Lakeland Electric

Ten-Year Site Plan 2023-2032

April 2023

Submitted to:

Florida Public Service Commission

LAKELAND ELECTRIC
POWERED FOR LIFE

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1.0 Introduction [SECTION 1]

This report contains the 2023 Lakeland Electric (LE) 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 TYSP is a comprehensive plan how LE can provide low cost, reliable, and clean energy to its customers to foster economic development in Lakeland for the next 10 years. TYSPs are non-binding in Florida, but they do provide state, regional, and local agencies a notice of proposed power plants and transmission facilities in near future.

The TYSP 2023 is divided into the following eight sections:

- Section 1: Introduction
- Section 2: General Description of the Utility
- Section 3: Forecast of Electric Demand and Energy
- Section 4: Energy Conservation & Management Programs
- Section 5: Forecasting Methods and Procedures
- Section 6: Forecast of New Capacity Requirements
- Section 7: Environmental and Land Use Information
- Section 8 Ten-Year Site Plan Schedules

The contents of each section are summarized in the remainder of this section.

1.1 General Description of the Utility [SECTION 2]

Section 2 of the TYSP discusses a historical overview of Lakeland Electric's system and a description of the existing power generating and transmission facilities. This section includes tables which show the source of the utility's current 721 MW of net winter generating capacity and 658 MW of net summer generating capacity (as of the end of year 2022). To increase grid reliability and energy supply, LE plans to add 120 MW of gas based modular RICE generating units by the 3rd quarter of 2024. This will bring LE's total generation amount of net installed capacity of 841 MW and 822 MW in winter and summer. This action will help to accelerate the deployment of additional 74.5 MW of solar energy by 2025.

1.2 Forecast of Electric Demand and Energy [SECTION 3]

Section 3 of the TYSP provides a summary of Lakeland's electric load and energy forecast. LE uses statistical and mathematical models that link electricity usage to several key input parameters such as region's economic activity, population growth, demographic data, and energy efficiency characteristics on electrical appliances. 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 on high and low load scenarios are developed on energy sales to customers, system net energy and peak load requirements for LE's customers.

1.3 Energy Conservation & Management Programs [SECTION 4]

Section 4 provides the description of the existing energy conservation & management programs as adopted by Lakeland Electric. Additional details regarding Lakeland Electric's energy conservation & management programs are on file with the Florida Public Service Commission (FPSC).

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

- Residential Programs:
  - Insulation rebate
  - Energy Savings Kits
  - HVAC Maintenance Incentive
  - Heat Pump Rebates
  - LED Lighting
  - On-Line Energy Audit
  - Energy Star Appliance Rebate
  - Rebate on Electric Vehicle Purchase

Section 4 also contains discussions on Lakeland Electric's solar programs. While these types of programs are not traditionally thought of 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 with the use of renewable energy. Lakeland Electric has capacity to generate more than 14 MW of power from solar, enough to supply power for more than 7,000 households during a sunny day in the summer. Lakeland Electric is determined to continuously increase the solar power for its customers with additional utility scale solar and customer's roof top solar.

1.4 Forecasting Methods and Procedures [SECTION 5]

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

Section 5 summarizes the Integrated Resource Planning process utilized by Lakeland Electric and explains Lakeland Electric's participation in the Florida Municipal Power Pool (FMPP). There are two other utilities which are the members of FMPP including Lakeland Electric. In FMPP, each member operates its power plants sharing the reserves and using the lowest cost of energy to balance the combined load by means of exchange of energy among the members.

While Section 3 discusses the forecast, methods used for the TYSP, Section 5 outlines the economic and fuel assumptions applied to planning capacity and energy in the future.

1.5 Forecast of New Capacity Requirements [SECTION 6]

Section 6 describes the process Lakeland Electric uses to assess the need for additional capacity to serve Lakeland Electric's customers. This section concludes by stating that Lakeland Electric plan to keep Reserve Margins at or greater than 15% during the current ten-year planning period and complies with the Florida Reliability Coordinating Council's (FRCC) minimum reserve margin criteria for the FRCC Region.

1.6 Environmental and Land Use Information [SECTION 7]

Section 7 addresses environmental and land use issues related to Lakeland Electric's recently planned 120 MW new Reciprocating Internal Combustion Engines (RICE) to be available in late 2024 at Lakeland Electric's McIntosh Power Plant (see Table 7-1). This section also provides Table 7-2 which summarizes different control strategies adopted to comply with various environmental emissions standards for existing major generating units. Also analyzed are the issues related to land use and air permits to build additional solar capacity in the McIntosh Power Plant site in future.

1.7 Ten-Year Site Plan Schedules [SECTION 8]

Section 8 presents the schedules of new generation and any retirements including any power purchase necessary to meet reliability required by the Florida Public Service Commission (FPSC) for the TYSP.

Tables 8-1 and 8-1a summarize the detailed information on existing generating units owned by Lakeland Electric. Tables 8-2 through 8-5 provide information by customer class. Tables 8-2 through 8-8 provide demand and energy history and forecasts. Table 8-9 provides a history and forecast of fuel requirements by fuel type. Tables 8-10 and 8-11 provide a history and forecast of energy produced by fuel type. Tables 8-12 and 8-13 provide comparisons of Lakeland Electric resources to Lakeland Electric demand. These tables demonstrate that Lakeland Electric's expected Reserve Margin exceeds 15% in each year in winter during this planning period. However, LE may need to have some capacity purchase necessary to meet the reserve margin of 15% in summer. Tables 8-14 provides information related to Lakeland Electric's planned new generating units and any changes/modifications on existing units. Tables 8.15-16 summarized the specifications of proposed new generating units and transmission line.

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 the need for a new power plant site. A site was purchased on the north side of 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 MW, 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 115 MW and at a cost of $25.77 million. This addition increased the total capacity of the Lakeland system to approximately 360 MW. At this time, the new plant site on the north shore of Lake Parker 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 increased to 365 MW. The unit used a minimal amount of natural gas for flame stabilization during startups. The plant utilized sewage effluent for cooling tower makeup water. This unit was jointly owned with the Orlando Utilities Commission (OUC) which has a 40 percent undivided interest in the unit.

Larsen Unit No. 8, a natural gas fired combined cycle unit 8 has a nameplate generating capacity of 131.5 MW at present. Larsen Unit No. 8 began its simple cycle operation in July 1992, and combined cycle operation in November of that year. A fogger system was re-commissioned during the Fall of 2022, which provides an additional 3 MW of Summer Capacity. A new Peak Fire controls system was also implemented and commissioned during the Fall of 2022, which added 2 MW of year-round capacity.

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 MW, 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 50 MW oil fired steam unit.

In 1999, the construction of McIntosh Unit No. 5, a simple cycle, natural gas fired combustion turbine was completed, having a summer nominal capacity of 225 MW. 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. In December of 2020, Unit No. 5 went through a major outage to install “NextGen Hardware” that increased the capacity of the combined cycle to 339 MW (net 332 MW) in summer and 385 MW (net 378 MW) in winter. Addition of Steam Power Augmentation (SPAG) increased the capacity to 349 MW (net 342 MW) in summer and 395 MW (net 388 MW) in winter. The final capacity was made achievable to 360 MW in summer and 405 MW in winter with SPAG and Flex Fire combined.

During the summer of 2001, Lakeland took its first step into the world of distributed generation with the groundbreaking of its Winston Peaking Station. The Winston Peaking Station consists of 20 quick start reciprocating internal combustion (RICE) engines each driving a 2.5 MW electric generator. This provides Lakeland with 50 MW of peaking capacity that can be started and put online at full load in ten minutes. The Station went in commercial operation in December 2001.

McIntosh Gas Turbine No. 2 at the McIntosh Plant was online on June 22, 2022. This unit has gross ratings of 125 (120) MW in winter (summer). McIntosh Unit No. 3 (a coal unit) was retired from its operations on April 4, 2021. This unit had been in operation since 1982. The decision to retire this unit was made possible due to significant savings realized on fuel and operation cost compared to energy from natural gas-based generation. While ensuring that LE’s capability grow and changes with time to supply low cost and environmentally friendly electricity to its customers, LE decided to build six (6) new small modular reciprocating internal combustion engines (RICE) in McIntosh power plant. Each unit will be capable of producing 20 MWs in less than 5 minutes for a total of 120 MWs in total. This enhanced flexibility of these units will help to firm up the energy variability of solar units being planned in Lakeland’s territory in near future. This plant is expected to be commercially available for operation by the 3rd Quarter of 2024. LE is expected to install additional 74.5 MW solar capacity by 2025.

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 Southwest 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 Southwest 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 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 the 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 had 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. However, as of January 31, 2019, Ridge Generating Station was permanently shut down. As a result, the 69 kV East to Ridge tie line is no longer in use. 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 230 kV ties and one 69 kV 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. In 2020, Lakeland added a 150 MVA 69/13.8 kV auto transformer to connect the recently installed

McIntosh Gas Turbine No. 2 into the Distribution System. In February 2022, Lakeland completed building the new 69/12.47 kV Bridgewater substation to accommodate the rising electric demand in the northern part of the service area. In order to accommodate the rising electric demand in the southwest part of the service area, Lakeland is in the process of building another new 69/12.47 kV substation on Hamilton Rd. The new 69/12.47kV Hamilton substation is expected to be in service in August 2024.

2.2 General Description: Lakeland Electric

2.2.1 Existing Generating Units

This section provides additional detail on Lakeland Electric's existing generating plants. Lakeland Electric'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 at Lake Parker in Polk County, Florida. The two plants have multiple units with different technologies and fuel types. Table 2-1 provides technical and other general characteristics of all Lakeland Electric generating units.

The Larsen plant site is located on the south east shore of Lake Parker in Lakeland. The site has three units. Larsen Unit 8 (CC) has a net winter (summer) capacity of 124 MW (114 MW). The Unit's combustion turbine has a net winter (summer) rating of 95 MW (85 MW).

Larsen 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. These two units are temporarily out of service for major maintenance.

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, Larsen Unit No. 8, was added to the facility. This allowed the gas turbine (Larsen Unit No. 8) to generate electricity and the waste heat from the gas turbine to repower the former Larsen Unit No. 5 steam turbine in a combined cycle configuration.

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 (summer) rating of 715 MW (647 MW).

McIntosh Gas Turbine 1 consists of a General Electric combustion turbine with a net winter (summer) output rating of 19 MW (17 MW). Whereas Gas Turbine No. 2 has a total net winter (summer) capacity of 125 MW (120 MW) and was installed in the summer of 2020.

