding four 12 kV feeders.

In 1966, a 69 kV line was completed from the North-west substation to the South-west substation, completing the loop around the town. At the same time, the old tie to Bartow was reinsulated for a 69 kV line and went into operation, feeding a new step-down substation in Highland City with four 12 kV feeders. In addition, a 69 kV line was completed from Larsen Plant around the South-east section of the town to the South-west substation. By 1972, 20 sections of 69 kV lines, feeding a total of nine step-down substations, with a total of 41 distribution feeders, were completed and placed in service. By the fall of 1996, all of the original 4 kV equipment and feeders had been replaced and/or upgraded to 12 kV service. By 1998, 29 sections of 69 kV lines were in service feeding 20 distribution substations.

As the Lakeland system continued to grow, the need for additional and larger transmission facilities grew as well. In 1981, Lakeland's first 230 kV facilities went into service to accommodate Lakeland's McIntosh Unit No. 3 and to tie Lakeland into the State transmission grid at the 230 kV level. A 230 kV line was built from McIntosh Plant to Lakeland's west substation. A 230/69 kV autotransformer was installed at each of those substations to tie the 69 kV and 230 kV transmission systems together. In 1988, a second 230 kV line was constructed from the McIntosh Plant to Lakeland's Eaton Park substation along with a 230/69 kV autotransformer at Eaton Park. That line was the next phase of the long-range goal to electrically circle the Lakeland service territory with 230 kV transmission to serve as the primary backbone of the system.

In 1999, Lakeland added a generation unit at its McIntosh Power Plant that resulted in a new 230/69/12kV substation being built and energized in March of that year. The Tenoroc substation replaced the switching station called North McIntosh. In addition to

Tenoroc, another new 230/69/12kV substation was built. The substation, Interstate, went into operation in June of 1999 and is connected by what was the McIntosh West 230 kV line. This station was built to address concerns on load growth in the areas adjacent to the I-4 corridor which were causing problems at both the 69kV and distribution levels in this area.

In 2001, Lakeland began its next phase of its 230kV transmission system with the construction of the Crews Lake 230/69kV substation. The substation was completed and placed in service in 2001. This project includes two 230kV ties and one 69kV tie with Tampa Electric Company (TECO), a 150MVA 230/69kV autotransformer and a 230kV line from Lakeland's Eaton Park 230kV substation to the Crews Lake substation.

Early transmission interconnections with other systems included a 69 kV tie at Larsen Plant with TECO, was established in mid-1960s. A second tie with TECO was later established at Lakeland's Highland City substation. A 115 kV tie was established in the 1970s with Progress Energy of Florida (PEF), now Duke Energy Florida (DEF) and Lakeland's West substation and was subsequently upgraded and replaced with the current two 230 kV lines to PEF in 1981. At the same time, Lakeland was interconnected with Orlando Utilities Commission (OUC) at Lakeland's McIntosh Power Plant. In August 1987, the 69 kV TECO tie at Larsen Power Plant was taken out of service and a new 69 kV TECO tie was put in service connecting Lakeland's Orangedale substation to TECO's Polk City substation. In mid-1994, a new 69 kV line was energized connecting Larsen Plant to the Ridge Generating Station (Ridge), an independent power producer. Lakeland has a 30-year firm power-wheeling contract with Ridge to wheel up to 40 MW of their power to DEF. In early 1996, a new substation – East - was installed in the Larsen Plant to the Ridge 69 kV transmission line. Later in 1996, the third tie line to TECO was built from East to TECO's Gapway substation. As mentioned above, in August of 2001, Lakeland completed two 230kV ties and one 69kV tie with TECO at Lakeland's Crews Lake substation. The multiple 230 kV interconnection configuration of Lakeland is also tied into the bulk transmission grid and provides access to the 500 kV transmission network via DEF, providing greater reliability. At present, Lakeland has a total of about 128 miles of 69 kV and 28 miles of 230 kV transmission lines in service along with six 150 MVA 230/69 kV autotransformers.

2.2 General Description: Lakeland Electric

2.2.1 Existing Generating Units

This section provides additional detail on Lakeland's existing generating plants. Lakeland's existing generating units are located at two different plant sites: Charles Larsen Memorial (Larsen) and C.D. McIntosh Jr. (McIntosh). Both plant sites are located on Lake Parker in Polk County, Florida. The two plants have multiple units with different technologies and fuel types. The following paragraphs provide a summary of the existing generating units for Lakeland. Table 2-1 provides technical and other general characteristics of all Lakeland generating units.

The Larsen site is located on the south-east shore of Lake Parker in Lakeland. The site has three units. The total net winter (summer) capacity of the plant is 151 MW (124 MW). Units 2 and 3, General Electric combustion turbines, have a combined net winter (summer) rating of 27 MW (19 MW). The units burn natural gas as the primary fuel with diesel as the backup. Historically, Larsen Unit No. 5 consisted of a boiler for steam generation and steam turbine generator to convert the steam to electrical power. When the boiler began to show signs of degradation beyond economical repair, a gas turbine with a heat recovery steam generator, Unit No. 8, was added to the facility. This allowed the gas turbine (Unit No. 8) to generate electricity and the waste heat from the gas turbine to repower the former Unit No. 5 steam turbine in a combined cycle configuration. The former Unit No. 5 steam turbine currently has a net winter (summer) rating of 31 MW (29 MW) and is referred to as Unit No. 8 Steam Turbine from this point on in this document and in the reporting of this unit. The Unit No. 8 combustion turbine has a net winter (summer) rating of 93 MW (76 MW).

The McIntosh site is located in the City of Lakeland along the northeastern shore of Lake Parker and encompasses 513 acres. Electricity generated by the McIntosh units is stepped up in voltage by generator step-up transformers to 69 kV and 230 kV for transmission via the power grid. The McIntosh site currently includes six (6) units in commercial operation having a total net winter and summer capacity of 689 MW and 670 MW, respectively. The gas turbine consists of a General Electric combustion turbine with a net winter (summer) output rating of 19 MW (16 MW). Unit No. 2 is a natural gas/oil fired Westinghouse steam turbine with a net winter and summer output of 106 MW. Unit No. 3 is a 342 MW pulverized coal fired steam unit owned 60 percent by Lakeland and 40 percent by OUC. Lakeland's share of the unit yields net winter and summer output of 205 MW. Technologies used for Unit 3 are very innovative making it a very environmentally friendly coal unit. Unit No. 3 was one of the first "zero-discharge" plants built, meaning no waste water products leave the plant site untreated. Unit No. 3 also includes a wet flue gas scrubber for SO_2 removal and uses treated sewage water for cooling water. Two small internal combustion engines with a net output of 2.5 MW each are also located at the McIntosh site.

McIntosh Unit No. 5, a Siemens 501G combined cycle unit, was initially built and operated as a simple cycle combustion turbine that was placed into commercial operation in May 2001. The unit was taken off line for conversion to combined cycle starting in mid-September 2001 and was returned to commercial service in May 2002 as a combined cycle unit with a rating of 354 MW winter and 338 MW summer. The unit is equipped with Selective Catalytic Reduction (SCR) for NO_x control.

Lakeland Electric constructed a 50 MW electric peaking station adjacent to its Winston Substation in 2001. The purpose of the peaking plant was to provide additional quick start generation capability for Lakeland's system during times of peak loads.

The station consists twenty (20) cylinder reciprocating engines driving 2.5 MW generator each. Altogether, 20 diesel engines provide 50 MW of installed Capacity. The units are currently fueled by #2 fuel oil but have the capability to burn a mix of 5% #2 oil and 95% natural gas. Lakeland currently does not have natural gas service to the site.

The plant has remote start/run capability for extreme emergencies at times when the plant is unmanned. The station does not use open cooling towers. This results in minimal water or wastewater requirements. Less than three quarters of the six (6) acre site was developed leaving considerable room for water retention.

The engines are equipped with hospital grade noise suppression equipment on the exhausts. Emission control is achieved by Selective Catalytic Reduction (SCR) using 19% aqueous ammonia. The SCR system will allow the plant to operate within the Minor New Source levels permitted by the Florida Department of Environmental Protection (DEP).

Winston Peaking Station (WPS) was constructed adjacent to Lakeland's Winston Distribution Load Substation. Power generated at WPS goes directly into Winston Substation at 12.47kV distribution level of the substation and has sufficient capacity to serve the substation loads. Winston Substation serves several of Lakeland's largest and most critical accounts. Should Winston lose all three 69kV circuits to the substation, the WPS can be on line and serving load within ten minutes. In addition to increasing the substation's reliability, this arrangement will allow Lakeland to delay the installation of a third 69kV to 12.47kV transformer by several years and also contributes to lowering loads on Lakeland's transmission system.

2.2.2 Capacity and Power Sales Contracts

Lakeland currently has no long-term firm power sales contract in place as of December 31, 2017.

Lakeland shares ownership of the C. D. McIntosh Unit 3 with OUC. The ownership breakdown is a 60 percent share for Lakeland and a 40 percent for OUC. The energy and capacity delivered to OUC from McIntosh Unit 3 is not considered a power sales contract because of the OUC's ownership share.

2.2.3 Capacity and Power Purchase Contracts

Lakeland currently has no long-term firm power purchase contracts in place as of December 31, 2017. However, Lakeland Electric makes capacity and energy contracts with neighboring utilities and other pool members on an as needed basis when its major units are on planned/forced outages.

2.2.4 Planned Unit Retirements

Other than the recent retirement of McIntosh Steam Unit 1 (85MW) on December 31, 2015, Lakeland has not set any retirement plans for any other units due to uncertain environmental regulations pertaining to the thermal units in the industry.

2.2.5 Load and Electrical Characteristics

Lakeland's electrical load variation has many similarities with those of other peninsular Florida utilities. The peak demand has historically occurred during the winter months. Lakeland's actual total peak demand (Net Integrated) in the winter of 2017/2018 was 704 MW which occurred on January 18, 2018. The actual summer peak in 2017 was 643 MW and occurred on July 26, 2017. Lakeland normally is winter peaking and expects to continue to do so in the future based on expected normal weather. Lakeland's historical and projected summer and winter peak demands are presented in Tables 9.5 and 9.6.

Lakeland is a member of the Florida Municipal Power Pool (FMPP), along with OUC and the Florida Municipal Power Agency's (FMPA) All-Requirements Power Supply Project. The FMPP operates as an energy pool, where all units are economically dispatched together whereas capacity and reserves are the responsibility of each utility member. Each member of the FMPP retains the responsibility of adequately planning its own system capacity to meet its native load obligation and reserve requirements.

2.3 Service Area

Lakeland's electric service area is shown on Figure 2-1 and is entirely located in the Polk County. Lakeland serves approximately 246 square miles of which approximately 174 square miles is outside of Lakeland's city limits.

Table 2-1
Lakeland Electric Existing Generating Facilities

				Fuel[4]		Fuel Transport[5]						Net Capability[2]	
Plant Name	Unit No.	Location	Unit Type[3]	Pri	Alt	Pri	Alt	Alt Fuel Days Use[1]	Commercial In-Service Month/Year	Expected Retirement Month/Year	Gen. Max. Nameplate kW	Summer MW	Winter MW
Charles Larsen Memorial	2	16-17/28S/24E	GT	NG	DFO	PL	TK	NR	11/62	Unknown	11,250	10	14
	3		GT	NG	DFO	PL	TK	NR	12/62	Unknown	11,250	9	13
	8		CA	WH	---	---	---	---	04/56	Unknown	26,000	29	31
	8		CT	NG	DFO	PL	TK	NR	07/92	Unknown	88,000	76	93
Plant Total												124	151

[1]Lakeland does not maintain records of the number of days that alternate fuel is used.
[2] Net Normal

[3]**Unit Type**
CA Combined Cycle Steam Part
CT Combined Cycle Combustion Turbine
GT Combustion Gas Turbine
ST Steam Turbine

[4]**Fuel Type**
DFO Distillate Fuel Oil
RFO Residual Fuel Oil
BIT Bituminous Coal
WH Waste Heat
NG Natural Gas

[5]**Fuel Transportation Method**
PL Pipeline
TK Truck
RR Railroad

Source: Lakeland Electric Energy Production

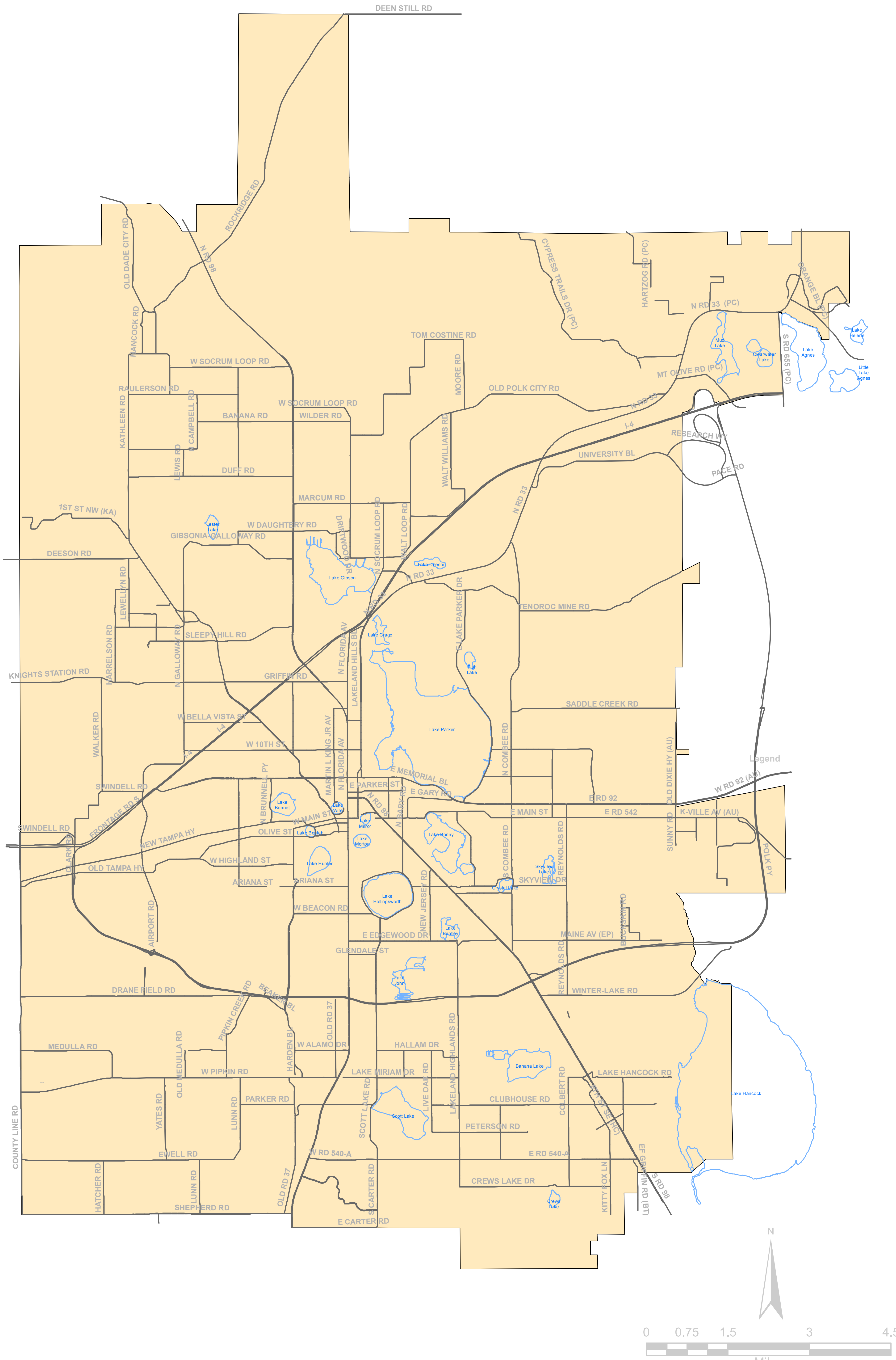
Table 2-1a
Lakeland Electric- Existing Generating Facilities

Plant Name	Unit No.	Location	Unit Type[3]	Fuel[4] Pri	Fuel[4] Alt	Fuel Transport[5] Pri	Fuel Transport[5] Alt	Alt Fuel Days Use[1]	Commercial In-Service Month/Year	Expected Retirement Month/Year	Gen. Max. Nameplate kW	Net Capability[2] Summer MW	Net Capability[2] Winter MW
Winston Peaking Station	1-20	21/28S/23E	IC	DFO	---	TK	---	NR	12/01	Unknown	2,500 each	50	50
Plant Total												50	50
C.D. McIntosh, Jr.	D1	4-5/28S/24E	IC	DFO	---	TK	---	NR	01/70	Unknown	2,500	2.5	2.5
	D2		IC	DFO	---	TK	---	NR	01/70	Unknown	2,500	2.5	2.5
	GT1		GT	NG	DFO	PL	TK	NR	05/73	Unknown	20,000	16	19
	2		ST	NG	RFO	PL	TK	NR	06/76	Unknown	114,700	106	106
	3		ST	BIT	---	RR	TK	NR	09/82	Unknown	219,000	205[6]	205[6]
	5		CT	NG	---	PL	---	NR	05/01	Unknown	245,000	213	233
	5		CA	WH	---	---	---	NR	05/02	Unknown	120,000	125	121
Plant Total												670	689
System Total												**844**	**890**

[1]Lakeland does not maintain records of the number of days that alternate fuel is used.
[2]Net Normal.
[6]Lakeland's 60 percent portion of joint ownership with Orlando Utilities Commission.