McIntosh Unit No. 3 - a net 342 MW size pulverized coal fired steam unit was owned 60 percent by Lakeland Electric and 40 percent by the OUC. Unit 3 was retired on April 4, 2021. The decommissioning of this unit along with previously retired units 1 and 2 at Macintosh Plant is scheduled to take place by 2024. Two small internal combustion engines with a net output of 2.5 MW each are also located at the McIntosh site, and will remain at the 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 out of service 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 net winter (summer) rating of 354 MW (338 MW). The unit is equipped with Selective Catalytic Reduction (SCR) for NO_x control. In December of 2020, Unit 5 went through a major outage, with Siemens' Next Gen Hardware, that increased the capacity of the combined cycle to 339 MW (net 332 MW) summer and 385 MW (net 378 MW) winter; the capacity with Steam Power Augmentation (SPAG) to 349 MW (net 342 MW) in summer and 395 MW (net 388 MW) in winter; and capacity with SPAG and Flex Fire to 359 MW (net 352 MW) summer and 405 MW (net 398 MW) winter.

Lakeland Electric constructed 50 MW peaking units adjacent to its Winston Substation in 2001. The purpose of the peaking plant is to provide additional quick start generation capability for Lakeland's changing system demand and during the times of high demand assuring extra reliability in Lakeland's System operation. The Winston station consists of twenty (20) cylinder RICE engines producing 2.5 MW of generation each. Altogether, the 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% by #2 oil and 95% natural gas. Lakeland Electric 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.

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 12.47 kV distribution level of the substation and has sufficient capacity to serve the substation loads. Winston Substation serves several of Lakeland Electric's largest and most critical accounts. Should the Winston Substation lose all three 69 kV circuits to the substation, the WPS can be online and serving load within ten minutes. In addition to increasing the substation's reliability, this arrangement allows Lakeland to delay the installation of a third 69kV to 12.47kV transformer by several years and contributes to lowering loads on Lakeland's transmission system.

2.2.2 Planned Unit Retirements

Lakeland Electric recently retired its McIntosh Unit No. 3 - a coal-fired steam unit in 2021. As an enhanced fleet modernization effort, Lakeland Electric will evaluate the performance of existing older peaking units and examine how LE can meet future power demand in a more innovative and reliable way. This may require retiring some additional older and less-efficient gas or oil units in the future.

2.2.3 Planned Unit Additions

Lakeland Electric has planned to add a combination of solar (74.5 MW) in 2025 and six (6) modular size (20 MW each, 120 MW total) reciprocating internal combustion engines (RICE) expected to be operational in 2024 to maintain the resource adequacy and flexibility in Lakeland System. In addition, plan for adding more solar is under study to explore the best options to meet LE customer's future need.

2.2.4 Power Purchase Agreements (PPAs)

Lakeland Electric has secured a long-term (20-25 years) PPAs with various solar private developers in its territory. There are five different solar farms ranging from small installed capacity of 250 kW in Lakeland Center to 3.15 MW near the airport. The total installed capacity is about 14.4 MWac which is available to Lakeland customers as of now. When energy is available during the daytime, Lakeland Electric obtains about 50% of the firm capacity from these solar farms. Lakeland Electric is actively looking to add another 74.5 MWac from solar farms in its territory by year 2025.

In addition to solar PPAs, LE has a firm PPA with OUC up to 125 MW in 2023 and 135 MW in 2024. This makes LE’s capacity reserve above 15% for maintaining adequate reliability in Florida Reliability Coordinating Council (FRCC). With various existing and planned PPAs along with LE’s existing/planned resources, LE is projected to have adequate capacity to satisfy reserve margin requirements through 2032 (see Table 6.2).

2.3 Service Area

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

Figure 2.1: Lakeland Electric Service Area Map

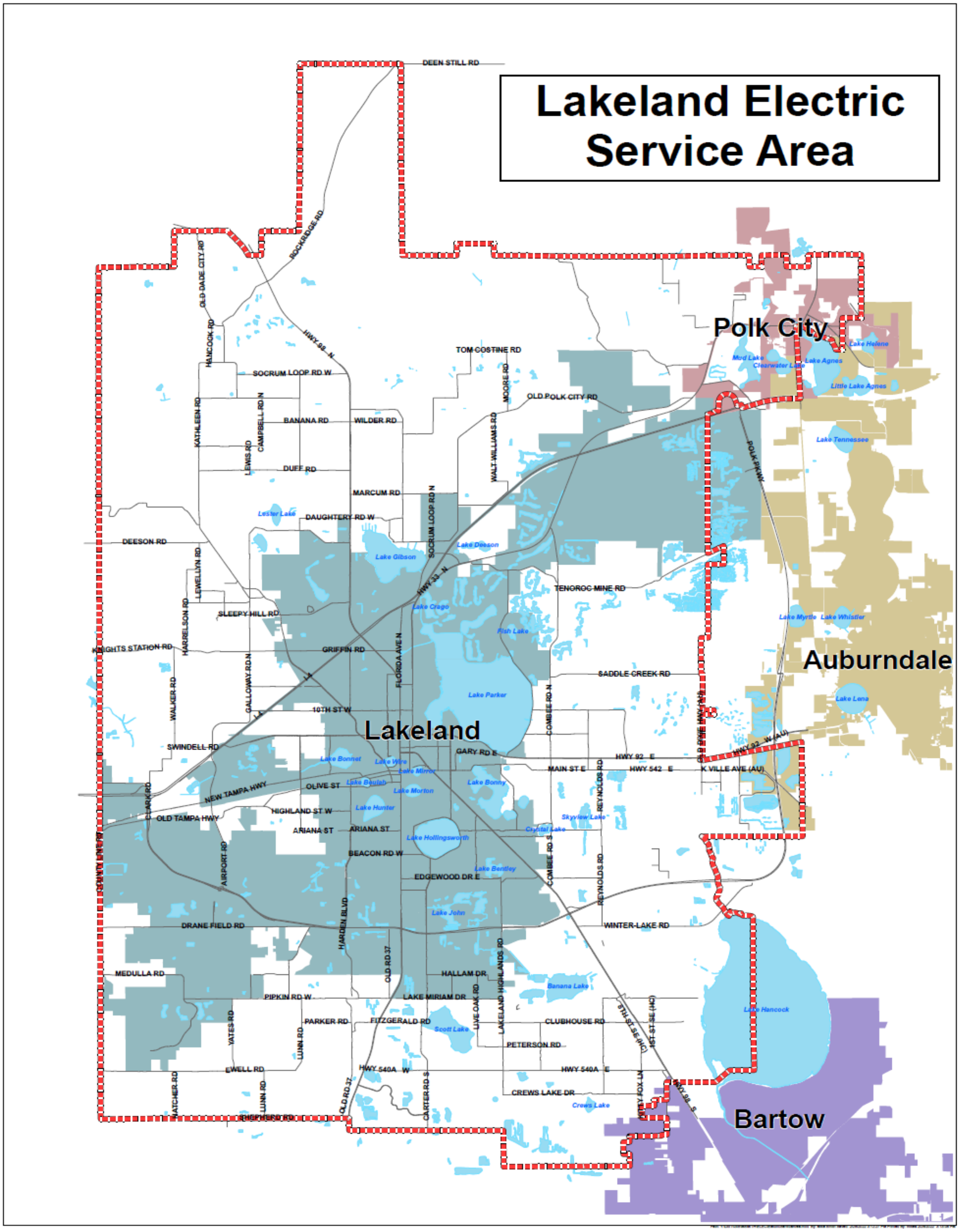

Table 2.1: Existing Generation Facilities

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	GT2*	16-17/28S/24E	GT	NG	DFO	PL	TK	NR	11/62	Unknown	11,250	10	14
	GT3*		GT	NG	DFO	PL	TK	NR	12/62	Unknown	11,250	9	13
	8		CA	WH	---	---			04/56	Unknown	30,000	30	30
	8		CT	NG	DFO	PL	TK	NR	07/92	Unknown	101,520	85	95
Plant Total												114	124

[1]LAK doesnot maintain records of the days the alternative fuel is avalable in reserve.[2]Net Normal, * Long term scheduled maintenance

[2]Net Normal

Source: Lakeland Energy Supply Unit Rating Group

[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
WH Waste Heat
NG Natural Gas

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

Table 2.2: Existing Generation Facilities

Table 2-2

Lakeland Electric Existing Generating Facilities

				Fuel[4]		Fuel Transport[5]						Net Capability	
Plant Name	Unit No.	Location	Unit Type[3]	Pri	Alt	Pri	Alt	Alt Fuel Days Use[2]	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	2,600	3	3
	D2		IC	DFO	---	TK	---	NR	01/70	Unknown	2,600	3	3
	GT1		GT	NG	DFO	PL	TK	NR	05/73	Unknown	26,640	17	19
	GT2		GT	NG	DFO	PL	TK	NR	06/20	Unknown	130,050	120	125
	5		CT	NG	---	PL	---	NR	05/01	Unknown	292,950	234	280
	5		CA	WH	---	---	---	NR	05/02	Unknown	135,000	118	118
Plant Total												494	547
System Total												**658**	**721**

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

[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	WH Waste Heat	TK Truck
GT Combustion Gas Turbine	NG Natural Gas	
ST Steam Turbine		

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.

Lakeland Electric 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. Lakeland Electric 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. Lakeland Electric 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 Lakeland Electric's established base temperature of 65 degrees 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.

Lakeland Electric 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 Lakeland Electric 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-years 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 Lakeland Electric historical price data, projections from the Lakeland Electric 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 Lakeland Electric's service area using average square feet by building type for the Commercial Sector and average use by dwelling type for the Residential Sector.

Lakeland Electric 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.

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

3.1 Service Territory Population Forecast

Electric Service Territory Population Estimate

Lakeland Electric's service area encompasses approximately 246 square miles, approximately 171 square miles of which are outside the City of Lakeland's corporate limits. The estimated electric service territory population for Lakeland Electric in 2022 was 303,910 persons.

Population Forecast

Lakeland Electric's service territory population is projected to increase at an estimated 1.10% average annual growth rate (AAGR) for years 2023-2032.

Polk County's population (Lakeland / Winter Haven MSA) is expected to grow at 1.27% AAGR for the same 10-year period. Historically, Polk County's population has grown faster than LE's service territory population.

PEV Forecast

Lakeland Electric included Plug-In Electric Vehicles (PEV) loads in the demand and energy forecast for the current planning period TYSP. We used a load profile provided by Itron consultants (and verified with our known EV customer hourly loads) that assumed no incentives for charging. We estimated the number of electric vehicles in our service area based on Department of Motor Vehicles (DMV) data for Polk County and made projections based on historical trends and expected saturation rates for Electric Vehicles. The EV forecast was added to the total sales forecast. We scaled the hourly EV load profile to estimate the projected impact at time of peak demand.

3.2 Accounts Forecast

Lakeland Electric 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 (GSD) rate classes.

Due in large part to energy efficiency, Lakeland Electric 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. Lakeland Electric 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 Lakeland Electric is the sum of all the individual forecasts mentioned above.

3.3 Energy Sales Forecast

Lakeland Electric'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,

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

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

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

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 2015.

$CoolUse_{y,m}$ 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 and 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 of 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, 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 structure 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 $OtherUse_{y,m}$ 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.

Lakeland Electric 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 for Load Forecast

A loss factor of approximately 2.6% is applied through 2032 to convert LE's 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 while delivering energy to the customers. The actual loss factor in 2022 was 3.7% for Lakeland Electric System.