[3]**Unit Type**		[4]**Fuel Type**		[5]**Fuel Transportation Method**	
CA	Combined Cycle Steam Part	DFO	Distillate Fuel Oil	PL	Pipeline
CT	Combined Cycle Combustion Turbine	RFO	Residual Fuel Oil	TK	Truck
GT	Combustion Gas Turbine	BIT	Bituminous Coal	RR	Railroad
ST	Steam Turbine	WH	Waste Heat		
		NG	Natural Gas		

Figure 2-1: Lakeland Electric System Service Territory (as of December, 2017)



3.0 Forecast of Electric Demand and Energy

Annually, Lakeland Electric (LE) develops a detailed short-term (1-year) electric load and energy forecast for budget purposes and short-term operational studies. An annual long-term forecast is developed for the Utility's long-term planning studies (i.e., TYSP).

Sales and customer forecasts of monthly data are prepared by rate classification. Separate forecast models are developed for inside and outside the City of Lakeland corporate limits for the Residential, Commercial, Industrial and Other (municipal departments and outdoor lighting) rate classifications. Monthly forecasts are summarized annually using fiscal period ending September 30th for the short-term budget forecast and by calendar year for long-term studies and reporting.

LE uses MetrixND, an advanced statistical forecasting software tool, developed by Itron, to assist with the development of LE's number of customers, energy and demand forecasts. LE uses MetrixLT, another Itron software tool, which integrates with MetrixND to develop the long-term system hourly load forecast.

The modeling techniques used to generate the forecasts include multiple regression, study of historical relationships and growth rates, trend analysis, and exponential smoothing. LE utilizes Itron's Statistically Adjusted End-Use (SAE) econometric modeling approach for the residential and commercial sectors. The SAE approach is designed to capture the impact of changing end-use saturation and efficiency trends by building type as well as economic conditions on long-term residential and commercial energy sales and demand.

Many variables are evaluated for the development of the forecasts. The variables that have proven to be significant and are included in the forecasts are weather, gross regional product, disposable personal income per household, persons per household, number of households, local population, electricity price, building type, appliance saturation and efficiency. Binary variables are used to explain outliers in historical billing discrepancies, trend shifts, monthly seasonality, rate migration between classes and other issues that could affect the accuracy of forecast models.

Weather variables

Heating and cooling degree days are weather variables that attempt to explain a customer's usage behavior as influenced by either hot or cold weather. Heating Degree Days (HDD) occur when the average daily temperature is less than LE's established base temperature of 65 degree Fahrenheit. Cooling Degree Days (CDD) occur when the average daily temperature is greater than 65 degrees. The formulas used to determine the number of degree days are:

HDD = Base Temperature (65) – Average Daily Temperature

CDD = Average Daily Temperature – Base Temperature (65)

These HDD and CDD variables are used in the forecasting process to correlate electric consumption with weather. The HDD and CDD variables are weighted to capture the impacts of weather on revenue from monthly billed consumption.

LE uses weather data from its own weather stations, which are strategically placed throughout the electric service territory to provide the best estimate of overall temperature for the LE service area.

The most recent 20 years of historical normal weather is used as an input into the sales forecast models.

Normal peak-producing weather is also developed using historical 20-year weather. A weighted average of temperatures on both the day of historical monthly peak and day prior to peak is used to create the HDD and CDD variables.

Economic and demographic variables

The economic and demographic projections used in the forecasts are purchased from Moody's Analytics.

Price variables

A real price forecast by month and rate class is created based on LE historical price data, projections from the LE Rates and Fuel teams, the U.S. Energy Information Administration (EIA) Annual Energy Outlook (AEO) forecasted price of electricity, historical and projected Net Energy for Load, and the projected Consumer Price Index. The 12-month moving average of projected real price of electricity is the price variable used in the sales and demand SAE models.

Structural Indices

The end-use saturation and efficiency indices used in the models are purchased from Itron. Itron's Energy Forecasting Group (EFG) offers end-use data services and forecasting support. EFG's projections are based on data derived from the EIA's AEO forecast for the South Atlantic Census Division. Itron is also contracted to further calibrate the indices based on LE's service area, using average square feet by building type for the Commercial Sector, and average use by dwelling type for the Residential Sector.

LE reviews the forecasts for reasonableness, compares projections to historical patterns, and modifies the results as needed using informed judgment.

Historical monthly data is available and is analyzed for the 20-year period. Careful evaluation of the data and model statistics is performed; this often results in most models being developed using less than a 10-year estimation period.

LE currently does not have any specific energy savings goals through Demand Side Management (DSM) programs, therefore, LE does not assume any deductions in peak load for the forecast period.

3.1 Service Territory Population Forecast

Electric Service Territory Population Estimate

LE's service area encompasses approximately 246 square miles, approximately 174 square miles of which are outside the City of Lakeland's corporate limits. The estimated electric service territory population for LE in 2017 was 283,626 persons.

Population Forecast

LE's service territory population is projected to increase at an estimated 1.39% average annual growth rate (AAGR) for years 2018 – 2027.

Polk County's population (Lakeland/Winter-Haven MSA) is expected to grow at 1.74% AAGR for the same 10-year period. Historically, Polk County's population has grown faster than LE's service territory population.

3.2 Accounts Forecast

LE forecasts the number of monthly electric accounts for the following categories and subcategories:

- Residential, Inside and Outside City Limits
- Commercial, Inside and Outside City Limits
- Industrial, Inside and Outside City Limits
- Other, Inside and Outside City Limits

3.2.1 Residential Accounts

A regression model is used to develop the Residential account forecast using monthly customer data. Total Residential accounts are projected as a function of number of households in the Lakeland/Winter-Haven Metropolitan Statistical Area (MSA). Binary variables are used to explain outliers in historical billing data and to account for seasonality.

3.2.2 Commercial Accounts

Commercial accounts consist of the General Service (GS), General Service Business Demand (GSBD) and General Service Demand rate classes.

Due in large part to energy efficiency, LE is experiencing a long-term trend of General Service Large Demand (GSLD) customers migrating to Commercial rate classes. For this reason, a regression model combining both Commercial and GSLD rate classes is being used. The number of Commercial and GSLD accounts is projected as a function of the moving average of projected residential accounts.

A ratio of the Commercial and GSLD rate classes is then applied to generate the Commercial and GSLD account forecasts.

3.2.3 Industrial Accounts

Industrial accounts consist of General Service Large Demand (GSLD), Interruptible (INT) and Extra Large Demand Customer (ELDC) rate classes.

The GSLD rate class consists of customers with a billing demand greater than 500 kW at least three times over the past 12 months. As noted in section 3.2.2, the GSLD account forecast is a ratio of the combined Commercial and GSLD account forecast.

The INT rate class consists of customers with a billing demand greater than 1000 kW at least three times over the past 12 months.

The ELDC rate class consists of customers with a billing demand greater than 5000 kW at least three times over the past 12 months.

Projections for INT and ELDC accounts are modeled independently of MetrixND. Special consideration is given to account for new major commercial and industrial development projects that may impact future demand and energy requirements.

3.2.4 Other Accounts

The Other account category consists of Municipal, Electric, and Water Department accounts within the City of Lakeland, as well as private area lighting and roadway lighting.

Historical data for these classes is inconsistent and difficult to model. Therefore, account projections for this category are based on time trends and historical growth rates. LE also takes into consideration any future projects and potential developments. These forecasts are developed outside of MetrixND.

3.2.5 Total Accounts Forecast

The Total Account Forecast for LE is the sum of all the individual forecasts mentioned above.

3.3 Energy Sales Forecast

Lakeland's Energy Sales Forecast is the sum of the following forecasts:

- Residential, Inside and Outside City Limits
- Commercial, Inside and Outside City Limits
- Industrial, Inside and Outside City Limits
- Other, Inside and Outside City Limits

3.3.1 Residential Energy Sales Forecast

The Residential energy sales forecast is developed using the Statistically Adjusted End-Use (SAE) econometric modeling approach.

The residential sales models are estimated with historical monthly energy sales data. They are average use models based on the following equation:

$$AvgUse_{y,m} = b_0 + b_1 XCool_{y,m} + b_2 XHeat_{y,m} + b_3 XOther_{y,m} + \varepsilon_{y,m}$$

Where $XCool_{y,m}$, $XHeat_{y,m}$ and $XOther_{y,m}$ are explanatory variables constructed from weather data, end use equipment efficiency and saturation trends, economic and demographic data, dwelling type (single family, multi family or mobile home) and square footage.

For example, *XCool* incorporates cooling equipment saturation levels, cooling equipment efficiency, thermal efficiency, thermal integrity and square footage by dwelling type, household income, persons per household, price of electricity and CDDs.

This cooling variable is represented by the product of an end use equipment index and a monthly usage multiplier.

That is,

$$XCool_{y,m} = CoolIndex_y \ \ x \ CoolUse_{y,m}$$

Where

$XCool_{y,m}$ is the estimated cooling energy use in year (y) and month (m)

$CoolIndex_y$ is the annual index of cooling equipment

$CoolUse_{y,m}$ is the monthly usage multiplier

The $CoolIndex_{y,m}$ is calculated as follows:

$$CoolIndex_y = Structural\ Index_y \times \sum_{Type} Weight^{Type} \times \frac{\left(Saturation_y^{Type} \big/ Efficiency_y^{Type} \right)}{\left(Satataturation_Y^{Type} \big/ Efficiency_Y^{Type} \right)}$$

Where

The *StructuralIndex* is constructed by combining the EIA's building shell efficiency index trends with surface area estimates, indexed to the base year value:

$$StructuralIndex_y = \frac{BuildingShellEfficiencyIndex_y \times SurfaceArea_y}{BuildingShellEfficiencyIndex_Y \times SurfaceArea_Y}$$

Type is the cooling equipment type (Room Air Conditioning, Central Air Conditioning, Air Source Heat Pump, Ground Source Heat pump)

Currently, the base year *Y* in the EFG residential end use energy projections is 2009.

$CoolUse_{y,m}$ is defined as follows:

$$CoolUse_{y,m} = \left(\frac{CDD_{\ y,m}}{CDD_{\ Y}}\right) \times \left(\frac{HHSize_{\ y,m}}{HHSize_{\ Y}}\right)^{\alpha} \times \left(\frac{HHIncome_{\ y,m}}{HHIncome_{\ Y}}\right)^{\beta} \times \left(\frac{Price_{y,m}}{Price_{\ Y}}\right)^{\gamma}$$

Where

HHSize is average household size (persons per household)

HHIncome is average income per household

α , β , γ are the elasticities

Y is the Base Year

The *XHeat* variable is constructed in the same manner as the XCool variable, with cooling equipment replaced by heating equipment and CDDs replaced by HDDs. The heating equipment types used to construct the XHeat variable are furnace, air-source heat pump, ground-source heat pump, secondary heating, furnace fans.

The corresponding $HeatUse_{y,m}$ variable is defined as follows:

$$HeatUse_{y,m} = \left(\frac{HDD_{\ y,m}}{HDD_{\ Y}}\right) \times \left(\frac{HHSize_{\ y,m}}{HHSize_{\ Y}}\right)^{\alpha} \times \left(\frac{HHIncome_{\ y,m}}{HHIncome_{\ Y}}\right)^{\beta} \times \left(\frac{Price_{y,m}}{Price_{\ Y}}\right)^{\gamma}$$

The *XOther* variable includes the equipment types that are not influenced by weather and constitute the base load portion of residential energy consumption. The equipment types included are electric water heating, electric cooking, refrigerator, freezer, dishwasher, electric clothes washer, electric clothes dryer, television, lighting, and miscellaneous electric appliances.

The corresponding $OtherUse_{y,m}$ variable is defined as follows:

$$OtherUse_{y,m} = \left(\frac{BDays_{y,m}}{30.44}\right) \times \left(\frac{HHSize_{y,m}}{HHSize_{Y}}\right)^{\alpha} \times \left(\frac{HHIncome_{y,m}}{HHIncome_{Y}}\right)^{\beta} \times \left(\frac{Price_{y,m}}{Price_{Y}}\right)^{\gamma}$$

Instead of a weather variable, the OtherUse formula contains a BDays variable, which represents the number billing days in year (y) and month (m). These values are normalized by 30.44, the average number of days in a month.

The equation used to develop the total residential energy sales forecast is:

$$ResidentialSales_{y,m} = ResidentialCustomer_{y,m} \times AverageUsePerCustomer_{y,m}$$

3.3.2 Commercial Energy Sales

As mentioned in section 3.2.2, there is an increase in rate migration between the GSLD and Commercial rate classes due to energy efficiency. Therefore, a combined Commercial and GSLD energy sales model is generated. This model is developed using the SAE modeling approach for Commercial building types using EFG projections derived from EIA data. The Commercial sales model is driven by Gross Regional Product, price of electricity, number of households, weather, commercial building type and appliance saturations and efficiencies. Binary variables are used to help explain fluctuations in historical billing data due to rate migrations, billing discrepancies, seasonality, and other factors that may affect the accuracy of the forecast models.

The Commercial SAE model framework defines energy use in a year as the sum of energy used by the heating equipment, cooling equipment and other equipment. The formal model equation is:

$$USE_{y,m} = b_0 + b_1 \times XCool_{y,m} + b_2 \times XHeat_{y,m} + b_3 \times XOther_{y,m} + \varepsilon_{y,m}$$

Where $XCool_{y,m}$, $XHeat_{y,m}$ and $XOther_{y,m}$ are explanatory variables constructed from weather data, end use equipment efficiency and saturation trends, economic projections, commercial building type and square footage.

The $XCool_{y,m}$ variable is the amount of energy used by cooling systems and is defined as:

$XCool_{y,m} = CoolIndex_y \times CoolUse_{y,m}$

Where

$XCool_{y,m}$	is the estimated cooling energy use in year (y) and month (m)
$CoolIndex_y$	is the annual index of cooling equipment
$CoolUse_{y,m}$	is the monthly usage multiplier

The cooling equipment index depends on equipment saturation levels (*CoolShare*) normalized by operating efficiency levels (*Efficiency*):

$$CoolIndex_y = CoolSales_Y \times \frac{\left({CoolShare_y}/{Efficiency_y} \right)}{\left({CoolShare_Y}/{Efficiency_Y} \right)}$$

Base year cooling sales are defined as:

$$CoolSales_Y = \left(\frac{kWh}{Sqft}\right)_{Cooling} \times \left(\frac{CommercialSales_Y}{\sum_e^{kWh}/Sqft_e}\right)$$

Base-year cooling sales are the product of the average space cooling intensity value and the ratio of the total commercial sales in the base year over the sum of the end use intensity values.

The monthly Commercial *CoolUse* variable is computed as:

$$CoolUse_{y,m} = \left(\frac{CDD_{\ y,m}}{CDD_{\ Y}}\right) \times \left(\frac{EconVar_{\ y,m}}{EconVar_{\ Y}}\right)^{\alpha} \times \left(\frac{Price_{\ y,m}}{Price_{\ Y}}\right)^{\beta}$$

Where

EconVar is a function of Household growth and Gross Regional Product
α, β are elasticities

The *XHeat* variable has the same structure as the *XCool* variable, with cooling equipment replaced by heating Equipment, and CDDs replaced by HDDs. The corresponding monthly $HeatUse_{y,m}$ variable is defined as:

$$HeatUse_{y,m} = \left(\frac{HDD_{\ y,m}}{HDD_{\ Y}}\right) \times \left(\frac{EconVar_{\ y,m}}{EconVar_{\ Y}}\right)^{\alpha} \times \left(\frac{Price_{\ y,m}}{Price_{\ Y}}\right)^{\beta}$$

The *XOther* variable is also similar in struture to the XCool variable, and replaces Cooling equipment with Other Equipment (Ventilation, Electric Water Heating, Cooking equipment, Refrigeration, Lighting, Office equipment and Miscellaneous equipment). Instead of a weather variable there is a *BDays* variable, which represents the number billing days in year (y) and month (m), normalized by 30.44 days (the average number of billing days in a month.)