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 December to March, between the hours of **7** a.m. and 9 a.m. Temperatures at time of winter peaks range from 19° F to 51° 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 September, on weekdays, and between the hours of 3 p.m. and 6 p.m. Temperatures at time of summer peaks range from 90° F to 101° 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 and Low Load Forecast Scenarios

A forecast is generated based on projections of its drivers and assumptions at the time of forecast development. This base load forecast ("50^{th} percentile") which is the median of simulation values based on historical weather pattern is intended to represent "most likely" load to occur in future.

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. The 90^{th} percentile forecast ("90/10") represents the high load scenario.

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).

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4.0 Energy Conservation & Management Programs

Lakeland Electric is committed to the efficient use of electric energy and provide cost effective energy conservation and demand reduction programs for all its consumers. Lakeland Electric is not subject to the Florida Energy Efficiency and Conservation Act (FEECA) rules but has in place several Energy Conservation & Management Programs and remains committed to utilize both supply- and demand-side options that will benefit its customers. Presented in this section are currently active energy efficiency and solar incentive programs from Lakeland Electric.

4.1 Conservation Programs 2023

In keeping with Lakeland Electric's plan to promote retail energy conservation programs, the utility is continuing the following activities as of now:

Residential

- Insulation rebate – Up to $300 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.
- HVAC Maintenance Incentive - $100 rebate for residential customers that have A/C maintenance done.
- Heat Pump Rebate - $500 rebate for installing a SEER 15 or higher heat pump.
- LED Lighting – giveaway at audits, up to 3 per resident.
- Free Energy Audit
- Energy Star Appliance Rebates

Estimated Demand and Energy Savings for FY 2021

- 2.0 MW demand reduction and over 3,500 MWhs

We expect the same estimated demand and energy savings in year 2022.

4.2 Solar and Renewable Program Activities

Lakeland Electric considers solar photovoltaic (PV) system as distributed generators irrespective of their connection to the grid. Solar being available during the daytime, it contributes to reduce system peak demand/energy avoiding the generation/purchase at higher cost. This helps to reduce the average cost of electricity to LE Customers. In addition, Solar Battery Incentive is currently in place for LE customers.

4.2.1 Utility Interactive Net Metered Photovoltaic Systems

As of December 2022, there were approximately 1097 PV residential customers in the Lakeland Electric service territory. These PV systems have about 10413 kW (DC) of installed capacity. Lakeland Electric has allowed the interconnection of these systems in a "net meter" fashion. There are also 80 battery + rooftop solar customers in LE service territory which have benefitted in LE's Solar Battery Incentive Program. The purpose of this program is to promote battery storage systems and helping customers reducing their peak demand.

Any residential customer on the demand rate with a rooftop PV system is eligible to participate in the Battery Incentive Program. Lakeland Electric provides a rebate of 50 percent of the cost of a battery energy storage system, up to $1,000/customer. Eligible battery systems should have a minimum of 6 KWh of usable capacity and a warranty of at least 10 years or 5000 cycles, with one cycle being defined as a full discharge. The rebate is subject to the availability of funds and be provided in the form of a check to the customer.

4.2.2 Utility Solar Water Heating Program

During November 2007, LE issued a RFP 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 was sold for the fixed monthly amount of $34.95. All solar heating systems continued 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. There are about 179 customers left as of December 2023. The water heaters are currently being installed by the vendors for the residential customers in Lakeland.

4.2.3 PHEV Activities

There are about 7 Level 1 charging stations available to the customers at different prime locations in the LE territory.

4.2.4 Renewable Energy Credit Trading

Lakeland Electric's Renewable Energy Credits (REC) are produced from its five solar energy purchases made through PPAs that have a combined name plate capacity of 14.4 MW.

In January of 2019, Lakeland Electric set up an account with the North American Renewable Registry to start trading its solar RECs classified as Green-e-Eligible. A REC is created for every (1) Megawatt-hour of renewable electricity generated and delivered to the utility grid.

The utility's 2023 fiscal year forecast for RECS is about 22,000 in total and a REC can sell for $3.00 to $4.00 in the state of Florida.

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5.0 Forecasting Method and Procedures

This section describes Lakeland's long-term Integrated Resource Planning (IRP) process in which economic and fuel parameters are the major drivers to develop a long-term plan that helps to develop a portfolio that focuses on a best forward path for Lakeland Electric. This chapter also explains the position of Lakeland Electric in economy energy purchase and sales from Florida Municipal Power Pool (FMPP). Also explained are fuel supply arrangement and fuel price projections to be used in the long-term resource planning process.

5.1 Integrated Resource Plan

In addition to the Ten -Year Site Plan process, Lakeland Electric utilizes an IRP process for meeting 10 to 20 years of forecasted energy demand plus reserve capacity through a combination of supply and demand-side resources along with economy energy purchase from the Florida Municipal Power Pool (FMPP) while meeting the objectives of environmental responsibility, reliability, and affordability for its customers. The IRP evaluates the risks and uncertainties related to regulation, marketplace and technologies based on known information and assumptions.

5.2 Florida Municipal Power Pool

Lakeland Electric is a member of the FMPP with the Orlando Utilities Commission (OUC) and the Florida Municipal Power Agency (FMPA). These three utilities operate under a single 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. Lakeland, therefore, must ultimately plan to meet its own load and reserve requirements as reflected in this document. Each member participates in a day ahead market in purchases or sales activities and all units are dispatched in an economic order. The FMPP provides an opportunity for members to purchase economy energy when available from other members.

5.3 Economic Parameters

Subsections of 5.3 present the assumed values adopted for economic parameters used in Lakeland Electric's planning process. The assumptions stated in this section are applied consistently throughout this document.

5.3.1 Inflation Rate

The general inflation rate applied is assumed to be 3.1% in 2023, 2.2% in 2024 and 2.1% thereafter based on Moody's CPI forecast as of December 2022.

5.3.2 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 5.0 percent.

5.3.3 Present Worth Discount Rate

The present worth discount rate used in the analysis is set equal to Lakeland's assumed bond interest rate of 5.0 percent.

5.3.4 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.

5.3.5 Fixed Charge Rate

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 fixed charged rate calculation is an assumed 0.7 percent issuance fee, a 0.0 percent annual insurance cost, and there is no 6 months' debt reserve for Lakeland.

5.4 Fuel Parameters

Subsections of 5.4 and below outline the basic fuel assumptions and fuel delivery arrangement for Lakeland.

5.4.1 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.

5.4.1.1 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. Production of natural gas from the Marcellus and Haynesville areas has increased due to advanced drilling technology which has lowered cost contributing to increased supply which reduces price volatility seen in recent years. During 2022, natural gas trading averaged around $6.647 per MMBtu as the market reacted to increased LNG exports to Europe due to the war between Russia and Ukraine. The five-year NYMEX Henry Hub Natural Gas forward curve is currently projected to average around $3.626 per MMBtu.

5.4.1.2 Natural Gas Transportation

There are 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 flexibility in gas delivery.

5.4.1.2.1 Florida Gas Transmission Company

FGT is an open access interstate pipeline company transporting natural gas for third parties through its 5,000 miles 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 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. Lakeland Electric currently has in excess of 33,000 MMBtu/day of firm transportation with FGT for natural gas delivery to its generation facilities.

5.4.1.2.2 Florida Gas Transmission market area pipeline system

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. 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 include 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 (HP) 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.

5.4.1.2.3 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. Phase I of the pipeline is complete and ends in Polk County, Florida. The pipeline extends to Florida Power & Light'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 Electric added an additional 10,000 MMBtus/day of Gulfstream Pipeline capacity during 2017, for a total of 50,000 MMBtus/day.

5.4.1.2.4 Sabal Trail Transmission

The Sabal Trail pipeline is a 515 miles 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.

5.4.1.2.5 Transcontinental Gas Pipeline (TRANSCO)

The Transco Pipeline is a 10,000-mile interstate pipeline extending from south Texas to New York City. Lakeland Electric acquired 5,800 MMBtus/day beginning January 26, 2022, as a risk mitigation strategy to flow additional natural gas to both FGT and Gulfstream pipelines. The city entered into long-term prepaid Natural Gas baseload agreements until October 31, 2026, with an option to extend another five years.

5.4.2 Fuel Oil

5.4.2.1 Fuel Oil supply and Availability

Lakeland Electric 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 Electric's Fuels Department continually monitors the cost effectiveness of spot market purchasing.

5.4.2.2 Fuel Oil Transportation

Although Lakeland Electric 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.

5.4.3 Fuel Price Projections

This section presents the long-term price projections for natural gas and fuel oil. The fuel price forecast for solid fuel oil and natural gas is prepared by Lakeland Electric's Fuels Department. The natural gas forecast uses a blended average from a consultant forecast and the New York Mercantile Exchange (NYMEX) natural gas forward curve along with transport rate, usage, and 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 Energy Information Administration's Annual Energy Outlook 2022.

5.4.3.1 Natural Gas Price Forecast

The price forecast for natural gas is based on historical prices and future expectations for the market. The forecast considers 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 Electric's consultant assisting in the administration and adjustment of policies and procedures, as well as the oversight of the program.

Lakeland Electric 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 two rates in FGT's tariff: FTS-1 and FTS-3. Rates in FTS-1 are based on FGT's Phase II, III, IV, V, VI and VII, expansion. Rates in FTS-3 are based on the Phase VIII expansion, which went in service April 1, 2011. Lakeland added FTS-3 capacity to increase its capacity for new generation. Lakeland diversified its capacity with 56% Gulfstream, 38% FGT and 6% Transco. The FTS usage and fuel rates for FGT, Gulfstream and Transco listed below are effective from February 1, 2023.

Table 5-1
Natural Gas Tariff Transportation Rates

Rates And Schedules	Rate Schedules					
	FGT FTS-1 w/surcharges (cents/DTH)*	**FGT FTS-3 w/surcharges (cents/DTH)*	FGT ITS-1	Transco FT	Gulfstream FTS-1	Gulfstream FTS-6%
Reservation	51.5	72.5	74.22	9.837	55.00	70.41
Usage	4.99	2.94	0.00	1.03	0.7	0.7
Total	56.49	75.44	74.22	10.867	55.7	71.11
Fuel Charge	2.25%	2.25%	2.25%	0.30%	1.55%	1.55%

* A DTH is equivalent to 1 MMBtu or 1 MCF

The average transportation rate of $0.56/MMBtu will be added for purposes of projecting delivered gas prices for existing gas units in Lakeland. This average rate is realized through a current mix of FGT, Gulfstream and Transco, including consideration of Lakeland Electric's ability to relinquish its FTS, Gulfstream and Transco transportation or acquire other firm and interruptible gas transportation on the market. The delivered natural gas price is projected to be very volatile during the next twelve months due to events in Russia, low storage projections and the end of withdrawal season. The long-term average price is forecasted to remain around $3.626 during the next five years. The average delivered gas price forecast in Lakeland will be around $3.121/MMBtu for the year 2023, which is below the last five-year average.