The corresponding *OtherUsey,m* variable is defined as:

$$OtherUse_{y,m} = \left(\frac{BDays_{\ y,m}}{30.44}\right) \times \left(\frac{EconVar_{\ y,m}}{EconVar_{\ Y}}\right)^{\alpha} \times \left(\frac{Price_{\ y,m}}{Price_{\ Y}}\right)^{\beta}$$

3.3.3 Industrial Energy Sales

While the GSLD demand and energy sales are forecast in combination with Commercial energy sales, the remainder of the Industrial class – the INT and ELDC rate classes - are modeled independently of the SAE methodology. Each INT and ELDC customer is evaluated individually to account for their expected future energy and demand consumption, using average historical growth rates, monthly demand and expected future changes to load based on information provided by various sources, including account managers, LE engineering, local news and informed judgement.

3.3.4 Other Sales Forecast

The Other energy sales forecast consists of sales for the City's Municipal, Electric and Water Departments, private area lighting, roadway lighting, and unmetered street lighting rate classes. Models are difficult to develop for these rate classes due to the large fluctuations in the historical billing data. Therefore, the projections for this category are based on historical trends and growth rates. Special consideration is given to account for new projects and potential developments.

3.3.5 Total Sales Forecast

The results of the energy sales forecasts for all revenue classes are added together to create a total sales forecast.

LE currently does not have any energy efficiency goals, therefore LE does not assume any deductions in peak load for the forecast period.

3.4 Net Energy Load Forecast

A loss factor of approximately 2.8% is applied to convert total energy sales to net energy for load (NEL). The loss factor is developed using a historical average of the estimated amount of energy lost during the generation, transmission, and distribution of electricity.

3.5 Peak Demand Forecast

A regression model is estimated in MetrixND to forecast monthly peaks. The model is developed using Itron's SAE modeling approach to ensure that end-use appliance saturations and efficiencies that may affect peak are being accounted for. The models are driven by monthly energy coefficients and normal peak-producing weather conditions.

The winter peak forecast is developed under the assumption that its occurrence will be on a January weekday. Historical winter peaks have occurred between the months of January to March, on weekdays, and between the hours of 7 and 8 a.m. Temperatures at time of winter peaks range from 27° F to 46° F.

The summer peak forecast is developed under the assumption that its occurrence will be on a July weekday. Historical summer peaks have occurred between the months of June to August, on weekdays, and between the hours of 3 and 6 p.m. Temperatures at time of summer peaks range from 92° F to 99° F.

3.6 Hourly Load Forecast

Twenty-four hourly regression models are developed in MetrixND to generate the 20-year hourly load shape. Each of these models relates weather and calendar conditions (day-of-week, month, holidays, seasonal periods, etc.) to load. The uncalibrated hourly load shape is then scaled to the energy forecast and the peak forecast using MetrixLT. The result is an hourly load shape that is calibrated to the system energy and system peak forecasts produced using MetrixND.

3.7 Sensitivity Cases

3.7.1 High & Low Load Forecast Scenarios

A forecast is generated based on the projections of its drivers and assumptions at the time of forecast development. This base forecast (50/50) is intended to represent the forecast that is "most likely" to occur.

There may be some conditions arising that may cause variation from what is expected in the base forecast. For these reasons, high and low case scenario forecasts are developed for customers, energy sales, system net energy for load and peaks. The high and low forecasts are based on variations of the primary drivers including population and economic growth.

Model Evaluation and Statistics

The results of the Electric Load and Energy Forecast are reviewed by an outside consultant. Itron is contracted to review all sales, customer, peak and energy forecast models for reasonableness and statistical significance. Itron also evaluates and reviews all key forecast assumptions.

Additionally, the MetrixND software is used to calculate statistical tests for determining a significant model, including Adjusted R-Squared, Durbin-Watson Statistic, F-Statistic, Probability (F-Statistic), Mean Absolute Deviation (MAD) and Mean Absolute Percentage Error (MAPE).

4.0 Energy Conservation & Management Programs

Lakeland Electric (LE) is committed to the efficient use of electric energy by adopting cost-effective energy efficiency and demand-side management programs for all its customers. Lakeland is not subject to Florida Efficiency and Conservation Act (FEECA) rules but has been continuously working to evaluate and implement cost-effective energy efficiency strategies. Presented in this section are the currently active programs.

This section also includes a brief description of Lakeland's adoption in solar technologies and a new LED traffic light retrofit program. Lakeland has been a pioneer in the deployment of solar technologies in lighting and heating, especially in the residential and commercial sectors. It continues to support and seek for opportunities to promote solar energy technologies such as utility scale solar and solar with storage technologies.

4.1 Existing Energy Conservation & Management Programs

Lakeland has the following energy conservation and management programs that are currently available and address two major areas of energy conservation issues:

- Reduction of energy needs on a per customer basis.
- Shifting of energy usage from peak to off-peak hours – which can lower the average energy cost.

4.1.1 In-direct Demand and Energy Savings

The programs outlined in this section cannot be measured directly in terms of demand and energy savings, but are very important as they have been shown to influence public behavior and thereby help reduce or shift energy usage and utilize energy efficiently. Lakeland considers the following programs to be an important part of its objective to cost-effectively reduce energy consumption:

- Residential Programs:
  - Energy Audit Program.
  - Public Awareness Program.

  - Informational Bill Inserts.
- Commercial Programs:
  - Commercial Audit Program.

4.1.1.1 Residential Programs.

4.1.1.1.1 Residential Energy Audits.

The Energy Audit Program promotes the usage of more energy-efficiency appliances at home and gives customers an opportunity to learn about other utility conservation programs that promotes energy savings options. The program provides Lakeland with a valuable customer interface and a good avenue for increased customer awareness.

4.1.1.1.2 Public Awareness Program.

Lakeland believes that public awareness of the need to conserve electricity is the greatest conservation resource. Lakeland's public awareness programs provide customers with information to help them reduce their electric bills by being more conscientious in their energy usage.

4.1.1.1.3 Informational Bill Inserts.

Monthly billing statements provide an excellent avenue for communicating timely energy conservation information to its customers. In this way, Lakeland conveys the message of better utilizing their electric resources on a regular basis in a low-cost manner.

4.1.1.2 Commercial Programs.

4.1.1.2.1 Commercial Energy Audits.

The Lakeland Commercial Audit Program includes educating customers about high efficiency lighting and thermal energy storage devices for customers to consider in their efforts to reduce costs associated with their electric usage.

4.1.2 Energy Conservation & Management Technology Research

Lakeland has made a commitment to study and review promising technologies in the area of energy conservation & management programs. Some of these efforts are summarized below.

4.1.2.1 Time-of-Day Rates.

Lakeland is currently offering a voluntary time of day pricing options for the interested customers as this makes consumers aware of the difference in costs during the different hours of a day. To date, there has been limited interest by Lakeland's customers in this demand-side management program.

4.1.3 Conservation Programs 2017

In keeping with LE's plan to promote retail conservation programs, the utility is continuing the following Energy Efficiency & Conservation Programs during 2017:

Residential

- Insulation rebate - $200 rebate for adding attic insulation to achieve R30 total. Certificate issued to resident at energy audit/visit and redeemed to Insulation Contractor. Can be homeowner installed
- Energy Saving Kits - giveaway at audits contains weather-stripping, outlet gaskets, low flow showerhead, LED, etc.
- HVAC Maintenance Incentive - $50 rebate for residential customers that have A/C maintenance done.
- Heat Pump Rebate - $300 rebate for installing a SEER 15 or higher heat pump
- LED Lighting - giveaway at audits, up to 3 per residence
- On-line Energy Audit
- Energy Star Appliance Rebate
    - Refrigerator $75
    - Dishwasher $40
    - Clothes Washer $100
    - Freezer $40
    - Pool Pump $200
    - Clothes Dryer $50
- Beat the Peak Rebates - to promote lower demand during peak hours
    - Water Heater Timers $150
    - Programmable Thermostat $200

Commercial

- Conservation Rebate - rebate of $150/kW for GSLD, Contract, and Interruptible customers that make energy efficiency improvements promoted by Account Executives
- Commercial Lighting - rebate of $150/kW reduced per customer for energy efficient lighting upgrades

Expected Results

- 2.6 MW demand reduction and over 4,600,000 kwh

4.2 Solar Program Activities

LE considers solar photovoltaic (PV) system as distributed generators irrespective of their connection to the grid. Solar being available during the day time, it contributes to reduce peak demand/energy, linking it to energy conservation & management programs. As such they can potentially fill the much-desired role that an electric utility needs to avoid future costs of building new (and/or re-working existing) supply side resources and delivery systems.

4.2.1 Solar Powered Street Lights.

Distributed generation produces the energy at the end use at the point of load by the customer, thereby eliminating many of the costs, wastes, pollutants, environmental degradation, and other objections to central station generation.

Solar powered streetlights offer a reliable, cost-effective solution to remote lighting needs. As shown in Figure 4-1, they are completely self-contained, with the ability to generate DC power from photovoltaic modules and batteries. During daylight hours solar energy is stored in the battery bank used to power the lights at night. By installing these self-sufficient, stand-alone solar lighting products, LE was able to avoid the construction costs related to expansion of its distribution system into remote areas. These avoided costs are estimated to be approximately $40,000.

For 13 years, LE had 20 solar powered streetlights in service. Each of these lights offset the need for a traditional 70 watt fixture that Lakeland typically would use in this type of application and displaced the equivalent amount of energy that the 70 watt fixture would use on an annual basis. The primary application for this type of lighting is for remote areas as stated above. In 2006, Lakeland's distribution system was developed in the areas where the solar powered streetlights were installed. Lakeland has chosen to phase-out the solar powered streetlights due to their age. Lakeland installed these 20 lights in mid-1994 in a grant program with the cooperation of the Florida Solar Energy Center (FSEC).

Figure 4-1 Solar Powered Streetlight

4.2.2 Solar Thermal Collectors for Water Heating.

The most effective application for solar energy is the heating of water for residential use. Solar water heating provides energy directly to the end-user. The sun's energy is stored directly in the heated water itself, eliminating the losses incurred when converting the energy to other forms.

During a ten-year pilot program, Lakeland installed and operated 57 solar water heaters in single family homes. Lakeland chose active solar water heaters as well as passive. All units were installed on the roofs of residential customers' homes, i.e. – at the point of consumption. Since this method of energy delivery bypasses the entire transmission and distribution system, there are benefits other than avoided generation costs.

In Lakeland's program, each solar water heater remained the property of the utility, thereby allowing the customer to avoid the financial cost of the purchase. Lakeland's return on this investment was realized through the sale of the solar generated energy as a separate line item on the customer's monthly bill. This energy device was monitored by using a utility-quality Btu meter calibrated to read in kWh.

One of the purposes of this program was to demonstrate that solar thermal energy can be accurately metered and profitably sold to the residential end-user as hot water. LE's fleet of 57 solar thermal energy generators displaces over 2,000 kWh per year per installation on average. During 2012, LE chose to end the pilot program, giving the participants the choice to either:

- assume ownership of the solar heater at no cost (or)
- have the solar heater removed and replaced with a standard electric water heater, also at no cost.

Sixty-two percent of the participants chose to keep the solar heaters at their premises.

4.2.3 Renewable Energy Credit Trading

LE is also the first utility to successfully trade Renewable Energy Credits (REC's) that were produced by these solar water heaters. In 2004, a cash transaction took place between Lakeland and two REC buyers: Keys Energy Services of Key West and the Democratic National Convention in Boston. Keys Energy needed the REC's for its retail Green Pricing program. The Democratic National Convention used the REC's to offset the emissions produced during that convention.

4.2.4 Utility Expansion of Solar Water Heating Program

During November 2007, LE issued a Request for Proposals for the expansion of its Residential Solar Water Heating Program. In this solicitation, Lakeland sought the services of a venture capital investor who would purchase, install, own, operate and maintain 3,000 – 10,000 solar water heaters on LE customers' residences in return for a revenue-sharing agreement. LE would provide customer service and marketing support, along with meter reading, billing and collections. During December 2007 a successful bidder was identified and notified. In August 2009, LE approved a contract with the vendor with plans to resume installations of solar water heaters. Annual projected energy savings from this project will range between 7,500 and 25,000 MWh. These solar generators will also produce Renewable Energy Credits that will contribute toward Florida's expected mandate for renewable energy as a part of the utility's energy portfolio.

During the summer of 2010 the "Solar for Lakeland" program began installing residential solar water heaters. Under this expanded program, the solar thermal energy will be sold for the fixed monthly amount of $34.95. All solar heating systems will continue to be metered for customers' verification of solar operation and for tracking green credits for the utility. Through the end of 2017, there were 259 solar heaters installed in Lakeland residences. The program is currently on hold with no new solar water heaters being installed.

4.2.5 Utility-Interactive Net Metered Photovoltaic Systems

This project started as a collaborative effort between the Florida Energy Office (FEO), Florida Solar Energy Center (FSEC), LE, and Shell Solar Industries. The primary objective of this program was to develop approaches and designs that integrate photovoltaic (PV) arrays into residential buildings, and to develop workable approaches to interconnect PV systems into the utility grid. Lakeland originally installed 3 PV systems, all of which were directly interconnected to the utility grid. These systems have an average nominal power rating of approximately 2.6 kilowatts peak (kwp) and are displacing approximately 2900 kWh per year per installation at standard test conditions.

During 2005, title to these systems was transferred to those homeowners in return for their extended voluntary participation. At the end of 2016, only one of these three original systems was still in operation.

Lakeland owned, operated, and maintained the systems for at least 7 years. FSEC conducted periodic site visits for testing and evaluation purposes. System performance data was continuously collected via telephone modem line during those years. FSEC prepared technical reports on system performance evaluation, onsite utilization, coincidence of PV generation with demand profiles, and utilization of PV generated electricity as a demand-side management option.

As of January 2018, there were approximately 200 PV systems that had been privately owned in the LE service territory. These systems now generate a total of 1000 kW of electric capacity. LE has allowed the interconnection of these systems in "net meter" fashion.

4.2.6 Utility-Interactive Photovoltaic Systems on Polk County Schools

Lakeland was also actively involved in a program called "Portable Power". The focus of the program was to install PV Systems on portable classrooms in the Polk County

School District. This program included LE, Polk County School District, Shell Solar Industries, Florida Solar Energy Research and Education Foundation (FSEREF), Florida Solar Energy Center (FSEC) and the Solar Electric Power Association (SEPA), formerly known as the Utility PV Group. The program allowed seventeen portable classrooms to be enrolled in former President Clinton's "Million Solar Roofs Initiative." With the installation of the PV systems 80 percent of the electricity requirements for these classrooms were met.

Along with the PV systems, a specially designed curriculum on solar energy appropriate to various grade levels was developed. This education package was delivered to the schools for their teachers' use for the instruction of solar sciences. By addressing solar energy technologies in today's public school classrooms, Lakeland is informing the next generation of the environmental and economic need for alternate forms of energy production.

The "Portable Power" in the schools, shown in Figure 4-2, consisted of 1.8kWp PV systems on 17 portable classrooms. In addition to the educational awareness benefits of PV programs in schools, there were several practical reasons why portable classrooms were most appropriate as the platforms for PVs. They provided nearly flat roofs and were installed in open spaces, so final orientation is of little consequence. Another reason was the primary electric load of the portable classroom was air conditioning. That load was reduced by the shading effect of the panels on their short stand-off mounts. Most important, the total electric load of the portable classroom was highly coincidental with the output from the PV system. The hot, sunny days which resulted in the highest cooling requirements also produced the maximum PV output.

Of extreme value to the PV industry, LE, in a partnership with the FSEC, provided on-site training sessions while installing the solar equipment on these school buildings. Attendees from other electric utilities were enrolled and given a hands-on opportunity to develop the technical and business skills needed to implement their own solar energy projects. The training classes covered all aspects of the solar PV experience from system design and assembly, safety and reliability, power quality, troubleshooting to distributed generation, and future requirements of deregulation.

Figure 4-2
Portable Classroom Topped by PV Panels

Lakeland owned, operated, and maintained the systems on these classrooms. Lakeland monitored the performance and FSEC conducted periodic testing of the equipment. Through the cooperative effort of the partnership, different ways to use a PV system efficiently and effectively in today's society were evaluated.