5.4.3.2 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.

5.4.4 Fuel Price Forecast Sensitivities

Lakeland Electric is not conducting any specific forecasted fuel price sensitivity analysis at this moment. Lakeland baseloads larger volumes during the winter and summer seasons to mitigate fuel price risk and ensure reliability. In addition, the utility financially hedges natural gas to manage fuel price risk. Lakeland Electric acquired FTS-3 capacity on the Florida Gas Transmission Company pipeline to increase its volume by October 2023.

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6.0 Forecast of New Capacity Requirements

6.1 Assessment of the Need for Capacity/Energy

This section describes the process Lakeland Electric uses to assess the need for capacity under the principle of resource adequacy to serve Lakeland Electric's customers reliably in the future. The need for future capacity is based on Lakeland Electric's long-term load forecast, Florida Reliability Coordinating Council (FRCC) and FMPP's reserve margin requirements, and existing generation capacity of Lakeland Electric. In order to serve the customers in its territory, LE needs to have enough resources to meet the peak hour demand including reserves at any hour of a day throughout the year.

6.1.1 Load Forecast

The load forecast described in Section 3.0 is used to determine the need for capacity. The total electricity sales and peak hour demand forecast for this TYSP were developed based on future economic expectation and future population. LE generates a range of load forecasts (i.e., base-expected, high, and low) to ensure that LE's plan is flexible enough to meet all scenarios. A summary of the annual peak load forecasts for winter and summer for base case (i.e., reference) scenario are presented in Tables 6-1 and 6-2.

6.1.2 Reserve Requirements

A 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 changes. This additional capacity (i.e., reserve capacity) should be large enough to cover the loss of any unit in the system and be able to respond adequately to cover the moment to moment change in system load. Total reserves should also be able cover uncertainties such as planned outage, interruption on transmission system due to planned maintenance or weather events and load forecasting error. 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 Electric looked at probabilistic approaches to determine its reliability needs in the past. The study has looked at reliability indices such as Loss of Load Probability (LOLP) and Expected Unserved Energy (EUE). Lakeland Electric has found that due to the strength of its transmission system, and interconnection with neighboring utilities, operation within FMPP, LOLP and EUE values were so small in the past that reserve margin-based reliability measures would be sufficient at this time. Moreover, FRCC performs LOLP analysis every two years, and the reliability standards are adequate to operate the entire FRCC system reliably.

6.1.3 Existing Energy Supply

Availability factor on Generating Units is reviewed annually and is found to be within industry standards for the types of units that Lakeland Electric has in its generation fleet, indicating adequate and prudent maintenance is taking place.

Lakeland Electric is using a wide variety of resources (build and purchase) to meet its load and reserve obligations. Lakeland plans to add 74.5 MW of solar in its territory to be available for generation in 2025. Lakeland expects to have additional solar in the future. LE uses a production cost model – PCI GenTrader - to obtain an optimal capacity plan to meet its energy need with minimal unserved energy over the next 10 years. Table 6-1 shows the combination of purchase and LE owned resources for existing and planned capacity requirements. In addition, LE has secured firm Power Purchases necessary to meet load and reserve obligations until new resources are installed and operational. In 2024, 120 MW (6 units) of additional capacity will be available and will replace the existing long-term power purchase contract. These new generating units are highly reliable, efficient, flexible, and cost effective. The high flexibility and modularity of these Reciprocating Internal Combustion Engines (RICE) can provide a low-cost energy solution to Lakeland supporting an optimized transition to additional solar energy in its energy portfolio. These new engines can quickly ramp up and down as needed to balance the variable nature of solar resources. This will help to improve the reliability in Lakeland System.

6.2 Seasonal Capacity and Reserve Margins

As discussed in Section 6.1.2 above, by comparing Lakeland Electric's load forecast plus reserves with firm supply, the Reserve Margins can be identified. Since electric supply and demand differ in summer and winter, planning based on seasonal reserve margin is critical. This TYSP study also considers capabilities and performance of solar resources in both summer and winter. Lakeland Electric's Reserve Margins presented in Tables 6-1 and 6-2 in both seasons are at or higher than 15% in both cases.

Tables 6-1 and 6-2 indicate that using the base winter and base summer load forecasts, Lakeland Electric's Reserve Margins are at or greater than 15% throughout the year with additional external firm power purchases, repairing existing out of service gas turbines, or building new resources, during the current ten-year planning period. This complies with the FRCC's minimum reserve margin criteria to meet its reliability requirements.

Table 6-1
Projected Reliability Levels - Winter / Base Case

Year	Net Generating Capacity	Net System Purchases	Net System Sales	Net System Capacity	System Peak Demand		Reserve Margin		Excess(Deficit) to Maintain 15% Reserve Margin	
					Before Interruptible and Load Management	After Interruptible and Load Management	Before Interruptible and Load Management	After Interruptible and Load Management	Before Interruptible and Load Management	After Interruptible and Load Management
	MW	MW	MW	MW	MW	MW	%	%	%	MW
2023/24	721	125	0	846	680	680	24%	24%	64	64
2024/25	841	0	0	841	686	686	23%	23%	52	52
2025/26	841	0	0	841	691	691	22%	22%	46	46
2026/27	841	0	0	841	697	697	21%	21%	39	39
2027/28	841	0	0	841	704	704	19%	19%	31	31
2028/29	841	0	0	841	711	711	18%	18%	23	23
2029/30	841	0	0	841	716	716	17%	17%	18	18
2030/31	841	0	0	841	723	723	16%	16%	9	9
2031/32	841	5	0	846	730	730	16%	16%	6	6
2032/33	841	10	0	851	736	736	16%	16%	5	5

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

					System Peak Demand		Reserve Margin		Excess(Deficit) to Maintain 15% Reserve Margin	
Year	Net Generating Capacity	Net System Purchases	Net System Sales	Net System Capacity	Before Interruptible and Load Management	After Interruptible and Load Management	Before Interruptible and Load Management	After Interruptible and Load Management	Before Interruptible and Load Management	After Interruptible and Load Management
	MW	MW	MW	MW	MW	MW	%	%	%	MW
2023	658	132	0	790	686	686	15%	15%	1	1
2024	658	142	0	800	694	694	15%	15%	2	2
2025	778	44	0	822	702	702	17%	17%	15	15
2026	778	44	0	822	709	709	16%	16%	7	7
2027	778	49	0	827	716	716	15%	15%	4	4
2028	778	59	0	837	724	724	16%	16%	4	4
2029	778	69	0	847	733	733	16%	16%	4	4
2030	778	79	0	857	741	741	16%	16%	5	5
2031	778	89	0	867	750	750	16%	16%	4	4
2032	778	94	0	872	758	758	15%	15%	0	0

Solar resources – unlike traditional dispatchable generators – are highly variable resources that depend on the time of the day, season, and weather conditions. Hence, solar firm capacity is considered only 50% of the installed capacity during summer and 0% in winter in this study – which aligns the industry's general practice for planning purpose

As Lakeland Electric's needs and fleet of resources continue to change through time, reserve margin levels will be reviewed and adjusted as appropriate.

6.3 Energy Resources Portfolio and Analysis

Table 6.3 summarizes the expected energy mix from different resources for Lakeland Electric in next 10 years from the Production Cost Analysis. This Table shows the different types of committed and planned resources to meet the future capacity and energy needs of LE customers.

This combination of resources is represented as a portfolio for Lakeland Electric under the base case assumptions and production cost analysis. The GenTrader software model provides the optimal energy generation from Lakeland units along with economy purchase from the FMPP members when Lakeland units are economically dispatched with the other Pool members. This portfolio is decided based on optimal optimization of cost, risk, and environmental factors. As can be seen in Table 6.3, natural gas-fired resources are dominant in LE's future energy mix as more than 80% of energy is expected to come from these resources. Solar mix is still low until 2025. It is anticipated to increase up to 5.2% range when new solar units are added in the portfolio. Lakeland expects to purchase certain percentage of economy energy from the FMPP members and fixed firm contract energy purchases from a bilateral agreement with the OUC until the new RICE resources are built. When LE's RICE engines and solar resources become available in 2024, LE becomes a net seller and a buyer based upon relative dispatch costs of LE units compared to the other units in FMPP.

Table 6.3: Energy Resource Mix

Energy Source	Type	Units	Calendar Year 2022-Actual	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Coal		%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Distillate	Steam	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	CC	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	CT	%	0.00%	0.03%	0.15%	0.03%	0.03%	0.00%	0.06%	0.06%	0.05%	0.11%	0.24%
	Total	%	0.00%	0.03%	0.15%	0.03%	0.03%	0.00%	0.06%	0.06%	0.05%	0.11%	0.24%
Natural Gas	Steam	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CC	%	71.4%	81.6%	71.9%	79.8%	85.3%	77.3%	75.2%	73.5%	63.8%	75.5%	73.4%
	CT	%	1.3%	0.3%	8.0%	6.1%	6.6%	7.0%	6.7%	5.4%	5.2%	12.0%	13.0%
	Total	%	72.7%	81.9%	79.9%	85.9%	91.9%	84.3%	81.9%	78.9%	69.0%	87.5%	86.5%
Solar		%	0.5%	0.5%	0.5%	5.2%	5.2%	5.1%	5.1%	5.0%	4.9%	4.9%	4.8%
Other (Specify)[1]		%	26.8%	17.5%	19.4%	8.8%	2.8%	10.6%	12.9%	16.1%	26.1%	7.5%	8.5%
Net Energy for Load		%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

1 Other = Purchase

6.4 Summary - Study Results

Table 6-1 and 6-2 presents the schedules of new planned resources and anticipated future purchases in addition to the existing resources and purchases. The planned portfolio provides adequate resource adequacy (i.e., reserve margin) during the summer period based on existing and planned supply and demand. While Lakeland anticipates more than 5% of installed capacity coming from solar by 2025, there is a need of additional capacity which may either come from external purchases or additional capacity from repairs from existing gas turbine units in 2027 and later. The capacity contribution from solar in meeting winter peak loads in the winter month's morning hours is assumed negligible. Table 6-3 presents the energy mix scenario for Lakeland Electric. LE starts to be more self-reliant in terms of energy after LE's new resources are installed in 2024 and the firm power purchase contract with the OUC culminates.

7.0 Environmental and Land Use Information

As discussed in Section 6, Lakeland Electric added a new 125 MW McIntosh Gas Turbine No. 2 in 2020 and retired its coal unit (219 MW – LE's net share) at Lakeland Electric's McIntosh Power Plant. LE is replacing its retired coal unit by a combination of 120 MW RICE engines in 2024 and solar in near future. LE has been issued a construction permit for those Engines to be built at McIntosh plant site (Figure 7-5 and 7-6) and the construction is in progress. These RICE engines can burn up to 10% of hydrogen, a non-carbon emitting fuel source. If the planning and permitting process goes well and price becomes favorable for Lakeland, Lakeland may add few solar plants at McIntosh Power Plant Site where appropriate (See Figures 7-2 and 7-3). To achieve LE's overall mission to provide affordable energy and environmental stewardship, LE has adopted different measures to maintain the environmental footprint of the new generating units, including air emissions, water, waste and land use impacts within the state and federal standard.