As a result of aging, all of the portable classrooms have been retired. And, where shifting populations have caused school officials to relocate some classrooms to schools outside Lakeland's service territory, Lakeland has removed the PV systems from those classrooms. Because the equipment is still capable of generating, budgets are being created so that these systems can be re-installed on buildings owned by the City of Lakeland.

4.2.7 Integrated Photovoltaics for Florida Residents

Lakeland's existing integrated PV program supports former President Clinton's "Million Solar Roofs Initiative". The Department of Energy granted five million dollars for solar electric businesses in addition to the existing privately funded twenty-seven million dollars, for a total of thirty-two million dollars for the program. Through the Utility PV Group, the investment supported 1,000 PV systems in 12 states and Puerto Rico with hopes to bring PV systems to the main market. The 1,000 systems were part of the 500,000 commitments received for the initiative to date. The goal was to have installed solar devices on one million roofs by the year 2010. Lakeland helped to accomplish this national goal.

This program provides research in the integration of PVs in newly constructed homes. Two new homes, having identical floor plans, were built in “side-by-side” fashion. The dwellings were measured for performance under two conditions: occupied and unoccupied. Data is being collected for end-use load and PV system interface. As a research project, the goal is to see how much energy could be saved without factoring in the cost of the efficiency features.

The first solar home was unveiled on May 28, 1998, in Lakeland, Florida. The home construction includes a 4 kW PV system, white tiled roof, argon filled windows, exterior wall insulation, improved interior duct system, high performance heat pump and high efficiency appliances. An identical home with strictly conventional construction features was also built as a control home. The homes are 1 block apart and oriented in the same direction as shown in Figure 4-3. For the month of July 1998, the occupied solar home air conditioning consumption was 72 percent lower than the unoccupied control house. Living conditions were simulated in the unoccupied home. With regard to total power, the solar home used 50 percent less electricity than the air conditioning consumption of the control home. The solar home was designed to provide enough power during the utility peak that it would not place a net demand on the grid. If the solar home produces more energy than what is being consumed on the premises, the output of the PV system could be sent into the utility grid. The objective was to test the feasibility of constructing a new, single family residence that was engineered to reduce air conditioning loads to an absolute minimum so most of the cooling and other daytime electrical needs could be accomplished by the PV component.

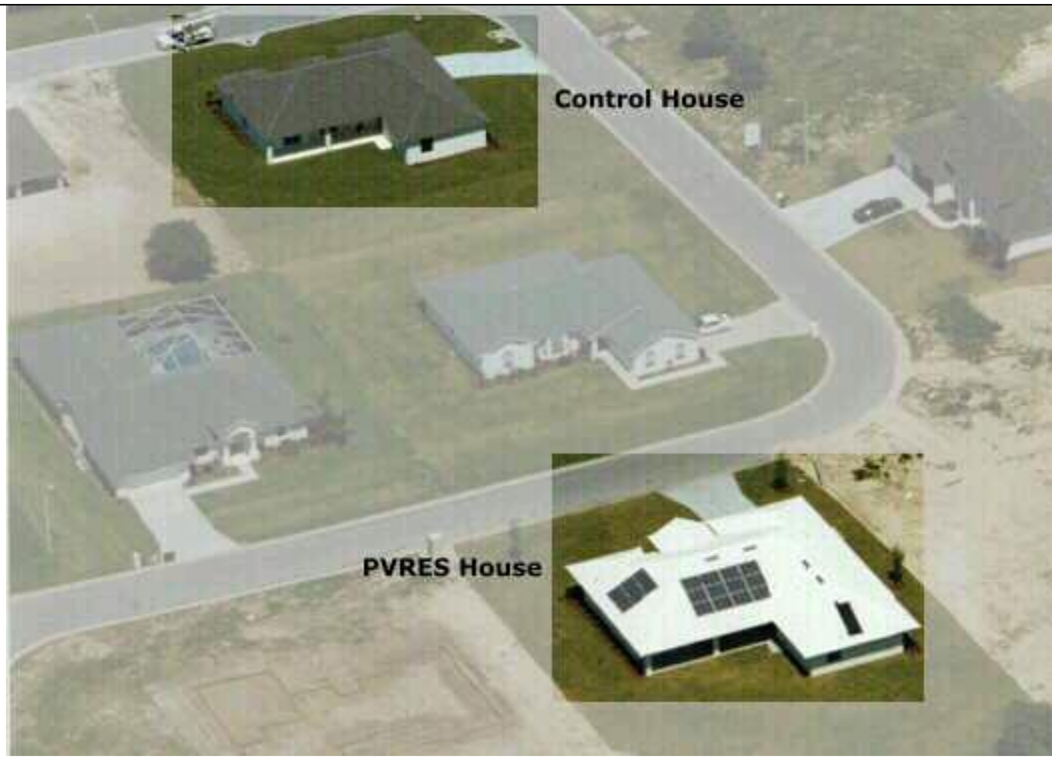


Figure 4-3
Solar House and Control House

4.2.8 Utility-Scale Solar PV Program

During November 2007, LE issued a Request for Proposal seeking an investor to purchase and install investor-owned PV systems totaling 24 MW on customer-owned sites as well as City of Lakeland properties. During December 2007, a successful bidder was identified. In October 2008, LE approved the contract with the vendor. Installation of these PV systems began in 2010. Projected reduction in annual fossil-fuel generation is expected to be 31,800 MWhs. This project will not only offset future energy generation, but will also produce highly valuable Renewable Energy Credits in anticipation of a Florida mandate to produce renewable energy as a part of the utility's overall portfolio.

During 2010, an investor-owned 250 kW PV system was installed on the roof of Lakeland's Civic Center. This system became operational during March and has produced a total of 2,470 MWh through 2015.

During 2011 a 2.25 MW PV system (Phase 1) was installed at the Lakeland Linder Airport. This system is interconnected directly to the utility's medium voltage distribution circuit on Hamilton Road. This system has generated a total of 18,540 MWh through the end of 2015.

During 2012, another 2.75 MW PV system (Phase 2) was added to the Hamilton Road site bringing the project total to 5.0 MWac. The Phase 2 system has generated 20,560 MWh through 2015.

In December of 2013, LE entered into another Solar Energy Purchase Agreement with this vendor. This agreement calls for the construction of a 6.0 MWac solar generation system on property adjacent to the Sutton substation. This system was completed and commissioned during July 2015. This system generated a total of 5,910 MWh through the end of 2015.

During October of 2015, another 3.15 MW project was started on Lakeland Airport property at Medulla Rd. This project was commissioned in December 2016. The plan calls for the development of another 6.0 MW has been postponed indefinitely. LE has a total of ~14.4 MW of solar capacity which has the potential to produce approximately 3.5% of the average daytime system-wide summer load.

4.2.9 Community Solar

Community Solar programs provide an alternative to the traditional process of individuals or businesses placing solar on their property. In this program, LE's customers will have the choice of purchasing solar energy from a designated solar generation facility instead of a traditional power plant.

Joining other utilities across the United States, LE has chosen Community Solar as a means to increase participation in solar energy for the people who may have physical, financial, or other limitations to installing solar on their own property.

During the second half of 2015, LE conducted telephone surveys and held focus group meetings to determine the level of interest in a Community Solar Program. A rollout date for this program was not determined at the end of 2016.

4.2.10 Energy Storage Pilot Project

The City of Lakeland is constantly looking to provide its customer base with the highest value by offering creative solutions to improve reliability and efficiency. The COL has deployed a pilot battery energy storage project of installed capacity of 6 kW in 2017. The energy storage solution is intended to provide energy storage capability to shave customer's peak demand which can potentially lead to monetary savings. In this pilot program, LE will charge the storage unit from the solar energy during off-peak hours and discharge daily during peak hours.

4.3 Green Pricing Program

Because no long-term budgets have been established for the deployment of solar energy devices, many utilities are dependent on infrequent, somewhat unreliable sources of funding for their solar hardware purchases. To provide for a more regularly available budget, a number of utilities are looking into the voluntary participation of their customers. Recent market studies performed in numerous locations and among diverse population groups reveal a public willingness to pay equal or even slightly higher premium on energy prices knowing that their payments are being directed towards renewable fuels.

The Florida Municipal Electric Association (FMEA) has assembled a workgroup called "Sunsmart". This workgroup is a committee composed of member utilities.

Its purpose is to raise environmental awareness and implement "Green Pricing" programs that would call for regular periodic payments from customers who wish to invest in renewables. The Florida Solar Energy Center (FSEC) co-hosts this effort by providing meeting places and website advertising to recruit from statewide responses. A grant from the State of Florida Department of Community Affairs, Florida Energy Office has been appropriated to encourage utility involvement with Green Pricing. LE is an active member of this committee and is investigating the marketability and public acceptance of a Green Pricing Program in its service territory.

4.4 LED Traffic Light Retrofit Program

The City of Lakeland is responsible for the operation and maintenance of 3,411 traffic lights at over 171 intersections. Historically, these traffic signals have used incandescent bulbs which are replaced every 18 months and use approximately 135 watts of electricity per bulb. This amounts to an annual electrical consumption of 1,633,525 kWh for all 12" red and green signals, arrow signals and pedestrian crossing signals.

This project retrofitted the existing bulbs with highly efficient Light Emitting Diodes (LEDs). The LEDs use approximately 10 watts of energy which is more than a 90% decrease in energy consumption as compared to their incandescent counterparts and have a longer life span, up to seven years, which reduces maintenance costs as well.

The Florida Department of Transportation (FDOT) agreed to help fund Lakeland's project to retrofit the signals. The FDOT contributed $50,000 for these new LED traffic lamps on all roadways within Lakeland's city limits. The FDOT views this as a "good neighbor policy" since FDOT depends on city crews to maintain the signals on its roads and highways within the city's limits.

The project began in December 2002 and was completed in June 2003. The project is expected to save the City of Lakeland $150,000 per year in maintenance and electricity costs.

As a next step, LE added backup power supply equipment at 14 critical intersections earmarked for FDOT-funded LED signals. These improvements were limited to those intersections that are located on state-funded roadways. The UPS systems will improve safety by keeping traffic signals operating during power outages and accidents. Emergency vehicles in Lakeland will see the added benefit of having easier access to desired areas such as fire and medical locations. Lakeland anticipates being one of the first cities in Florida to have the UPS systems applied to the LED signal lights.

5.0 Forecasting Methods and Procedures

This section describes and presents Lakeland's long-term Integrated Resource Planning (IRP) process, the economic parameter assumptions, plus the fuel price projections being used in the current evaluation process.

5.1 Integrated Resource Planning

Lakeland plans its capacity and energy resources through the IRP process. Lakeland presently has enough capacity and energy resources to meet its load obligation and reserves in next 10 years. However, Lakeland purchases economy energy from the Florida Municipal Power Pool (FMPP) and capacity from neighboring utilities on an as needed basis. Lakeland's planning process considers both demand-side management and supply-side resources along with the efficiency improvement in its Generation, Transmission and Distribution System. As promising alternatives emerge, they are included in the Portfolio after the evaluation process.

5.2 Florida Municipal Power Pool

Lakeland is a member of the Florida Municipal Power Pool (FMPP) along with the Orlando Utilities Commission (OUC) and the Florida Municipal Power Agency's (FMPA) All-Requirements Power Supply Project. The three utilities operate as one Balancing Authority (BA). All FMPP generating units are committed and dispatched together ensuring economic dispatch and reliability to the entire FMPP BA.

The FMPP is not a capacity pool meaning that each member must plan for and maintain sufficient capacity to meet their own individual electric demand and operating reserve obligations. Any member of the FMPP can withdraw from FMPP with a three-year written notice. Lakeland, therefore, must ultimately plan to meet its own load and reserve requirements as reflected in this document.

5.3 Economic Parameters and Evaluation Criteria

This section presents the assumed values adopted for economic parameters and inputs used in Lakeland's planning process. The assumptions stated in this section are applied consistently throughout this document. Subsection 5.3.1 outlines the basic economic assumptions. Subsections 5.3.2 and 5.3.3 outline the constant differential fuel forecasts, and base case, high and low.

5.3.1 Economic Parameters

This section presents the values assumed for the economic parameters currently being used in Lakeland's least-cost planning analysis.

5.3.1.1 Inflation and Escalation Rates

The general inflation rate applied is assumed to be 2.0 percent per year based on the CBO's projection for the GDP deflator as of June 2017. Fuel price escalation rates are discussed below in Section 5.3.2.

5.3.1.2 Bond Interest Rate

Consistent with the traditional tax-exempt financing approach used by Lakeland, the self-owned supply-side alternatives assume 100 percent debt financing. Lakeland's long-term tax-exempt bond interest rate is assumed to be 4.5 percent.

5.3.1.3 Present Worth Discount Rate

The present worth discount rate used in the analysis is set equal to Lakeland's assumed bond interest rate of 4.5 percent.

5.3.1.4 Interest During Construction

During construction of the plant, progress payments will be made to the EPC contractor and interest charges will accrue on loan draw downs. The interest during construction rate is assumed to be 4.5 percent.

5.3.1.5 Fixed Charge Rates

The fixed charge rate is the sum of the project fixed charges as a percent of the project's total initial capital cost. When the fixed charge rate is applied to the initial investment, the product equals the revenue requirements needed to offset fixed costs for a given year. A separate fixed charge rate can be calculated and applied to each year of an economic analysis, but it is most common to use a Levelized Fixed Charge Rate that has the same present value as the year by year fixed charged rates. Included in the fix charged rate calculation is an assumed 2.0 percent issuance fee, a 1.0 percent annual insurance cost, and a 6-month debt reserve fund earning interest at a rate equal to the bond interest rate.

5.3.2 Fuel Price Projections

This section presents the fuel price projections for coal, natural gas and oil. The fuel price forecast for solid fuels and oils and natural gas is prepared by Lakeland Electric's Fuels Department. Transportation inflation rate is base off the January 2017-2027 Congressional Budget Office (CBO) GDP inflation rate of 2%. Natural Gas forecast uses a blended average from a consultant forecast and the NYMEX Natural Gas forward curve along with including the following: transport rate, usage, fuel to provide a total delivered price. The Oil prices use the ten-year NYMEX Crude Oil forward curve. The diesel oil forecast is, with respect to the percentage of growth, based off the EIA Annual Energy Outlook 2017.

5.3.2.1 Natural Gas

Natural gas is a colorless, odorless fuel that burns cleaner than many other traditional fossil fuels. Natural gas can be used for heating, cooling, and production of electricity, and other industrial uses.

Natural gas is found in the Earth's crust. Once the gas is brought to the surface, it is refined to remove impurities such as water, sand, and other gases. The natural gas is then transported through pipelines and delivered to the customer either directly from the pipeline or through a distribution company or utility.

5.3.2.1.1 Natural gas supply and availability

Significant natural gas reserves exist, both in the United States and throughout the North American mainland and coastal regions. Natural gas reserves are mostly dependent on domestic production. Increasing production of natural gas from the Marcellus shale and advance drilling technology has lower mining cost contributing to increase supply which reduces price volatility seen in recent years. Recent periods have experienced gas trading in the mid $2.50's per MMBtu and the five-year NYMEX Natural Gas forward curve is projecting the price to average under $2.90 per MMBtu.

5.3.2.1.2 Natural gas transportation

There are now three transportation companies serving Peninsular Florida, Florida Gas Transmission Company (FGT), Sabal Trail Transmission, and Gulfstream Natural Gas System (GNGS). Lakeland Electric has interconnections and service agreements with GNGS and FGT to provide diversification and competition in delivery.

5.3.2.1.2.1 Florida Gas Transmission Company

FGT is an open access interstate pipeline company transporting natural gas for third parties through its 5,000-mile pipeline system extending from South Texas to Miami, Florida.

The FGT pipeline system accesses a diversity of natural gas supply regions, including:

- Anadarko Basin (Texas, Oklahoma, and Kansas).
- Arkona Basin (Oklahoma and Arkansas).
- Texas and Louisiana Gulf Areas (Gulf of Mexico).
- Black Warrior Basin (Mississippi and Alabama).
- Louisiana – Mississippi – Alabama Salt Basin.

FGT's total receipt point capacity is in excess of 3.0 billion cubic feet per day and includes connections with 12 interstate and 12 intrastate pipelines to facilitate transfers of natural gas into its pipeline system. FGT reports a current delivery capability to Peninsular Florida of approximately 3.1 billion cubic feet per day.

5.3.2.1.2.2 Florida Gas Transmission market area pipeline system

FGT's total receipt point capacity is in excess of 3.0 billion cubic feet per day and includes connections with 12 interstate and 12 intrastate pipelines to facilitate transfers of natural gas into its pipeline system. Lakeland Electric currently has in excess of 28,000 MMBtu / day of firm transportation contracted with FGT for natural gas delivery to Lakeland Electric's generation facilities.