Per the Ten-Year Site Plan definitions (rule 25-22-072), "Preferred Sites" include sites where a utility has taken action to site new generation. "Preferred Site" information of the Plant site for planned units is presented from Figures 7-1 – 7.5.

Table 7-1 summarizes different control strategies adopted to comply with various environmental emission regulations in LE's existing major generating units. The air pollution control technologies installed at those generating units meet all the state and federal regulations for all pollutants.

The retirement of our coal burning unit has prompted the closure of our coal combustion (CCR) residuals landfill. We are actively pursuing State permits to begin final closure of the CCR landfill. Closing the landfill will significantly limit the exposure of the materials into the environment. Closure is likely to be completed by early 2025.

The coal burning unit retirement has also significantly reduced LAK's emissions of pollutants such as carbon monoxide, sulfur dioxide, nitrogen oxides, particulate matter, hazardous air pollutants, as well as other greenhouse gases.

EPA is planning to purpose changes to the existing Clean Air Act to regulate CO_2 emissions which would potentially impact existing natural gas plants for the first time. Additionally, EPA is considering altering regulations to regulate closed CCR landfills. Both actions would have considerable impacts on LAK's operations. Until the new regulations are final, the actual impacts will not be known at this time.

LE has installed an epoxy coating on the once through cooling water tubes at Larsen in the past year. This was done to help reduce the amount of copper that is picked up by water and returned to the lake. Laboratory testing of the cooling water has shown the project to be effective in reducing the copper impacts to the lake.

Table 7-1: Emission Control Options in Major LE Units

Table 7-1
Lakeland Electric
Existing Generating Facilities
Environmental Emissions and Control Strategies for Major Existing Generating Units

Plant Name	Unit (Type)	Fuel		Air Pollutants and Control Strategies				Cooling Type
		Primary	Alt.	PM	SO2	Nox	CO	
Charles Larsen Memorial	8 (CC)	NG	DFO	None	LS	LNB WI	None	OTF
C.D. McIntosh, Jr.	GT2 (GT)	NG	DFO	None	LS	WI	None	N/A
	5 (CC)	NG	N/A	None	LS	LNB SCR	OC	WCTM
Winston	1-20 (IC)	DFO	N/A	None	LS	SCR	OC	N/A

PM Particulte matter
SO2 Sulfur dioxide
NOX Nitrogen oxides
CO Carbon monoxide
LS Low sulfur fuel
LNB Low Nox burners
WI Water injections
GT Gas Turbine
OTF Once-through flow
FGR Flue gas recirculation
IC Internal combustion
NG Natural Gas
WCTM Water cooling tower mechanical
ESP Electrostatic precipitator
CC Combined Cycle
FGD Flue gas desulfurization
OFA Overfire air
SCR Selective catalytic reduction
N/A Not Applicable
OC Oxidation catalyst
DFO Distilate Fuel oil
Alt Alterenate

Source: Lakeland Environmental Staff

Figure 7-1: C.D. McIntosh Power Plant Topographic Map

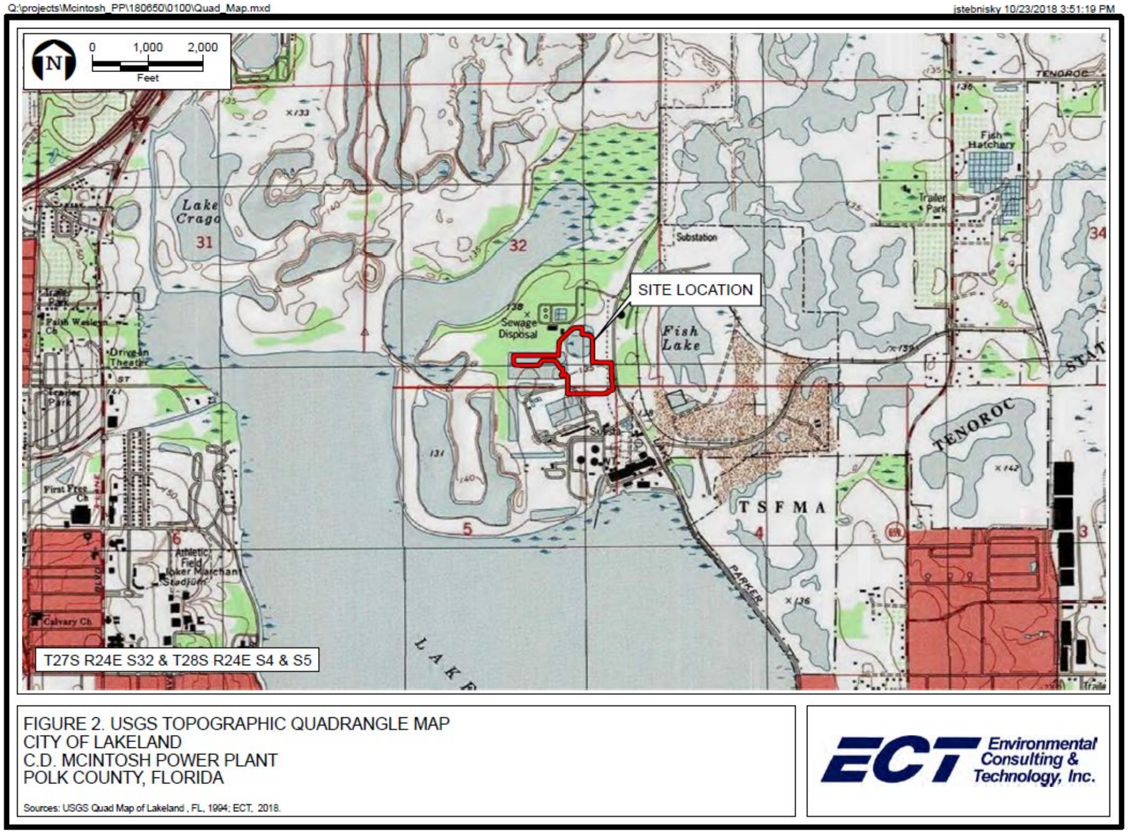


Figure 7-2: City of Lakeland – Zoning Map

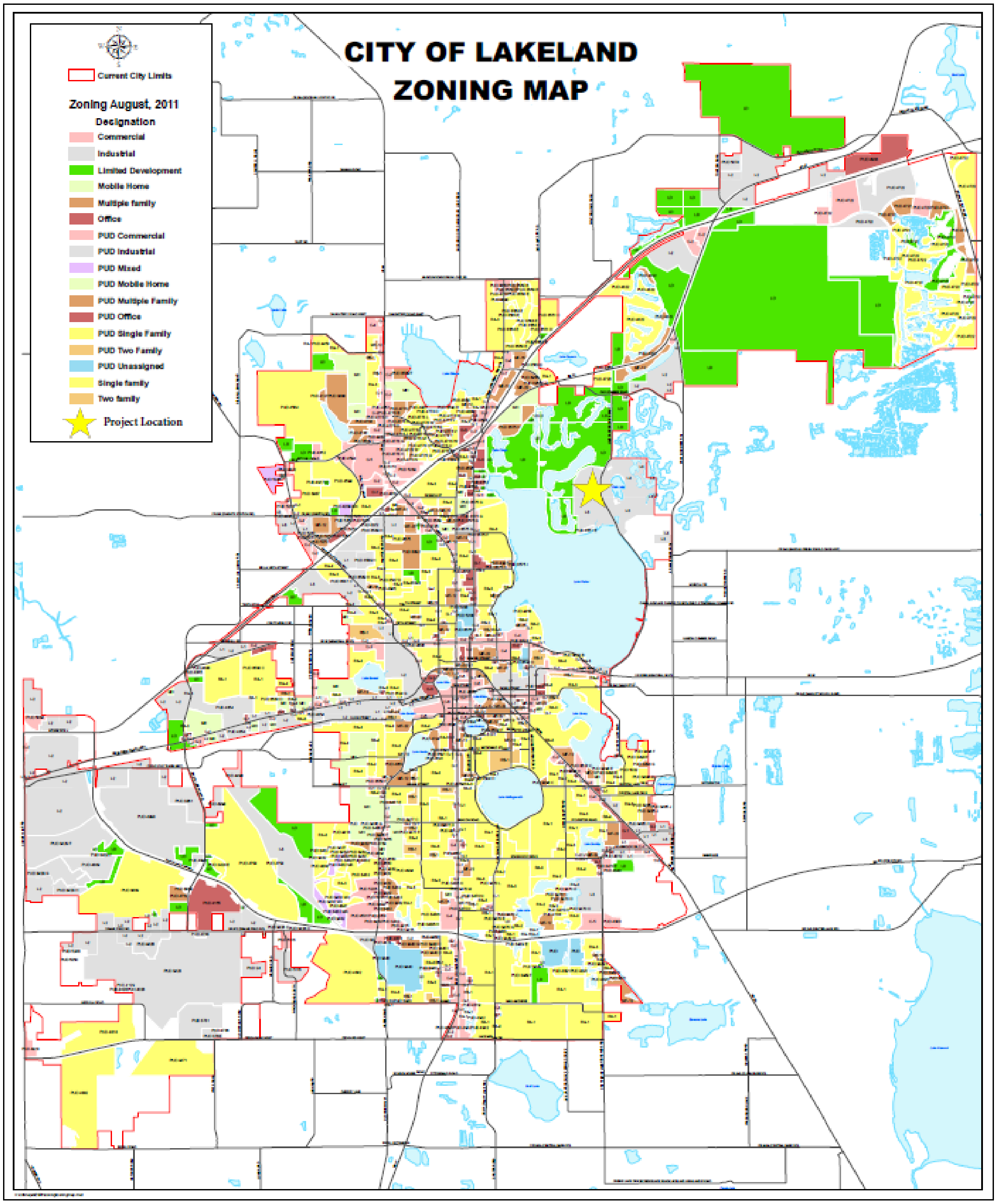


Figure 7-3: McIntosh Solar Plant Site – Topological map (tentative)