The FGT multiple pipeline system corridor enters the Florida Panhandle in northern Escambia County and runs easterly to a point in southwestern Clay County, where the pipeline corridor turns southerly to pass west of the Orlando area. The mainline corridor then turns to the southeast to a point in southern Brevard County, where it turns south generally paralleling Interstate Highway 95 to the Miami area (see Fig. 5-1). A major lateral line (the St. Petersburg Lateral) extends from a junction point in southern Orange County westerly to terminate in the Tampa, St Petersburg, and Sarasota area. A major loop corridor (the West Leg Pipeline) branches from the mainline corridor in southeastern Suwannee County to run southward through western Peninsular Florida to connect to the St. Petersburg Lateral system in northeastern Hillsborough County. Each of the above major corridors includes stretches of multiple pipelines (loops) to provide flow redundancy and transport capability. Numerous lateral pipelines extend from the major corridors to serve major local distribution systems and industrial/utility customers.

FGT's Phase VIII Expansion Project came into full operation April 1, 2011. It consists of approximately 483.2 miles of multi diameter pipeline in Alabama, Mississippi and Florida with approximately 365.8 miles built parallel to existing pipelines. The project added 213,600 horsepower of additional mainline compression. One new compressor station was built in Highlands County, Florida. The project provides an annual average of 820,000 MMBtu/day of additional firm transportation capacity.

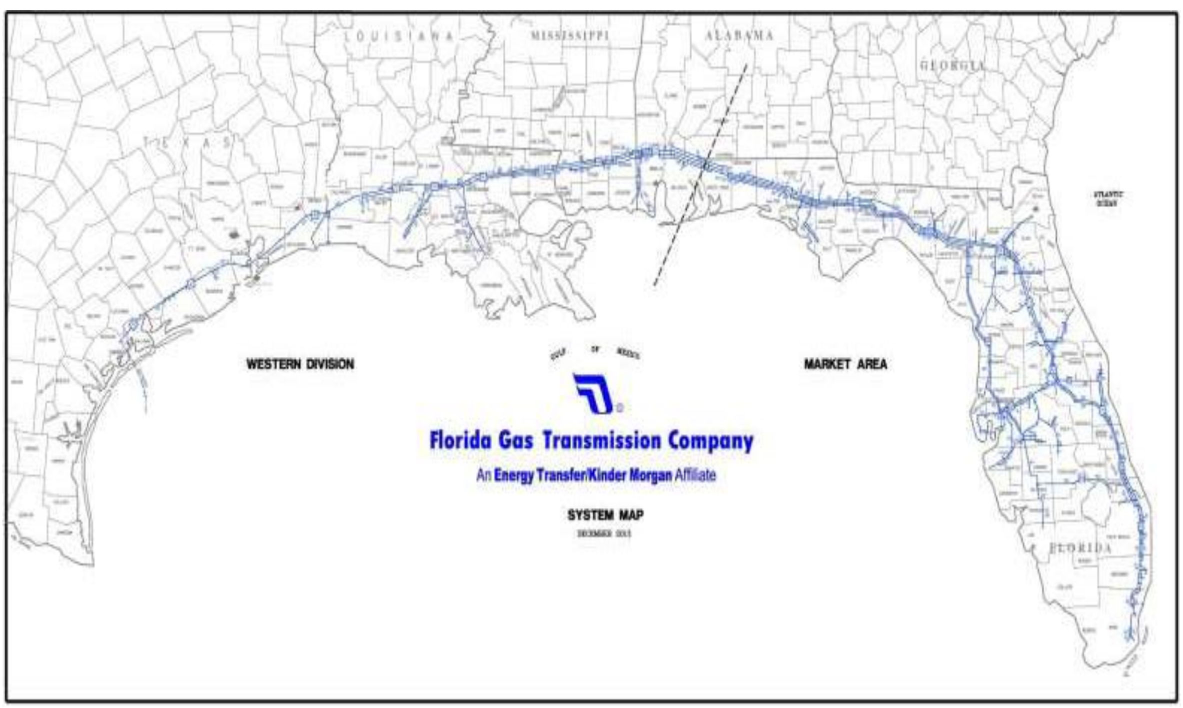


Figure 5-1
Florida Gas Transmission Company System Map

5.3.2.1.2.3 Gulfstream pipeline

The Gulfstream pipeline is a 744-mile pipeline originating in the Mobile Bay region and crossing the Gulf of Mexico to a landfall in Manatee County (south Tampa Bay). The pipeline supplies Florida with up to 1.1 billion cubic feet of gas per day serving existing and prospective electric generation and industrial projects in southern Florida. Figure 5-2 shows the route for the Gulfstream pipeline. Phase I of the pipeline is complete and ends in Polk County, Florida. The pipeline extends to FP&L's Martin Plant. Construction for the Gulfstream pipeline began in 2001 and it was placed in service in May, 2002. Phase II was completed in 2005. Lakeland added an additional 10,000 MMBtus/day of Gulfstream Pipeline capacity during 2017, for a total of 50,000 MMBtus/day.

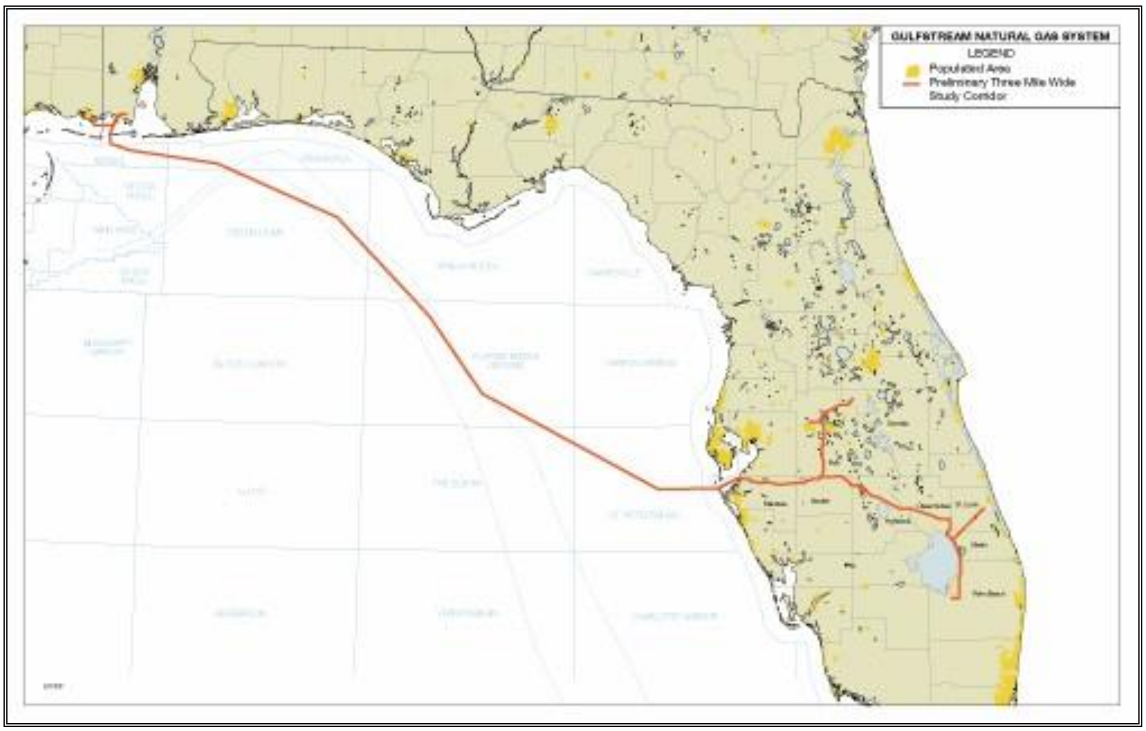


Figure 5-2
Gulfstream Natural Gas Pipeline

5.3.2.1.2.4 Sabal Trail Transmission

The Sabal Trail pipeline is a 515-mile interstate pipeline originating in Central Alabama and terminating in Central Florida. The pipeline's Phase 1 facilities began commercial service July 3, 2017. The Phase 1 capacity of the pipeline is 830,000 Dth/day. Lakeland Electric is not currently a customer of Sabal Trail Transmission.

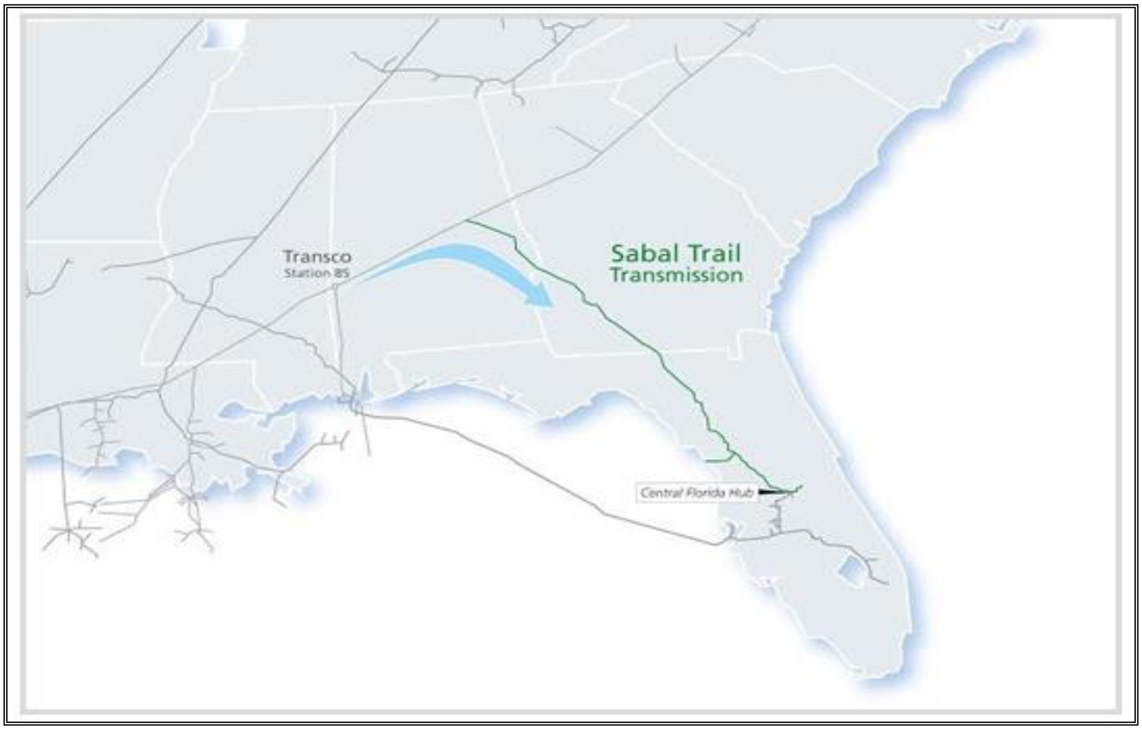


Figure 5-3
Sabal Trail Gas Pipeline System

5.3.2.1.3 Natural gas price forecast

The price forecast for natural gas is based on historical experience and future expectations for the market. The forecast takes into account the spot purchases of gas to meet its needs along with its risk management holdings intended to reduce price volatility. To address the historic volatility of the natural gas market, Lakeland Electric initiated a formal fuel hedging program in 2003. The Energy Authority (TEA), a company located in Jacksonville, FL, is Lakeland's consultant assisting in the administration and adjustment of policies and procedures as well as the oversight of the program.

Lakeland purchases “seasonal” gas to supplement the base requirement and purchases “as needed” daily gas, known commonly as “spot gas”, to round out its supply needs.

Natural gas transportation from FGT is currently supplied under three rates in FGT’s tariff, FTS-1, FTS-2 and FTS-3. Rates in FTS-1 are based on FGT’s Phase II expansion and rates in FTS-2 are based on the Phase III expansion. Rates in FTS-3 are based on the Phase VIII expansion, which went in service April 1, 2011[1]. The FTS-1 and FTS-2 rates have the same reservation rate but the FTS-2 has a $0.10 surcharge added to it effective February 1, 2016 for sixty-six months as part of the November 2014 rate case settlement. Rates for the Phase IV, Phase V, and Phase VI are included in the FTS-2 rate structure. Transportation rates are reflected in Table 5-1. Once the surcharge expires, the FTS-1 and FTS-2 rate classes will merge as a result of the settlement of FGT’s rate case. Lakeland’s rate for FGT transportation decreased on an overall basis as a result of the rate case lowering the FTS-2 rate which Lakeland owns 67% of its FGT capacity proving a savings to our ratepayers. The FGT tariff rates listed below became effective, March 1, 2018.

Table 5-1
Natural Gas Tariff Transportation Rates

	Rate Schedules					
Rates And Surcharges	FGT FTS-1 w/surcharges (cents/DTH)*	FGT FTS-2 w/surcharges (cents/DTH)*	**FGT FTS-3 w/surcharges (cents/DTH)*	FGT ITS-1	Gulfstream FTS-1	Gulfstream FTS-6%
Reservation	55.18	65.18	132.99	94.35	55.41	70.41
Usage	0.93	0.93	-0.40	0.00	0.0218	0.0055
Total	56.11	66.11	132.59	94.35	55.4318	70.4155
Fuel Charge	2.64%	2.64%	2.64%	2.64%	1.95%	1.95%

* A DTH is equivalent to 1 MMBtu or 1 MCF
** Lakeland does not currently subscribe to any FTS-3 Capacity

[1] Lakeland does not currently subscribe to any FTS-3 capacity.

A combination rate of $0.62/MMBtu will be used for purposes of projecting delivered gas prices, transportation charges applied to existing units as this is the average cost for Lakeland to obtain natural gas transportation for those units. This average rate is realized through a current mix of FTS-1, FTS-2 and Gulfstream transportation, including consideration of Lakeland's ability to relinquish its FTS and Gulfstream transportation or acquire other firm and interruptible gas transportation on the market. The delivered natural gas price is projected to remain relatively flat during the next few years (i.e., average growth rate of 1%). The average delivered gas price forecast for year 2018 is below $3.5/MMBtu.

5.3.2.2 Coal

Coal is a long-standing and reliable fuel used primarily for electric generation. Lakeland's McIntosh Unit #3 is a 365 megawatt coal burning generator placed into service in the early 1980's. The coal commodity escalation rate is 2.4% base off the 2017 U.S. Energy Information Administration (EIA) forecast.

5.3.2.2.1 Coal supply and availability

Lakeland's current coal purchase contract equals approximately 100 percent of Lakeland Electric's annual requirements for calendar year 2017. Under normal supply conditions, Lakeland maintains a 40 – 75 days coal supply reserve (100,000 –150,000 tons).

5.3.2.2.2 Coal transportation

McIntosh Unit 3 is Lakeland's only unit burning coal. Lakeland projects McIntosh Unit 3 will burn approximately 620,000 tons of coal per year. The coal sources are located in southwest Indiana, western Kentucky, southern Illinois, Pennsylvania, West Virginia, Tennessee, Alabama and North & South Carolina which affords Lakeland multiple transportation options by water or a single rail line haul via CSX Transportation. Lakeland at times may also imports a portion of its coal needs from South American sources, primarily from the nation of Colombia. Coal transportation for U.S. rail origins is provided under a contract signed with CSX in January 2017, which expires on December 31, 2019.

5.3.2.2.3 Coal price forecast

Currently, Lakeland's long-term purchase of coal for McIntosh 3 is effective through December 31, 2019. Coal prices are expected to continue increasing this year with stable IB pricing with modest price increases. The plant is pursuing implanting compliance for the 2018 standards on the Flue Desulfurization (FDG) and effluent limitation guideline (ELD) for sulfur, mercury and arsenic to meet EPA regulations. Expected delivered coal price to Lakeland is less than $3/MMBtu in 2018.

5.3.2.3 Fuel Oil

5.3.2.3.1 Fuel oil supply and availability

The City of Lakeland obtains all fuel oil through spot market purchases and has no long-term contracts. This strategy provides the lowest cost for fuel oil consistent with usage, current price stabilization, and on-site storage. Lakeland's Fuels Section continually monitors the cost-effectiveness of spot market purchasing.

5.3.2.3.2 Fuel oil transportation

Although the City of Lakeland is not a large consumer of fuel oils, a small amount is consumed during operations for backup fuel and diesel unit operations. Fuel oil is transported to Lakeland by truck.

5.3.2.3.3 Fuel oil price forecast

Changes in production levels and methods are placing oil prices at a lower level in the world market. Lakeland adjusts its oil price forecast to reflect current market pricing and what the anticipated future price may be.