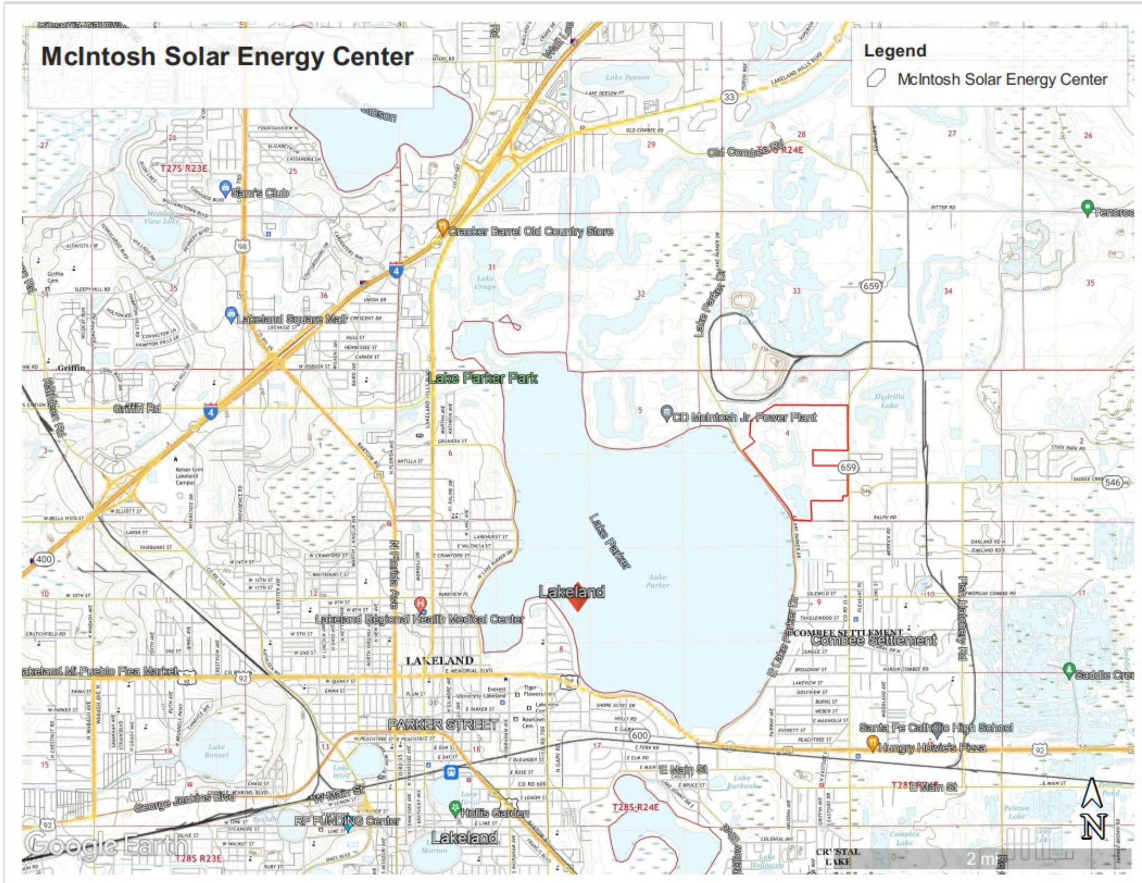


Figure 7-4: Site location – McIntosh Solar (tentative)

Figure 7-5: Site location of 120 MW RICE Engines in McIntosh Plant

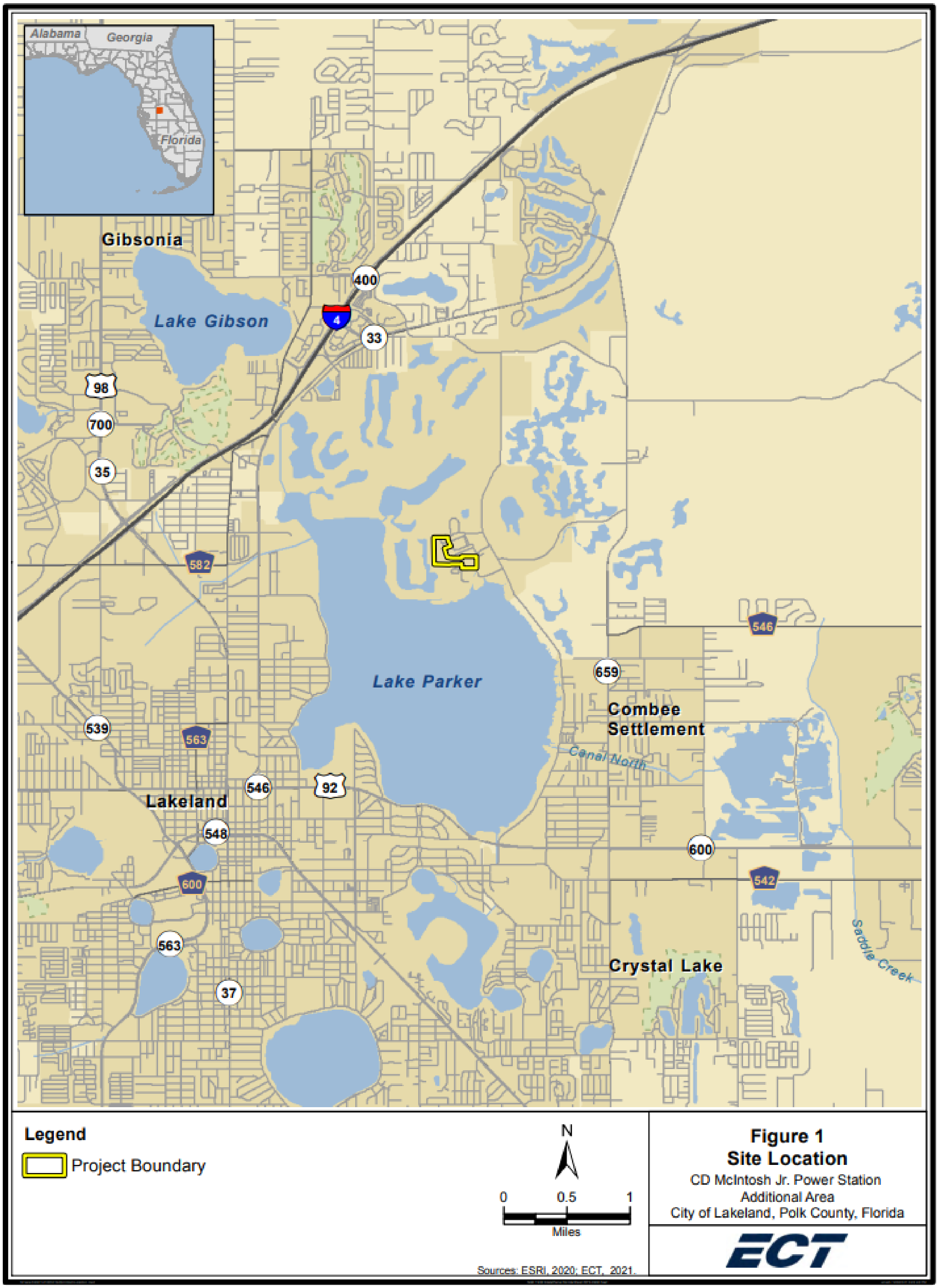
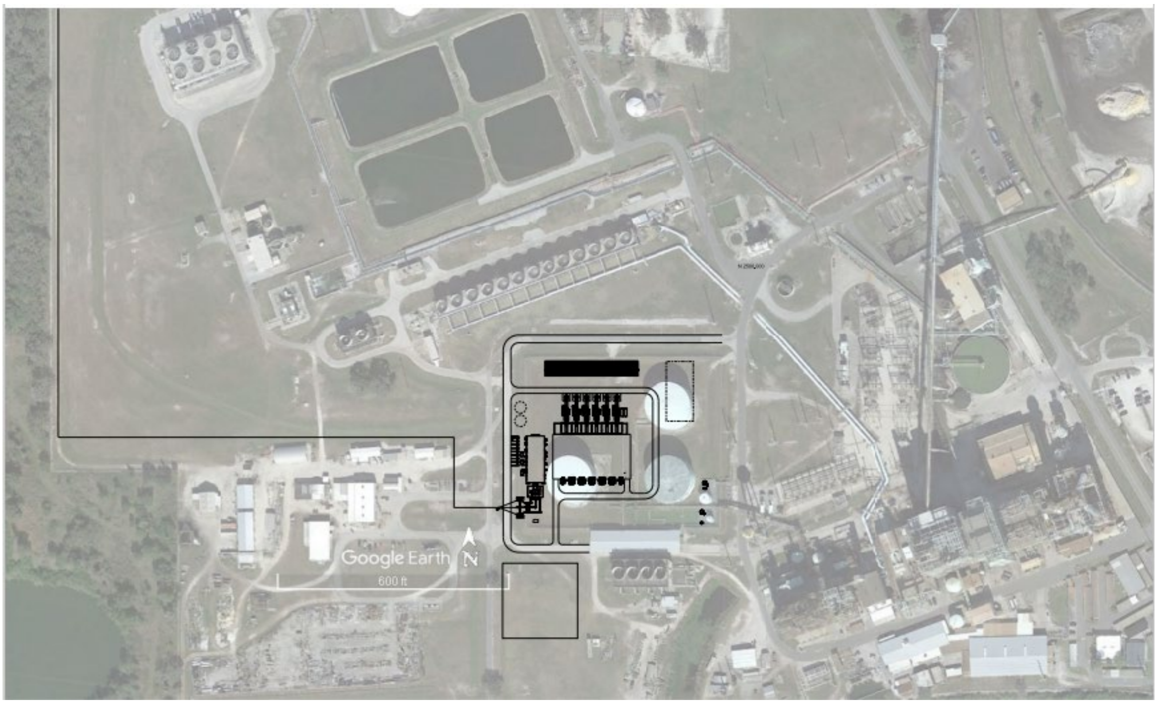


Figure 7-6: Site location of 120 MW RICE Engines in McIntosh Plant



8.0 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.

Tables 8-1 and 8-1a provide LE's existing unit characteristics.

Tables 8-2 through 8-5 provide information on energy usage characteristics by customer class in the past and the future.

Tables 8-2 through 8-8 provide history and forecast on LE's electric demand and energy.

Table 8-9 provides a history and forecast of fuel requirements by fuel type.

Tables 8-10 and 8-11 provide a history and forecast of energy produced by fuel type.

Tables 8-12 and 8-13 provide comparisons of Lakeland Electric resources to Lakeland Electric demand. This table demonstrates that Lakeland Electric's Reserve Margin forecast will be maintained at 15% or higher each year in this Ten-Year-Site Plan period.

Tables 8-14 provides information related to changes in the status of Lakeland Electric's existing and future units.

Tables 8-15 and 8-16 present the major technical and cost characteristics of new units to be installed at McIntosh Plant including solar and main transmission line to be built in its Transmission System.