5.3.3 Fuel Forecast Sensitivities

Lakeland is not presenting specific forecasted fuel price sensitivities.

6.0 Forecast of New Capacity Requirements

6.1 Need for Capacity

This section addresses the need for additional capacity to serve Lakeland's electric customers in the future. The need for capacity is based on Lakeland's load forecast, reserve margin requirements, power sales contracts, existing generating and unit capability and scheduled retirement of generating units.

6.1.1 Load Forecast

The load forecast described in Section 3.0 is used to determine the need for capacity. A summary of the load forecast for winter and summer peak demand for base high, and low projections are provided in Tables 6-1 and 6-2. As the Table shows, Lakeland has more than 20% capacity reserve by the end of the planning period.

6.1.2 Reserve Requirements

Prudent utility planning requires that utilities secure firm generating resources over and above the expected peak system demand to account for unanticipated demand levels and supply constraints. Several methods of estimating the appropriate level of reserve capacity are used. A commonly used approach is the reserve margin method, which is calculated as follows:

$$\frac{\text{System net capacity - System net peak demand}}{\text{System net peak demand}}$$

Lakeland has looked at probabilistic approaches to determine its reliability needs in the past. These have included indices such as Loss of Load Probability (LOLP) and Expected Unserved Energy (EUE) Use. Lakeland has found that due to the strength of its transmission system, expected LOLP or EUE values were so small that reserves based on those measures would be nearly non-existent. Conversely, isolated probabilistic values come out overly pessimistic calling for excessively high levels of reserves due to more than 50% of Lakeland’s capacity being made up by only two units. As a result, Lakeland has stayed with the reserve margin method based on the equation presented above. When combined with regular review of unit performance at times of system peak, Lakeland finds reserve margin to be the proper reliability measure for its system.

Generation availability is reviewed annually and is found to be within industry standards for the types of units that Lakeland has in its fleet, indicating adequate and prudent maintenance is taking place. Lakeland's winter and summer reserve margin target is currently 15%, but Lakeland has more than 20% in reserve. This complies with the FRCC minimum reserve margin criteria for the FRCC Region in terms of reliability requirement. As Lakeland's needs and fleet of resources continue to change through time, reserve margin levels will be reviewed and adjusted as appropriate.

6.1.3 Additional Capacity Requirements

By comparing the load forecast plus reserves with firm supply, the additional capacity required on a system over time can be identified. Lakeland's requirements for additional capacity are presented in Tables 6-1 and 6-2 which show the projected reliability levels for winter and summer base case load demands, respectively. Lakeland's capacity requirements are driven by the base winter peak demand forecasts.

The last column of Tables 6-1 and 6-2 indicates that using the base winter and summer forecast, Lakeland will not need any additional capacity in the current ten year planning period.

Table 6-1

Projected Reliability Levels - Winter / Base Case

					System Peak Demand		Reserve Margin		Excess/ (Deficit) to Maintain 15% Reserve Margin	
Year	Net Generating Capacity (MW)	Net System Purchases (MW)	Net System Sales (MW)	Net System Capacity (MW)	Before Interruptible and Load Management (MW)	After Interruptible and Load Management (MW)	Before Interruptible and Load Management (%)	After Interruptible and Load Management (%)	Before Interruptible and Load Management (MW)	After Interruptible and Load Management (MW)
2018/19	890	0	0	890	684	684	30.1	30.1	103	103
2019/20	890	0	0	890	687	687	29.5	29.5	100	100
2020/21	890	0	0	890	688	688	29.4	29.4	99	99
2021/22	890	0	0	890	693	693	28.4	28.4	93	93
2022/23	890	0	0	890	699	699	27.3	27.3	86	86
2023/24	890	0	0	890	707	707	25.9	25.9	77	77
2024/25	890	0	0	890	710	710	25.4	25.4	74	74
2025/26	890	0	0	890	715	715	24.5	24.5	68	68
2026/27	890	0	0	890	721	721	23.4	23.4	61	61
2027/28	890	0	0	890	730	730	21.9	21.9	51	51

Table 6-2
Projected Reliability Levels - Summer / Base Case

Year	Net Generating Capacity (MW)	Net System Purchases (MW)	Net System Sales (MW)	Net System Capacity (MW)	System Peak Demand		Reserve Margin		Excess/ (Deficit) to Maintain 15% Reserve Margin	
					Before Interruptible and Load Management (MW)	After Interruptible and Load Management (MW)	Before Interruptible and Load Management (%)	After Interruptible and Load Management (%)	Before Interruptible and Load Management (MW)	After Interruptible and Load Management (MW)
2018	844	0	0	844	639	639	32.1	32.1	109	109
2019	844	0	0	844	645	645	30.9	30.9	102	102
2020	844	0	0	844	650	650	29.8	29.8	97	97
2021	844	0	0	844	654	654	29.1	29.1	92	92
2022	844	0	0	844	660	660	27.9	27.9	85	85
2023	844	0	0	844	666	666	26.7	26.7	78	78
2024	844	0	0	844	673	673	25.4	25.4	70	70
2025	844	0	0	844	679	679	24.3	24.3	63	63
2026	844	0	0	844	686	686	23.0	23.0	55	55
2027	844	0	0	844	692	692	22.0	22.0	48	48

7.0 Generation Expansion

As shown in Tables 6-1 and 6-2 in Section 6, Lakeland does not have an immediate capacity need in the current ten-year planning horizon if all existing units are available. After LE retired McIntosh 1 Steam Unit in December 2015, LE has occasionally purchased capacity when the larger units (i.e., Unit 5 and Unit 3) were in outages. Short-term capacity and energy deficits were fulfilled from Pool/market purchases. Taking consideration of maintaining capacity and adequate reliability under various future scenarios, LE is continuously evaluating new supply/demand-side options along with existing resources to provide affordable/economic supply of electrical power for LE customers. In addition, there is slower than expected load growth in current and projected future demand of electricity, which is likely due to shifts in customer behavior (voluntary conservation), increase in government efficiency standards, and limited customer growth in the Lakeland territory.

7.1 Reliability and Security of Power Supply

The purpose of the Generation Expansion Plan is to maintain a reliable and affordable power supply portfolio in a system. In the U.S. power systems, 1-in-10 reliability standard (1-day equivalent of loss of load hours in 10 years) is a well adopted benchmark while developing a supply portfolio. This reliability benchmark, in most cases, translates into the requirement of 15% reserve margin in long-term planning. LE is committed not only to plan for meeting the present capacity requirement, but also the additional 15% reserve capacity. This is needed because the generating resources of the utility can be in planned or forced outages and existing capacity resources may not be able to meet the customers' demand. In that aspect, LE is in an agreement with other Florida Municipal Power Pool (FMPP) members (i.e., OUC and FMPA), to dispatch all available members' generating resources to meet the total energy demand and maintain sufficient capacity, since the reserve margin is an individual member's responsibility.

As far as daily operating reliability is concerned, FRCC, as per the NERC criteria, requires its member utilities (including LE) to have operating reserve capacity (including contingency reserves) to maintain the continuous supply and demand balance at all time. This is required to provide voltage regulation and local system protection as well as to compensate for load forecast error and equipment outage, as per NERC standard (BAL-002-0). In this context, FMPP, as a representative for Lakeland Electric, uses power exchange agreements with other neighboring utilities (such as, Duke Energy, TECO, and FP&L) encompassing 10 different Balancing Authorities in an emergency (contingency) condition. This group of utilities is called the Florida Reserve Sharing Group (FRSG) making the use of the contingency reserve through the network interconnections and reducing the risk of not serving individual native load requirement. The FRSG contingency reserves are maintained at this greater value to its most severe single contingency. The FRSG adjusts 102% for the most severe single contingency loss of capacity in Florida (i.e., 1386 MW, Cape Canaveral Unit) and adjusts to 1414 MW for contingency reserve in 2017. Contingency reserves may be comprised of different generating resources and interruptible load that are available within 15 minutes after the reportable disturbance. As of December 2017, FMPP and Lakeland Electric’s share of contingency reserves was 141 MW and 33.5 MW, respectively. As a part of FMPP agreement, each member plans for the 10% of the generation reserves over the projected annual peak for the next year.

Lakeland Electric ensures capacity and energy sufficiency through Pool agreements and comply Reliability Standard (BAL-001-2) through the FRSG agreement with neighboring utilities to maintain system frequency limits in the Lakeland Electric system.

7.2 Energy Generation

Lakeland’s annual energy requirement will be mainly covered by its own resources during the whole planning horizon. When two major units are in operation, LAK generally sells during off-peak hours and purchases energy from the Pool during peak hours. But more than 95% energy is covered by its own resources. Production cost analysis shows that the average energy cost to serve Lakeland during the next TYSP is less than $30/MWh. However, there could be a very minimal additional cost for capacity for any purchase requirement to maintain the reliability of the System. Since Lakeland dispatches its resources in the FMPP Pool according to the economic order, utilization of peakers is very minimal and is used as reserve during the emergency purpose.

8.0 Environmental and Land Use Information

Lakeland's 2018 Ten-Year Site Plan has no capacity additions during 2018-27 and thus no additional environmental or land use information is required now. Any future additions would comply with all applicable environmental and land use requirements.

All existing units are fully permitted and meet all regulatory requirements. Table 8-1 summarizes different control strategies adopted to comply with various environmental emissions for major generating units. The following is a summary of major existing and emerging environmental regulations and how Lakeland complies or plans to comply with them in near future.

8.1 Air

In 2010, the Environmental Protection Agency (EPA) finalized a rule that was aimed at reducing emissions of toxic air pollutants from existing stationary reciprocating internal combustion engines (RICE). Subpart ZZZZ, also known as the RICE rule, became effective in May 2013 for compression ignition engines (diesel-fired) and in October 2013 for spark ignition engines (gasoline-fired and propane-fired). The rule has different requirements based on engines' intended use. Requirements for non-emergency engines are most stringent and include limitations such as carbon monoxide (CO) emission standards (requiring oxidation catalysts to be installed), periodic CO emissions testing, fuel restrictions (only fuel containing no more than 0.0015% sulfur is allowed), and monitoring of catalyst inlet temperature and pressure drop. Requirements for emergency engines are essentially to keep the annual hours of operation below certain thresholds and to conduct the required engine maintenance at specified time intervals. The only requirement for startup (black start) engines is to conduct the required engine maintenance. Lakeland currently has 21 non-emergency, three emergency, and three startup engines that are subject to the RICE rule requirements.

In 2012, EPA finalized the Mercury and Air Toxics Standards (MATS) for power plants. MATS was designed to reduce emissions of heavy metals and acid gases. The compliance date for this rule was April 16, 2015. MATS primarily affects coal-fired Unit 3 at McIntosh, while Lakeland's other oil/gas-fired unit (Unit 2) remains exempt as long as it does not fire oil for more than 10% of the average annual heat input during any three consecutive calendar years or for more than 15% of the annual heat input during any calendar year. In addition to the new, more stringent particular matter (PM) and sulfur dioxide (SO_2) emission limits under this rule, MATS also requires Unit 3 to comply with a new mercury (Hg) limit. To comply with these new limitations, upgrades to Unit 3's scrubber were necessary and were performed in early 2015. To demonstrate compliance with the PM and Hg standards, new continuous emission monitors for these pollutants were installed in 2015.

In 2010, EPA promulgated a new 1-hour National Ambient Air Quality Standard (NAAQS) for SO_2 of 75 parts per billion. Florida was required to use atmospheric modeling (to predict ambient impacts), in addition to the normal ambient monitoring (which provides actual impacts), to show whether the standard was being met in areas surrounding large sources of SO_2. One of those large SO_2 sources was Lakeland's McIntosh plant. In early 2016, Florida Department of Environmental Protection (FDEP) concluded the SO_2 modeling of McIntosh. The modeling indicated that the plant was in compliance with the 2010 SO_2 NAAQS.

In June 2014, EPA proposed the carbon dioxide (CO_2) emissions guidelines for existing power plants, commonly known as the Clean Power Plan (CPP). The guidelines were finalized in 2015, but the Supreme Court stayed implementation of the rule in early 2016. Furthermore, pursuant to President Trump's Executive Order in April 2017, EPA announced that it was reviewing the CPP. In October 2017, EPA proposed a rule that would repeal it, and in December 2017, EPA took a first step toward potentially replacing the CPP by releasing an advance notice of proposed rulemaking. This notice asked the public for comments on what a CPP replacement rule should include. It is unknown at this point what the new CO_2 rule would look like and how it would affect Lakeland's generating units.

Lakeland's generating units were subject to EPA's air transport rules, Clean Air Interstate Rule (CAIR) and Cross State Air Pollution Rule (CSAPR), but starting in 2017 Florida was removed from this program.

8.2 Water

The EPA published a final 316(b) rule in August 2014 that became effective on October 14, 2014. The rule establishes standards for cooling water intake structures at existing power plants to reduce the effects on aquatic life. The rule also addresses cooling water intakes for new units at existing facilities. Compliance with the rule may require changes to existing cooling water intake structures at Lakeland's Unit 8. However, the final impact of this rule will depend on the results of additional studies and how the rule is implemented by state regulators based on site-specific factors. During the next permit renewal cycle in 2021, the impacts will be fully known.

EPA published a final Effluent Limitation Guidelines (ELG) rule in late 2015, and it became effective on January 4, 2016. The ELGs establish stringent limits for wastewater discharges from flue gas desulfurization (FGD) processes, fly ash and bottom ash transport water, leachate from ponds and landfills containing coal combustion residuals (CCRs), gasification processes, and flue gas mercury controls. In August 2017 EPA decided to reconsider the ELG rule. Compliance date for pretreatment standards for existing sources (PSES) was originally set for November 1, 2018. EPA subsequently postponed the compliance dates until November 1, 2020 to give them time to put in place a new ELG rule. A draft of the reconsidered rule has yet to be released, so the impact of the rule on Lakeland's operations is unknown at this time.

8.3 Waste

On April 17, 2015, EPA issued new rules regulating the disposal and beneficial use of Coal Combustion Residuals (CCRs) such as coal ash and gypsum. This rule was promulgated in response to the 2008 TVA incident and others that followed involving the release of CCRs into the environment. Initially, these new rules were designed to be enforced through citizen lawsuits instead of the normal delegated permitting process from EPA to FDEP. In late 2016, Congress passed the Water Infrastructure Improvements for the Nation Act (WIIN Act) which fundamentally changed the manner in which the CCR Rule is to be implemented. Under the WIIN Act, EPA is authorized to review and approve state CCR permit programs that are at least as protective as the federal CCR Rule. Currently, Florida has not been authorized to implement a CCR permit program. The ultimate impact of the CCR rule will depend on the results of initial and ongoing minimum criteria assessments and the implementation of state or federal permit programs.

Table 8-1
Lakeland Electric
Existing Generating Facilities
Environmental Considerations for Major Generating Units

Plant Name	Unit (Type)	Fuel		Air Pollutants and Control Strategies				Cooling Type
		Primary	Alt	PM	SO_2	NO_x	CO	
Charles Larsen Memorial	8 (CC)	NG	DFO	None	LS	LNB WI	None	OTF
C. D. McIntosh, Jr.	2 (ST)	NG	RFO	None	LS	FGR	None	WCTM
	3 (ST)	Coal	--	ESP	FGD	LNB OFA SCR	None	WCTM
	5 (CC)	NG	--	None	LS	LNB SCR	OC	WCTM
Winston	1-20 (IC)	DFO	--	None	LS	SCR	OC	N/A

PM	Particulate matter	OTF	Once-through flow	FGD	Flue gas desulfurization
SO_2	Sulfur dioxide	FGR	Flue gas recirculation	OFA	Overfire air
NO_x	Nitrogen oxides	IC	Internal combustion	SCR	Selective catalytic reduction
CO	Carbon monoxide	NG	Natural Gas	ST	Steam turbine
LS	Low sulfur fuel	WCTM	Water cooling tower mechanical	OC	Oxidation catalyst
LNB	Low NO_x burners	ESP	Electrostatic precipitator	DFO	Distillate Fuel Oil
WI	Water injection	CC	Combined Cycle	Alt	Alternate
RFO	Residual Fuel Oil				

Source: Lakeland Environmental Staff

9.0 Ten-Year Site Plan Schedules

This section presents all the schedules as required by the Ten-Year Site Plan for the Florida Public Service Commission. All the schedules (Tables 9-1 through 9-17) are a compilation of historical and forecasted load and energy requirement for LE with seasonal variation. Also included are technical specifications of existing units with variations of their capacity in different seasons.

9.1 Abbreviations and Descriptions

The following abbreviations are used throughout the Ten-Year Site Plan Schedules.