Table 8-1
Lakeland Electric Existing Generating Facilities

				[4]Fuel		[5]Fuel Transport						[2]Net Capability	
Plant Name	Unit No.	Location	[3]Unit Type	Pri	Alt	Pri	Alt	[1]Alt Fuel Days Use	Commercial In-Service Month/Year	Expected Retirement Month/Year	Gen. Max. Nameplate kW	Summer MW	Winter MW
Charles Larsen Memorial	GT2*	16-17/28S/24E	GT	NG	DFO	PL	TK	NR	11/62	Unknown	11,250	10	14
	GT3*		GT	NG	DFO	PL	TK	NR	12/62	Unknown	11,250	9	13
	8		CA	WH	---	---			04/56	Unknown	30,000	30	30
	8		CT	NG	DFO	PL	TK	NR	07/92	Unknown	101,520	85	95
Plant Total												114	124

[1]LAK doesnot maintain records of the days the alternative fuel available in reserve. ,[2]Net Normal, * Long term scheduled maintenance - not included in available

[2]Net Normal

Source: Lakeland Energy Supply Unit Rating Group

[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	NG Natural Gas	TK Truck
GT Combustion Gas Turbine	WH Waste Heat	
ST Steam Turbine		

Table 8-1a

Schedule 1.0: Existing Generating Facilities as of December 31, 2021

				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	---	---	12/01	Unknown	2,500 each	50	50
Plant Total												50	50
C.D. McIntosh, Jr.	D1	4-5/28S/24E	IC	DFO	---	TK	---	---	01/70	Unknown	2,600	3	3
	D2		IC	DFO	---	TK	---	---	01/70	Unknown	2,600	3	3
	GT1		GT	NG	DFO	PL	TK	---	05/73	Unknown	26,640	17	19
	GT2		GT	NG	DFO	PL	TK	---	06/20	Unknown	130,050	120	125
	5		CT	NG	---	PL	---	---	05/01	Unknown	292,950	234	280
	5		CA	WH	---	---	---	---	05/02	Unknown	135,000	118	118
Plant Total												494	547
System Total												**658**	**721**

[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
WH Waste Heat
NG Natural Gas

[5]Fuel Transportation Method
PL Pipeline
TK Truck

Table 8-2

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
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
2018	288,157	2.64	1,524	109,043	13,976	813	12,543	64,817
2019	292,465	2.65	1,540	110,403	13,949	806	12,687	63,530
2020	295,899	2.64	1,612	112,175	14,370	789	12,889	61,215
2021	299,557	2.61	1,597	114,683	13,925	832	13,219	62,940
2022	303,910	2.61	1,637	116,907	14,003	843	13,452	62,667
Forecast								
2023	307,320	2.62	1,632.00	117,429	13,898	836	13,449	62,161
2024	310,595	2.61	1,660.00	119,028	13,946	845	13,613	62,073
2025	313,874	2.60	1,687.00	120,616	13,987	852	13,779	61,833
2026	317,226	2.60	1,714.00	122,210	14,025	858	13,943	61,536
2027	320,702	2.59	1,743.00	123,812	14,078	865	14,109	61,308
2028	324,293	2.59	1,774.00	125,415	14,145	871	14,275	61,016
2029	327,964	2.58	1,808.00	127,014	14,235	878	14,441	60,799
2030	331,665	2.58	1,842.00	128,576	14,326	884	14,605	60,527
2031	335,348	2.58	1,877.00	130,060	14,432	890	14,763	60,286
2032	338,391	2.57	1,912.00	131,489	14,541	896	14,913	60,082

Table 8-3
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
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
2018	676	74	9,135,135	0	35	70	3,118
2019	667	76	8,776,316	0	35	69	3,117
2020	660	75	8,800,000	0	35	68	3,163
2021	679	71	9,563,380	0	35	67	3,210
2022	697	76	9,171,053	0	35	67	3,279
Forecast							
2023	690	73	9,452,055	0	36	67	3,261
2024	695	74	9,391,892	0	36	67	3,303
2025	698	75	9,306,667	0	36	67	3,340
2026	701	76	9,223,684	0	36	67	3,376
2027	705	77	9,155,844	0	36	67	3,416
2028	708	78	9,076,923	0	36	67	3,456
2029	711	79	9,000,000	0	36	67	3,500
2030	714	79	9,037,975	0	36	67	3,543
2031	718	80	8,975,000	0	36	67	3,587
2032	722	81	8,913,580	0	36	67	3,632

Table 8-4

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
2013	0	0	2,919	8,820	122,803
2014	0	0	3,006	8,860	124,019
2015	0	0	3,126	8,921	125,674
2016	0	0	3,109	8,966	127,152
2017	0	0	3,086	8,997	129,113
2018	0	0	3,180	9,051	130,658
2019	0	0	3,189	9,051	132,217
2020	0	0	3,273	9,182	134,320
2021	65	0	3,305	9,189	137,162
2022	71	0	3,406	9,200	139,635
Forecast					
2023	65	0	3,358	9,276	140,227
2024	65	0	3,401	9,327	142,043
2025	0	0	3,440	9,380	143,849
2026	0	0	3,477	9,432	145,662
2027	0	0	3,518	9,486	147,484
2028	0	0	3,559	9,539	149,307
2029	0	0	3,604	9,594	151,127
2030	0	0	3,649	9,649	152,910
2031	0	0	3,694	9,704	154,608
2032	0	0	3,740	9,760	156,244

Table 8-5
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
2013	602	0	602	0	0	0	0	0	602
2014	627	0	627	0	0	0	0	0	627
2015	632	0	632	0	0	0	0	0	632
2016	649	0	649	0	0	0	0	0	649
2017	644	0	644	0	0	0	0	0	644
2018	639	0	639	0	0	0	0	0	639
2019	667	0	667	0	0	0	0	0	667
2020	678	0	678	0	0	0	0	0	678
2021	692	0	692	0	0	0	0	0	692
2022	704	0	704	0	0	0	0	0	704
Forecast									
2023	686	0	686	0	0	0	0	0	686
2024	694	0	694	0	0	0	0	0	694
2025	702	0	702	0	0	0	0	0	702
2026	709	0	709	0	0	0	0	0	709
2027	716	0	716	0	0	0	0	0	716
2028	724	0	724	0	0	0	0	0	724
2029	733	0	733	0	0	0	0	0	733
2030	741	0	741	0	0	0	0	0	741
2031	750	0	750	0	0	0	0	0	750
2032	758	0	758	0	0	0	0	0	758

Table 8-5a
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
2013	602	0	602	0	0	0	0	0	602
2014	627	0	627	0	0	0	0	0	627
2015	632	0	632	0	0	0	0	0	632
2016	649	0	649	0	0	0	0	0	649
2017	644	0	644	0	0	0	0	0	644
2018	639	0	639	0	0	0	0	0	639
2019	667	0	667	0	0	0	0	0	667
2020	678	0	678	0	0	0	0	0	678
2021	692	0	692	0	0	0	0	0	692
2022	704	0	704	0	0	0	0	0	704
Forecast									
2023	680	0	680	0	0	0	0	0	680
2024	687	0	687	0	0	0	0	0	687
2025	695	0	695	0	0	0	0	0	695
2026	702	0	702	0	0	0	0	0	702
2027	709	0	709	0	0	0	0	0	709
2028	717	0	717	0	0	0	0	0	717
2029	726	0	726	0	0	0	0	0	726
2030	734	0	734	0	0	0	0	0	734
2031	743	0	743	0	0	0	0	0	743
2032	751	0	751	0	0	0	0	0	751

Table 8-5b
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
2013	602	0	602	0	0	0	0	0	602
2014	627	0	627	0	0	0	0	0	627
2015	632	0	632	0	0	0	0	0	632
2016	649	0	649	0	0	0	0	0	649
2017	644	0	644	0	0	0	0	0	644
2018	639	0	639	0	0	0	0	0	639
2019	667	0	667	0	0	0	0	0	667
2020	678	0	678	0	0	0	0	0	678
2021	692	0	692	0	0	0	0	0	692
2022	704	0	704	0	0	0	0	0	704
Forecast									
2023	688	0	688	0	0	0	0	0	688
2024	696	0	696	0	0	0	0	0	696
2025	704	0	704	0	0	0	0	0	704
2026	711	0	711	0	0	0	0	0	711
2027	718	0	718	0	0	0	0	0	718
2028	726	0	726	0	0	0	0	0	726
2029	735	0	735	0	0	0	0	0	735
2030	744	0	744	0	0	0	0	0	744
2031	753	0	753	0	0	0	0	0	753
2032	761	0	761	0	0	0	0	0	761

Table 8-6
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
2013/14	577	0	577	0	0	0	0	0	577
2014/15	653	0	653	0	0	0	0	0	653
2015/16	583	0	583	0	0	0	0	0	583
2016/17	534	0	534	0	0	0	0	0	534
2017/18	701	0	701	0	0	0	0	0	701
2018/19	545	0	545	0	0	0	0	0	545
2019/20	600	0	600	0	0	0	0	0	600
2020/21	605	0	605	0	0	0	0	0	605
2021/22	663	0	663	0	0	0	0	0	663
2022/23	677	0	677	0	0	0	0	0	677
Forecast									
2023/24	684	0	684	0	0	0	0	0	684
2024/25	689	0	689	0	0	0	0	0	689
2025/26	695	0	695	0	0	0	0	0	695
2026/27	701	0	701	0	0	0	0	0	701
2027/28	708	0	708	0	0	0	0	0	708
2028/29	715	0	715	0	0	0	0	0	715
2029/30	720	0	720	0	0	0	0	0	720
2030/31	727	0	727	0	0	0	0	0	727
2031/32	734	0	734	0	0	0	0	0	734
2032/33	740	0	740	0	0	0	0	0	740

Table 8-6a

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
2013/14	577	0	577	0	0	0	0	0	577
2014/15	653	0	653	0	0	0	0	0	653
2015/16	583	0	583	0	0	0	0	0	583
2016/17	534	0	534	0	0	0	0	0	534
2017/18	701	0	701	0	0	0	0	0	701
2018/19	545	0	545	0	0	0	0	0	545
2019/20	600	0	600	0	0	0	0	0	600
2020/21	663	0	663	0	0	0	0	0	663
2021/22	663	0	663	0	0	0	0	0	663
2022/23	677	0	677	0	0	0	0	0	677
Forecast									
2023/24	680	0	680	0	0	0	0	0	680
2024/25	686	0	686	0	0	0	0	0	686
2025/26	691	0	691	0	0	0	0	0	691
2026/27	697	0	697	0	0	0	0	0	697
2027/28	704	0	704	0	0	0	0	0	704
2028/29	711	0	711	0	0	0	0	0	711
2029/30	716	0	716	0	0	0	0	0	716
2030/31	723	0	723	0	0	0	0	0	723
2031/32	730	0	730	0	0	0	0	0	730
2032/33	736	0	736	0	0	0	0	0	736

Table 8-6b

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
2013/14	577	0	577	0	0	0	0	0	577
2014/15	653	0	653	0	0	0	0	0	653
2015/16	583	0	583	0	0	0	0	0	583
2016/17	534	0	534	0	0	0	0	0	534
2017/18	701	0	701	0	0	0	0	0	701
2018/19	545	0	545	0	0	0	0	0	545
2019/20	600	0	600	0	0	0	0	0	600
2020/21	663	0	605	0	0	0	0	0	605
2021/22	663	0	663	0	0	0	0	0	663
2022/23	677	0	677	0	0	0	0	0	677
Forecast									
2023/24	692	0	692	0	0	0	0	0	692
2024/25	698	0	698	0	0	0	0	0	678
2025/26	704	0	704	0	0	0	0	0	704
2026/27	710	0	710	0	0	0	0	0	710
2027/28	717	0	717	0	0	0	0	0	717
2028/29	724	0	724	0	0	0	0	0	724
2029/30	730	0	730	0	0	0	0	0	730
2030/31	736	0	736	0	0	0	0	0	736
2031/32	743	0	743	0	0	0	0	0	743
2032/33	750	0	750	0	0	0	0	0	750