Abbreviation	Description
Unit Type	
CA	Combined Cycle Steam Part
GT	Combustion Gas Turbine
ST	Steam Turbine
CT	Combustion Turbine
CC	Combined Cycle
IC	Internal Combustion Engine
Fuel Type	
NG	Natural Gas
DFO	Distillate Fuel Oil
RFO	Residual Fuel Oil
BIT	Bituminous Coal
WH	Waste Heat
Fuel Transportation Method	
PL	Pipeline
TK	Truck
RR	Railroad
Unit Status Code	
RE	Retired
SB	Cold Standby (Reserve)
TS	Construction Complete, not yet in commercial operation
U	Under Construction
P	Planned for installation

Table 9-1

Schedule 1.0: Existing Generating Facilities as of December 31, 2017

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
				Fuel[4]		Fuel Transport[5]						Net Capability[2]	
Plant Name	Unit No.	Location	Unit Type[3]	Pri	Alt	Pri	Alt	Alt Fuel Days Use[1]	Commercial In-Service Month/Year[1]	Expected Retirement Month/Year	Gen. Max. Nameplate kW	Summer MW	Winter MW
Charles Larsen Memorial	2	16-17/28S/24E	GT	NG	DFO	PL	TK	NR	11/62	Unknown	11,250	10	14
	3		GT	NG	DFO	PL	TK	NR	12/62	Unknown	11,250	9	13
	8		CA	WH	---	---	---	---	04/56	Unknown	26,000	29	31
	8		CT	NG	DFO	PL	TK	NR	07/92	Unknown	88,000	76	93
Plant Total												124	151

[1]LAK does not maintain records of the days the alternative fuel was used.
[2]Net Normal.

[3]**Unit Type**		[4]**Fuel Type**		[5]**Fuel Transportation Method**	
CA	Combined Cycle Steam Part	DFO	Distillate Fuel Oil	PL	Pipeline
CT	Combined Cycle Combustion Turbine	RFO	Residual Fuel Oil	TK	Truck
GT	Combustion Gas Turbine	BIT	Bituminous Coal	RR	Railroad
ST	Steam Turbine	WH	Waste Heat		
		NG	Natural Gas		

Source: Lakeland Electric Energy Production

Table 9-1a

Schedule 1.0: Existing Generating Facilities as of December 31, 2017

				Fuel[4]		Fuel Transport[5]						Net Capability[2]	
Plant Name	Unit No.	Location	Unit Type[3]	Pri	Alt	Pri	Alt	Alt Fuel Days Use[1]	Commercial In-Service Month/Year	Expected Retirement Month/Year	Gen. Max. Nameplate kW	Summer MW	Winter MW
Winston Peaking Station	1-20	21/28S/23E	IC	DFO	---	TK	---	NR	12/01	Unknown	2,500 each	50	50
Plant Total												50	50
C.D. McIntosh, Jr.	D1	4-5/28S/24E	IC	DFO	---	TK	---	NR	01/70	Unknown	2,500	2.5	2.5
	D2		IC	DFO	---	TK	---	NR	01/70	Unknown	2,500	2.5	2.5
	GT1		GT	NG	DFO	PL	TK	NR	05/73	Unknown	20,000	16	19
	2		ST	NG	RFO	PL	TK	NR	06/76	Unknown	114,700	106	106
	3		ST	BIT	---	RR	TK	NR	09/82	Unknown	219,000	205[6]	205[6]
	5		CT	NG	---	PL	---	NR	05/01	Unknown	245,000	213	233
	5		CA	WH	---	---	---	NR	05/02	Unknown	120,000	125	121
Plant Total												670	689
System Total												**844**	**890**

[1] Lakeland does not maintain records of the number of days that alternate fuel is used.
[2]Net Normal.
[6]Lakeland's 60 percent portion of joint ownership with Orlando Utilities Commission.

[3]**Unit Type**	[4]**Fuel Type**	[5]**Fuel Transportation Method**
CA Combined Cycle Steam Part	DFO Distillate Fuel Oil	PL Pipeline
CT Combined Cycle Combustion Turbine	RFO Residual Fuel Oil	TK Truck
GT Combustion Gas Turbine	BIT Bituminous Coal	RR Railroad
ST Steam Turbine	WH Waste Heat	
	NG Natural Gas	

Table 9-2
Schedule 2.1: History and Forecast of Energy Consumption and Number of Customers by Customer Class

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Rural & Residential					Commercial		
Year	Population	Members per Household	GWh	Average No. of Customers	Average kWh Consumption per Customer	GWh	Average No. of Customers	Average kWh Consumption per Customer
2008	252,731	2.51	1,383	100,739	13,729	762	11,914	63,958
2009	253,084	2.51	1,417	100,641	14,080	749	11,836	63,282
2010	253,009	2.51	1,530	100,719	15,191	753	11,806	63,781
2011	260,567	2.59	1,437	100,784	14,258	744	11,786	63,126
2012	262,288	2.59	1,343	101,252	13,264	727	11,765	61,793
2013	264,023	2.59	1,368	101,968	13,416	742	11,864	62,542
2014	271,379	2.63	1,400	103,099	13,579	752	12,022	62,552
2015	274,861	2.63	1,468	104,581	14,037	789	12,157	64,901
2016	279,331	2.64	1,473	105,932	13,905	795	12,225	65,031
2017	283,626	2.63	1,460	107,703	13,556	803	12,372	64,905
Forecast								
2018	287,882	2.64	1,486	109,023	13,630	809	12,510	64,668
2019	292,141	2.64	1,497	110,597	13,536	819	12,647	64,758
2020	296,408	2.64	1,503	112,217	13,394	823	12,792	64,337
2021	300,650	2.64	1,514	113,769	13,308	832	12,934	64,327
2022	304,865	2.64	1,528	115,319	13,250	841	13,072	64,336
2023	309,089	2.64	1,544	116,885	13,210	850	13,212	64,335
2024	313,300	2.64	1,562	118,455	13,186	858	13,352	64,260
2025	317,484	2.64	1,579	120,042	13,154	867	13,493	64,256
2026	321,649	2.64	1,596	121,618	13,123	876	13,635	64,246
2027	325,887	2.65	1,614	123,177	13,103	885	13,775	64,247

Table 9-3
Schedule 2.2: History and Forecast of Energy Consumption and Number of Customers by Customer Class

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Industrial						
Year	GWh	Average No. of Customers	Average kWh Consumption per Customer	Railroads and Railways	Street & Highway Lighting GWh	Other Sales to Public Authorities GWh	Total Sales to Ultimate Consumers GWh
2008	607	87	6,977,011	0	32	74	2,859
2009	590	84	7,023,810	0	33	71	2,860
2010	581	84	6,916,667	0	33	69	2,966
2011	578	86	6,720,930	0	33	73	2,864
2012	579	81	7,148,148	0	33	70	2,751
2013	618	79	7,822,785	0	33	70	2,831
2014	649	77	8,428,571	0	33	70	2,903
2015	670	76	8,815,789	0	34	73	3,034
2016	655	74	8,851,351	0	34	73	3,030
2017	648	72	9,000,000	0	35	72	3,018
Forecast							
2018	665	73	9,109,589	0	35	71	3,066
2019	682	73	9,342,466	0	36	70	3,104
2020	687	74	9,283,784	0	36	70	3,119
2021	691	75	9,213,333	0	36	70	3,143
2022	696	76	9,157,895	0	36	70	3,171
2023	701	77	9,103,896	0	36	71	3,202
2024	708	78	9,076,923	0	36	70	3,234
2025	712	79	9,012,658	0	36	71	3,265
2026	717	80	8,962,500	0	36	71	3,296
2027	723	81	8,925,926	0	36	71	3,329

Table 9-4

Schedule 2.3: History and Forecast of Energy Consumption and Number of Customers by Customer Class

(1)	(2)	(3)	(4)	(5)	(6)
Year	Wholesale Purchases for Resale GWH	Wholesale Sales for Resale GWH	Net Energy for Load GWh	Other Customers (Average No.)	Total No. of Customers
2008	0	0	2,975	9,685	122,425
2009	0	0	2,992	9,430	121,991
2010	0	0	3,118	9,207	121,815
2011	0	0	2,893	9,070	121,725
2012	0	0	2,873	8,953	122,050
2013	0	0	2,919	8,892	122,803
2014	0	0	3,006	8,820	124,019
2015	0	0	3,126	8,860	125,674
2016	0	0	3,109	8,921	127,152
2017	0	0	3,086	8,966	129,113
Forecast					
2018	0	0	3,156	8,980	130,585
2019	0	0	3,195	8,999	132,316
2020	0	0	3,210	9,029	134,112
2021	0	0	3,235	9,059	135,837
2022	0	0	3,264	9,090	137,557
2023	0	0	3,296	9,120	139,294
2024	0	0	3,329	9,151	141,036
2025	0	0	3,361	9,183	142,797
2026	0	0	3,393	9,214	144,547
2027	0	0	3,427	9,246	146,279

Table 9-5
Schedule 3.1: History and Forecast of Summer Peak Demand Base Case (MW)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
					Residential		Commercial/Industrial		
Year	Total	Wholesale	Retail	Interrupt.	Load Management	Conservation	Load Management	Conservation	Net Firm Demand
2008	615	0	615	0	0	0	0	0	615
2009	625	0	625	0	0	0	0	0	625
2010	638	0	638	0	0	0	0	0	638
2011	611	0	611	0	0	0	0	0	611
2012	590	0	590	0	0	0	0	0	590
2013	602	0	602	0	0	0	0	0	602
2014	627	0	627	0	0	0	0	0	627
2015	630	0	630	0	0	0	0	0	630
2016	646	0	646	0	0	0	0	0	646
2017	643	0	643	0	0	0	0	0	643
Forecast									
2018	639	0	639	0	0	0	0	0	639
2019	645	0	645	0	0	0	0	0	645
2020	650	0	650	0	0	0	0	0	650
2021	654	0	654	0	0	0	0	0	654
2022	660	0	660	0	0	0	0	0	660
2023	666	0	666	0	0	0	0	0	666
2024	673	0	673	0	0	0	0	0	673
2025	679	0	679	0	0	0	0	0	679
2026	686	0	686	0	0	0	0	0	686
2027	692	0	692	0	0	0	0	0	692

Table 9-5a
Schedule 3.1a: History and Forecast of Summer Peak Demand Low Case (MW)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
					Residential		Commercial/Industrial		
Year	Total	Wholesale	Retail	Interrupt.	Load Management	Conservation	Load Management	Conservation	Net Firm Demand
2008	615	0	615	0	0	0	0	0	615
2009	625	0	625	0	0	0	0	0	625
2010	638	0	638	0	0	0	0	0	638
2011	611	0	611	0	0	0	0	0	611
2012	590	0	590	0	0	0	0	0	590
2013	602	0	602	0	0	0	0	0	602
2014	627	0	627	0	0	0	0	0	627
2015	630	0	630	0	0	0	0	0	630
2016	646	0	646	0	0	0	0	0	646
2017	643	0	643	0	0	0	0	0	643
Forecast									
2018	636	0	636	0	0	0	0	0	636
2019	641	0	641	0	0	0	0	0	641
2020	646	0	646	0	0	0	0	0	646
2021	651	0	651	0	0	0	0	0	651
2022	657	0	657	0	0	0	0	0	657
2023	663	0	663	0	0	0	0	0	663
2024	670	0	670	0	0	0	0	0	670
2025	675	0	675	0	0	0	0	0	675
2026	682	0	682	0	0	0	0	0	682
2027	688	0	688	0	0	0	0	0	688

Table 9-5b
Schedule 3.1b: History and Forecast of Summer Peak Demand High Case (MW)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
					Residential		Commercial/Industrial		
Year	Total	Wholesale	Retail	Interrupt.	Load Management	Conservation	Load Management	Conservation	Net Firm Demand
2008	615	0	615	0	0	0	0	0	615
2009	625	0	625	0	0	0	0	0	625
2010	638	0	638	0	0	0	0	0	638
2011	611	0	611	0	0	0	0	0	611
2012	590	0	590	0	0	0	0	0	590
2013	602	0	602	0	0	0	0	0	602
2014	627	0	627	0	0	0	0	0	627
2015	630	0	630	0	0	0	0	0	630
2016	646	0	646	0	0	0	0	0	646
2017	643	0	643	0	0	0	0	0	643
Forecast									
2018	642	0	642	0	0	0	0	0	642
2019	648	0	648	0	0	0	0	0	648
2020	653	0	653	0	0	0	0	0	653
2021	658	0	658	0	0	0	0	0	658
2022	664	0	664	0	0	0	0	0	664
2023	670	0	670	0	0	0	0	0	670
2024	677	0	677	0	0	0	0	0	677
2025	683	0	683	0	0	0	0	0	683
2026	689	0	689	0	0	0	0	0	689
2027	696	0	696	0	0	0	0	0	696

Table 9-6
Schedule 3.2: History and Forecast of Winter Peak Demand Base Case (MW)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
					Residential		Comm./Ind.		
Year	Total	Wholesale	Retail	Interrupt.	Load Management	Conservation	Load Management	Conservation	Net Firm Demand
2008/09	710	0	710	0	0	0	0	0	710
2009/10	804	0	804	0	0	0	0	0	804
2010/11	665	0	665	0	0	0	0	0	665
2011/12	612	0	612	0	0	0	0	0	612
2012/13	553	0	553	0	0	0	0	0	553
2013/14	579	0	579	0	0	0	0	0	579
2014/15	656	0	656	0	0	0	0	0	656
2015/16	589	0	589	0	0	0	0	0	589
2016/17	539	0	539	0	0	0	0	0	539
2017/18	704	0	704	0	0	0	0	0	704
Forecast									
2018/19	684	0	684	0	0	0	0	0	684
2019/20	687	0	687	0	0	0	0	0	687
2020/21	688	0	688	0	0	0	0	0	688
2021/22	693	0	693	0	0	0	0	0	693
2022/23	699	0	699	0	0	0	0	0	699
2023/24	707	0	707	0	0	0	0	0	707
2024/25	710	0	710	0	0	0	0	0	710
2025/26	715	0	715	0	0	0	0	0	715
2026/27	721	0	721	0	0	0	0	0	721
2027/28	730	0	730	0	0	0	0	0	730

Table 9-6a
Schedule 3.2a: History and Forecast of Winter Peak Demand Low Case (MW)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
					Residential		Comm./Ind.		
Year	Total	Wholesale	Retail	Interrupt.	Load Management	Conservation	Load Management	Conservation	Net Firm Demand
2008/09	710	0	710	0	0	0	0	0	710
2009/10	804	0	804	0	0	0	0	0	804
2010/11	665	0	665	0	0	0	0	0	665
2011/12	612	0	612	0	0	0	0	0	612
2012/13	553	0	553	0	0	0	0	0	553
2013/14	579	0	579	0	0	0	0	0	579
2014/15	656	0	656	0	0	0	0	0	656
2015/16	589	0	589	0	0	0	0	0	589
2016/17	539	0	539	0	0	0	0	0	539
2017/18	704	0	704	0	0	0	0	0	704
Forecast									
2018/19	679	0	679	0	0	0	0	0	679
2019/20	682	0	682	0	0	0	0	0	682
2020/21	684	0	684	0	0	0	0	0	684
2021/22	689	0	689	0	0	0	0	0	689
2022/23	694	0	694	0	0	0	0	0	694
2023/24	702	0	702	0	0	0	0	0	702
2024/25	705	0	705	0	0	0	0	0	705
2025/26	711	0	711	0	0	0	0	0	711
2026/27	716	0	716	0	0	0	0	0	716
2027/28	725	0	725	0	0	0	0	0	725

Table 9-6b
Schedule 3.2b: History and Forecast of Winter Peak Demand High Case (MW)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
					Residential		Comm./Ind.		
Year	Total	Wholesale	Retail	Interrupt.	Load Management	Conservation	Load Management	Conservation	Net Firm Demand
2008/09	710	0	710	0	0	0	0	0	710
2009/10	804	0	804	0	0	0	0	0	804
2010/11	665	0	665	0	0	0	0	0	665
2011/12	612	0	612	0	0	0	0	0	612
2012/13	553	0	553	0	0	0	0	0	553
2013/14	579	0	579	0	0	0	0	0	579
2014/15	656	0	656	0	0	0	0	0	656
2015/16	589	0	589	0	0	0	0	0	589
2016/17	539	0	539	0	0	0	0	0	539
2017/18	704	0	704	0	0	0	0	0	704
Forecast									
2018/19	688	0	688	0	0	0	0	0	688
2019/20	691	0	691	0	0	0	0	0	691
2020/21	693	0	693	0	0	0	0	0	693
2021/22	698	0	698	0	0	0	0	0	698
2022/23	703	0	703	0	0	0	0	0	703
2023/24	712	0	712	0	0	0	0	0	712
2024/25	715	0	715	0	0	0	0	0	715
2025/26	720	0	720	0	0	0	0	0	720
2026/27	726	0	726	0	0	0	0	0	726
2027/28	735	0	735	0	0	0	0	0	735

Table 9-7
Schedule 3.3: History and Forecast of Annual Net Energy for Load – GWh
Base Case

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Year	Total Sales	Residential Conservation	Comm./Ind. Conservation	Retail	Wholesale	Utility Use & Losses	Net Energy for Load	Load Factor %
2008	2,859	0	0	2,859	0	116	2,975	49.65%
2009	2,860	0	0	2,860	0	132	2,992	48.11%
2010	2,966	0	0	2,966	0	152	3,118	44.27%
2011	2,864	0	0	2,864	0	29	2,893	49.67%
2012	2,751	0	0	2,751	0	122	2,873	53.58%
2013	2,831	0	0	2,831	0	88	2,919	55.37%
2014	2,903	0	0	2,903	0	103	3,006	54.73%
2015	3,034	0	0	3,034	0	92	3,126	54.44%
2016	3,030	0	0	3,030	0	79	3,109	55.02%
2017	3,018	0	0	3,018	0	68	3,086	54.81%
Forecast								
2018	3,066	0	0	3,066	0	90	3,156	53.19%
2019	3,104	0	0	3,104	0	91	3,195	53.35%
2020	3,119	0	0	3,119	0	91	3,210	53.37%
2021	3,142	0	0	3,142	0	92	3,235	53.64%
2022	3,171	0	0	3,171	0	93	3,264	53.74%
2023	3,201	0	0	3,201	0	94	3,296	53.83%
2024	3,234	0	0	3,234	0	95	3,329	53.75%
2025	3,265	0	0	3,265	0	96	3,361	54.03%
2026	3,296	0	0	3,296	0	97	3,393	54.14%
2027	3,329	0	0	3,329	0	98	3,427	54.27%

Table 9-7a
Schedule 3.3a: History and Forecast of Annual Net Energy for Load – GWh
Low Case

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Year	Total Sales	Residential Conservation	Comm./Ind. Conservation	Retail	Wholesale	Utility Use & Losses	Net Energy for Load
2008	2,859	0	0	2,859	0	116	2,975
2009	2,860	0	0	2,860	0	132	2,992
2010	2,966	0	0	2,966	0	152	3,118
2011	2,864	0	0	2,864	0	29	2,893
2012	2,751	0	0	2,751	0	122	2,873
2013	2,831	0	0	2,831	0	88	2,919
2014	2,903	0	0	2,903	0	103	3,006
2015	3,034	0	0	3,034	0	92	3,126
2016	3,030	0	0	3,030	0	79	3,109
2017	3,018	0	0	3,018	0	68	3,086
Forecast							
2018	3,050	0	0	3,050	0	90	3,139
2019	3,087	0	0	3,087	0	91	3,178
2020	3,102	0	0	3,102	0	91	3,192
2021	3,125	0	0	3,125	0	92	3,217
2022	3,153	0	0	3,153	0	93	3,246
2023	3,183	0	0	3,183	0	94	3,277
2024	3,216	0	0	3,216	0	94	3,310
2025	3,246	0	0	3,246	0	96	3,341
2026	3,277	0	0	3,277	0	97	3,373
2027	3,309	0	0	3,309	0	98	3,407

Table 9-7b
Schedule 3.3b: History and Forecast of Annual Net Energy for Load – GWh
High Case

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Year	Total Sales	Residential Conservation	Comm./Ind. Conservation	Retail	Wholesale	Utility Use & Losses	Net Energy for Load
2008	2,859	0	0	2,859	0	116	2,975
2009	2,860	0	0	2,860	0	132	2,992
2010	2,966	0	0	2,966	0	152	3,118
2011	2,864	0	0	2,864	0	29	2,893
2012	2,751	0	0	2,751	0	122	2,873
2013	2,831	0	0	2,831	0	88	2,919
2014	2,903	0	0	2,903	0	103	3,006
2015	3,034	0	0	3,034	0	92	3,126
2016	3,030	0	0	3,030	0	79	3,109
2017	3,018	0	0	3,018	0	68	3,086
Forecast							
2018	3,083	0	0	3,083	0	91	3,173
2019	3,120	0	0	3,120	0	92	3,212
2020	3,136	0	0	3,136	0	92	3,228
2021	3,160	0	0	3,160	0	93	3,253
2022	3,189	0	0	3,189	0	94	3,283
2023	3,219	0	0	3,219	0	95	3,314
2024	3,253	0	0	3,253	0	95	3,348
2025	3,284	0	0	3,284	0	97	3,381
2026	3,315	0	0	3,315	0	98	3,413
2027	3,349	0	0	3,349	0	99	3,448

Table 9-8
Schedule 4: Previous Year and Two Year Forecast of Retail Peak Demand and Net Energy for Load by Month

(1)	(2)	(3)	(4)	(5)	(6)	(7)
	2017 Actual		2018 Forecast		2019 Forecast	
Month	Peak Demand[1] MW	NEL GWh	Peak Demand[1] MW	NEL GWh	Peak Demand[1] MW	NEL GWh
January	539	226	704	262	684	249
February	453	197	484	214	581	207
March	492	228	492	240	498	244
April	585	248	541	253	546	256
May	610	293	596	300	602	304
June	612	278	623	293	628	296
July	643	308	639	308	645	312
August	637	321	633	316	638	320
September	616	277	603	277	609	281
October	587	268	568	256	572	258
November	457	215	465	217	469	219
December	519	227	505	247	510	249

[1]Includes Conservation

Table 9-9
Schedule 5: Fuel Requirements

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
				Calendar Year										
	Fuel Requirements	Type	UNITS	2017-Actual	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
(1)	Nuclear		Trillion Btu	0	0	0	0	0	0	0	0	0	0	0
(2)	Coal		1000 Ton	391	256	287	253	250	270	249	228	240	245	224
(3)	Residual	Steam	1000 BBL	0	0	0	0	0	0	0	0	0	0	0
(4)		CC	1000 BBL	0	0	0	0	0	0	0	0	0	0	0
(5)		CT	1000 BBL	0	0	0	0	0	0	0	0	0	0	0
(6)		Total	1000 BBL	0	0	0	0	0	0	0	0	0	0	0
(7)	Distillate	Steam	1000 BBL	0	0	0	0	0	0	0	0	0	0	0
(8)		CC	1000 BBL	0	0	0	0	0	0	0	0	0	0	0
(9)		CT	1000 BBL	0	0	0	0	0	0	0	1	3	3	1
(10)		Total	1000 BBL	0	0	0	0	0	0	0	1	3	3	1
(11)	Natural Gas	Steam	1000 MCF	120	90	289	307	355	300	240	262	263	332	368
(12)		CC	1000 MCF	11,758	18,857	17,705	17,646	19,125	18,064	18,931	18,126	17,642	19,418	18,339
(13)		CT	1000 MCF	10	3	0	2	0	0	0	2	5	17	20
(14)		Total	1000 MCF	11,888	18,950	17,994	17,955	19,480	18,364	19,171	18,390	17,910	19,767	18,727
(15)	Other		Trillion Btu	0	0	0	0	0	0	0	0	0	0	0

Table 9-10
Schedule 6.1: Energy Sources

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
				Calendar Year										
	Energy Sources	Type	UNITS	2017-Actual	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
(1)	Inter-Regional Interchange		GWh	0	0	0	0	0	0	0	0	0	0	0
(2)	Nuclear		GWh	0	0	0	0	0	0	0	0	0	0	0
(3)	Coal		GWh	846	549	614	542	536	574	527	485	510	519	474
(4)	Residual	Steam	GWh	0	0	0	0	0	0	0	0	0	0	0
(5)		CC	GWh	0	0	0	0	0	0	0	0	0	0	0
(6)		CT	GWh	0	0	0	0	0	0	0	0	0	0	0
(7)		Total	GWh	0	0	0	0	0	0	0	0	0	0	0
(8)	Distillate	Steam	GWh	0	0	0	0	0	0	0	0	0	0	0
(9)		CC	GWh	0	0	0	0	0	0	0	0	0	0	0
(10)		CT	GWh	0	0	0	0	0	0	0	0	0	1	1
(11)		Total	GWh	0	0	0	0	0	0	0	0	0	1	1
(12)	Natural Gas	Steam	GWh	6	7	22	24	27	22	18	20	20	25	28
(13)		CC	GWh	1582	2707	2557	2531	2759	2611	2735	2617	2538	2796	2638
(14)		CT	GWh	1	0	0	0	0	0	0	0	0	1	1
(15)		Total	GWh	1,589	2,714	2,579	2,555	2,786	2,633	2,753	2,637	2,558	2,822	2667
(16)	NUG			0	0	0	0	0	0	0	0	0	0	0
(17)	Solar			27	37	37	37	37	37	37	37	37	37	37
(18)	Other (Specify)[1]			624	-144	-35	76	-124	20	-21	170	256	14	248
(19)	Net Energy for Load		GWh	3,086	3,156	3,195	3,210	3,235	3,264	3,296	3,329	3,361	3,393	3,427

[1] Intra-Regional Net Interchange

Table 9-11
Schedule 6.2: Energy Sources

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
				Calendar Year										
	Energy Source	Type	Units	2017-Actual	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
(1)	Inter-Regional Interchange		%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(2)	Nuclear		%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(3)	Coal		%	27.41	17.40	19.22	16.88	16.57	17.59	15.99	14.57	15.17	15.30	13.83
(4)	Residual	Steam	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(5)		CC	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(6)		CT	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(7)		Total	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(8)	Distillate	Steam	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(9)		CC	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(10)		CT	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03
(11)		Total	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03
(12)	Natural Gas	Steam	%	0.19	0.22	0.69	0.75	0.84	0.68	0.55	0.60	0.60	0.74	0.82
(13)		CC	%	51.26	85.77	80.03	78.85	85.29	79.99	82.98	78.61	75.51	82.40	76.98
(14)		CT	%	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03
(15)		Total	%	51.49	85.99	80.72	79.60	86.12	80.67	83.53	79.21	76.11	83.17	77.82
(16)	NUG		%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Solar		%	0.87	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10	1.09	1.08
	Other (Specify)[1]		%	20.22	-4.56	-1.10	2.37	-3.83	0.61	-0.64	5.11	7.62	0.41	7.24
(18)	Net Energy for Load		%	100	100	100	100	100	100	100	100	100	100	100

[1] Other = Intra-Regional Net Interchange

Table 9-12

Schedule 7.1: Forecast of Capacity, Demand, and Scheduled Maintenance at Time of Summer Peak

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Year	Total Installed Capacity	Firm Capacity Import	Firm Capacity Export	Projected Firm Net To Grid from NUG	Total Capacity Available	System Firm Peak Demand	Reserve Margin Before Maintenance[1]		Scheduled Maintenance	Reserve Margin After Maintenance[1]	
	MW	MW	MW	MW	MW	MW	MW	%	MW	MW	%
2018	844	0	0	0	844	639	205	32	0	205	32
2019	844	0	0	0	844	645	199	31	0	199	31
2020	844	0	0	0	844	650	194	30	0	194	30
2021	844	0	0	0	844	654	190	29	0	190	29
2022	844	0	0	0	844	660	184	28	0	184	28
2023	844	0	0	0	844	666	178	27	0	178	27
2024	844	0	0	0	844	673	171	25	0	171	25
2025	844	0	0	0	844	679	165	24	0	165	24
2026	844	0	0	0	844	686	158	23	0	158	23
2027	844	0	0	0	844	692	152	22	0	152	22

[1]Includes Conservation

Table 9-13

Schedule 7.2: Forecast of Capacity, Demand, and Scheduled Maintenance at Time of Winter Peak

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Year	Total Installed Capacity	Firm Capacity Import	Firm Capacity Export	Projected Firm Net To Grid from NUG	Total Capacity Available	System Firm Peak Demand	Reserve Margin Before Maintenance[1]		Scheduled Maintenance	Reserve Margin After Maintenance[1]	
	MW	MW	MW	MW	MW	MW	MW	%	MW	MW	%
2018/19	890	0	0	0	890	684	206	30	0	206	30
2019/20	890	0	0	0	890	687	203	30	0	203	30
2020/21	890	0	0	0	890	688	202	29	0	202	29
2021/22	890	0	0	0	890	693	197	28	0	197	28
2022/23	890	0	0	0	890	699	191	27	0	191	27
2023/24	890	0	0	0	890	707	183	26	0	183	26
2024/25	890	0	0	0	890	710	180	25	0	180	25
2025/26	890	0	0	0	890	715	175	24	0	175	24
2026/27	890	0	0	0	890	721	169	23	0	169	23
2027/28	890	0	0	0	890	730	160	22	0	160	22

[1]Includes Conservation

Table 9-14
Schedule 8.0: Planned and Prospective Generating Facility Additions and Changes

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Plant Name	Unit No.	Location	Unit Type	Fuel		Fuel Transport		Const Start	Commercial In-Service	Expected Retirement	Gen Max Nameplate	Net Capability		Status
				Pri.	Alt.	Pri.	Alt.	Mo/Yr	Mo/Yr	Mo/Yr	kW	Sum MW	Win MW	

None At Time of This Filing

Table 9-15
Schedule 9.1: Status Report and Specifications of Approved Generating Facilities

(1)	Plant Name and Unit Number:	N/A
(2)	Capacity:	
(3)	Summer MW	
(4)	Winter MW	
(5)	Technology Type:	
(6)	Anticipated Construction Timing:	
(7)	Field Construction Start-date:	
(8)	Commercial In-Service date:	
(9)	Fuel	
(10)	Primary	
(11)	Alternate	
(12)	Air Pollution Control Strategy:	
(13)	Cooling Method:	
(14)	Total Site Area:	
(15)	Construction Status:	
(16)	Certification Status:	
(17)	Status with Federal Agencies:	
(18)	Projected Unit Performance Data:	
(19)	Planned Outage Factor (POF):	
(20)	Forced Outage Factor (FOF):	
(21)	Equivalent Availability Factor (EAF):	
(22)	Resulting Capacity Factor (%):	
(23)	Average Net Operating Heat Rate (ANOHR):	
(24)	Projected Unit Financial Data:	
(25)	Book Life:	
(26)	Total Installed Cost (In-Service year $/kW):	
(27)	Direct Construction Cost ($/kW):	
(28)	AFUDC Amount ($/kW):	
(29)	Escalation ($/kW):	
(30)	Fixed O&M ($/kW-yr):	
(31)	Variable O&M ($/MWh):	

Table 9-16
Schedule 9.2: Status Report and Specifications of Proposed Generating Facilities

(1)	Plant Name and Unit Number:	None in Current Planning Cycle
(2)	Capacity:	
(3)	Summer MW	
(4)	Winter MW	
(5)	Technology Type:	
(6)	Anticipated Construction Timing:	
(7)	Field Construction Start-date:	
(8)	Commercial In-Service date:	
(9)	Fuel	
(10)	Primary	
(11)	Alternate	
(12)	Air Pollution Control Strategy:	
(13)	Cooling Method:	
(14)	Total Site Area:	
(15)	Construction Status:	
(16)	Certification Status:	
(17)	Status with Federal Agencies:	
(18)	Projected Unit Performance Data:	
(19)	Planned Outage Factor (POF):	
(20)	Forced Outage Factor (FOF):	
(21)	Equivalent Availability Factor (EAF):	
(22)	Resulting Capacity Factor (%):	
(23)	Average Net Operating Heat Rate (ANOHR):	
(24)	Projected Unit Financial Data:	
(25)	Book Life:	
(26)	Total Installed Cost (In-Service year $/kW):	
(27)	Direct Construction Cost ($/kW):	
(28)	AFUDC Amount ($/kW):	
(29)	Escalation ($/kW):	
(30)	Fixed O&M ($/kW-yr):	
(31)	Variable O&M ($/MWh):	

Table 9-17
Schedule 10: Status Report and Specifications of Proposed
Directly Associated Transmission Lines

(1)	Point of Origin and Termination:	None planned.
(2)	Number of Lines:	None planned.
(3)	Right of Way:	None planned.
(4)	Line Length:	None planned.
(5)	Voltage:	None planned.
(6)	Anticipated Construction Time:	None planned.
(7)	Anticipated Capital Investment:	None planned.
(8)	Substations:	None planned.
(9)	Participation with Other Utilities:	None planned.