Table 8-7
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 %
2013	2,831	0	0	2,831	0	88	2,919	55%
2014	2,903	0	0	2,903	0	103	3,006	55%
2015	3,034	0	0	3,034	0	92	3,126	54%
2016	3,030	0	0	3,030	0	79	3,109	55%
2017	3,018	0	0	3,018	0	68	3,086	55%
2018	3,118	0	0	3,118	0	62	3,180	55%
2019	3,117	0	0	3,117	0	73	3,190	55%
2020	3,163	0	0	3,163	0	109	3,273	55%
2021	3,210	0	0	3,210	0	95	3,304	53%
2022	3,279	0	0	3,279	0	127	3,406	55%
Forecast								
2023	3262	0	0	3,262	0	97	3,359	56%
2024	3303	0	0	3,303	0	98	3,402	56%
2025	3340	0	0	3,340	0	100	3,440	56%
2026	3376	0	0	3,376	0	101	3,477	56%
2027	3415	0	0	3,415	0	102	3,517	56%
2028	3457	0	0	3,457	0	103	3,560	56%
2029	3500	0	0	3,500	0	104	3,605	56%
2030	3543	0	0	3,543	0	106	3,649	56%
2031	3588	0	0	3,588	0	107	3,695	56%
2032	3632	0	0	3,632	0	108	3,740	56%

Table 8-7a
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
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
2018	3,118	0	0	3,118	0	62	3,180
2019	3,117	0	0	3,117	0	73	3,190
2020	3,163	0	0	3,163	0	109.3	3,273
2021	3,210	0	0	3,210	0	95	3,304
2022	3,279	0	0	3,279	0	127	3,406
Forecast							
2023	3,243	0	0	3,243	0	97	3,339
2024	3,284	0	0	3,284	0	98	3,381
2025	3,320	0	0	3,320	0	99	3,419
2026	3,356	0	0	3,356	0	100	3,456
2027	3,394	0	0	3,394	0	101	3,496
2028	3,436	0	0	3,436	0	102	3,538
2029	3,479	0	0	3,479	0	104	3,583
2030	3,521	0	0	3,521	0	105	3,626
2031	3,565	0	0	3,565	0	106	3,672
2032	3,609	0	0	3,609	0	107	3,716

Table 8-7b
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
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
2018	3,118	0	0	3,118	0	62	3,180
2019	3,117	0	0	3,117	0	73	3,190
2020	3,163	0	0	3,163	0	109	3,273
2021	3,210	0	0	3,210	0	95	3,304
2022	3,279	0	0	3,279	0	127	3,406
Forecast							
2023	3,281	0	0	3,281	0	98	3,379
2024	3,323	0	0	3,323	0	99	3,422
2025	3,360	0	0	3,360	0	100	3,461
2026	3,397	0	0	3,397	0	101	3,498
2027	3,436	0	0	3,436	0	103	3,539
2028	3,478	0	0	3,478	0	104	3,582
2029	3,522	0	0	3,522	0	105	3,627
2030	3,565	0	0	3,565	0	106	3,671
2031	3,610	0	0	3,610	0	108	3,718
2032	3,655	0	0	3,655	0	109	3,764

Table 8-8

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)
Month	2022 Actual		2023 Forecast		2024 Forecast	
	[1]Peak Demand MW	NEL GWh	[1]Peak Demand MW	NEL GWh	[1]Peak Demand MW	NEL GWh
January	663	258	673	257	680	260
February	531	226	594	214	602	221
March	525	254	416	253	427	256
April	588	264	551	257	558	260
May	649	313	640	318	648	322
June	704	322	668	319	676	323
July	690	347	686	329	694	333
August	694	348	668	342	676	346
September	676	302	655	308	663	312
October	576	273	625	280	632	283
November	580	247	519	221	525	223
December	620	252	455	260	461	263

[1]Includes Conservation

Table 8-9

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	2022-Actual	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
(1)	Nuclear		Trillion Btu	0	0	0	0	0	0	0	0	0	0	0
(2)	Coal		1000 Ton	0	0	0	0	0	0	0	0	0	0	0
(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	1	0	0	0	0	0	0	0	0	0	0
(9)		CT	1000 BBL	1	3	10	2	1	1	4	0	0	0	17
(10)		Total	1000 BBL	2	3	10	2	1	1	4	0	0	0	17
(11)	Natural Gas	Steam	1000 MCF	0	0	0	0	0	0	0	0	0	0	0
(12)		CC	1000 MCF	17,883	19,528	17,959	19,658	21,413	19,625	19,467	19,039	17,072	20,463	20,154
(13)		CT	1000 MCF	581	144	2,470	1,696	1,917	2,016	1,969	1,556	1,688	3,975	4,461
(14)		Total	1000 MCF	18,464	19,672	20,429	21,354	23,330	21,641	21,436	20,595	18,760	24,438	24,615
(15)	Other		Trillion Btu	0	0	0	0	0	0	0	0	0	0	0

Table 8-10
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	2022-Actual	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
(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	0	0	0	0	0	0	0	0	0	0	0
(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	1	5	1	1	0	2	2	2	4	9
(11)		Total	GWh	0	1	5	1	1	0	2	2	2	4	9
(12)	Natural Gas	Steam	GWh	0	0	0	0	0	0	0	0	0	0	0
(13)		CC	GWh	2,432	2,741	2,446	2,745	2,967	2,718	2,677	2,651	2,327	2,789	2,747
(14)		CT	GWh	45	11	273	210	230	247	240	193	189	445	487
(15)		Total	GWh	2,477	2,752	2,719	2,955	3,197	2,965	2,917	2,844	2,516	3,234	3234
(16)	NUG													
(17)	Solar			17	18	18	180	180	180	180	180	180	180	180
(18)	[1]Other (Purchase/Sales)			912	588	660	304	99	372	461	579	951	277	317
(19)	Net Energy for Load		GWh	3,406	3,359	3,402	3,440	3,477	3,517	3,560	3,605	3,649	3,695	3,740

[1] Intra-Regional Purchase

Table 8-11
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	2022-Actual	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
(1)	Inter-Regional Interchange		%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(2)	Nuclear		%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(3)	Coal		%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
(4)	Residual	Steam	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
(5)		CC	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
(6)		CT	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
(7)		Total	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
(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%	0.03%	0.15%	0.03%	0.03%	0.00%	0.06%	0.06%	0.05%	0.11%	0.24%
(11)		Total	%	0.00%	0.03%	0.15%	0.03%	0.03%	0.00%	0.06%	0.06%	0.05%	0.11%	0.24%
(12)	Natural Gas	Steam	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(13)		CC	%	71.4%	81.6%	71.9%	79.8%	85.3%	77.3%	75.2%	73.5%	63.8%	75.5%	73.4%
(14)		CT	%	1.3%	0.3%	8.0%	6.1%	6.6%	7.0%	6.7%	5.4%	5.2%	12.0%	13.0%
(15)		Total	%	72.7%	81.9%	79.9%	85.9%	91.9%	84.3%	81.9%	78.9%	69.0%	87.5%	86.5%
(16)	NUG		%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Solar		%	0.5%	0.5%	0.5%	5.2%	5.2%	5.1%	5.1%	5.0%	4.9%	4.9%	4.8%
	[1]Other (Specify)		%	26.8%	17.5%	19.4%	8.8%	2.8%	10.6%	12.9%	16.1%	26.1%	7.5%	8.5%
(18)	Net Energy for Load		%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

[1] Other = Purchase

Table 8-12

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)	(13)
Year	Total Installed Capacity	Firm Capacity Import	Firm Capacity Export	Projected Firm Net To Grid from NUG	Firm Contracts	Total Capacity Available	System Firm Peak Demand	Reserve Margin Before Maintenance[1]		Scheduled Maintenance	[1]Reserve Margin After Maintenance	
	MW	MW	MW	MW	MW	MW	MW	MW	%	MW	MW	%
2023	658	0	0	7	125	790	686	104	15	0	104	15
2024	658	0	0	7	135	800	694	106	15	0	106	15
2025	778	0	0	44	0	822	702	120	17	0	120	17
2026	778	0	0	44	0	822	709	113	16	0	113	16
2027	778	0	0	44	5	827	716	111	15	0	111	15
2028	778	0	0	44	15	837	724	113	16	0	113	16
2029	778	0	0	44	25	847	733	114	16	0	114	16
2030	778	0	0	44	35	857	741	116	16	0	116	16
2031	778	0	0	44	45	867	750	117	16	0	117	16
2032	778	0	0	44	50	872	758	114	15	0	114	15

[1] Includes conservation.

Table 8-13

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

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Year	Total Installed Capacity	Firm Capacity Import	Firm Capacity Export	Projected Firm Net To Grid from NUG	Firm Contracts	Total Capacity Available	System Firm Peak Demand	[1]Reserve Margin Before Maintenance		Scheduled Maintenance	Reserve Margin After Maintenance[1]	
	MW	MW	MW	MW		MW	MW	MW	%	MW	MW	%
2023/24	721	0	0	0	125	846	680	166	24	0	166	24
2024/25	841	0	0	0	0	841	686	155	23	0	155	23
2025/26	841	0	0	0	0	841	691	150	22	0	150	22
2026/27	841	0	0	0	0	841	697	144	21	0	144	21
2027/28	841	0	0	0	0	841	704	137	19	0	137	19
2028/29	841	0	0	0	0	841	711	130	18	0	130	18
2029/30	841	0	0	0	0	841	716	125	17	0	125	17
2030/31	841	0	0	0	0	841	723	118	16	0	118	16
2031/32	841	0	0	0	5	846	730	116	16	0	116	16
2032/33	841	0	0	0	10	851	736	115	16	0	115	16

[1]Includes Conservation

Table 8-14
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		[1]Status
				Pri.	Alt.	Pri.	Alt.	Mo/Yr	Mo/Yr	Mo/Yr	MW	Sum MW	Win MW	
Charles Larsen Power Plant	Gas Turbine #2	Polk County	CT	NG	DFO	PL	TK	-	Nov-62	-	11.2	10	14	OS
Charles Larsen Power Plant	Gas Turbine #3	Polk County	CT	NG	DFO	PL	TK	-	Dec-62	-	11.2	9	13	OS
-	-	Polk County	PV	SUN	-	-	-	-	Jan-25	-	74.5	74.5	74.5	P
C.D. McIntosh Power Plant	ME1-ME6	Polk County	IC	NG	-	PL	-	-	Aug-24	-	120	120	120	P

[1]Notes: OS - On long-tem scheduled maintenance ; P - Planned for installation

Table 8-15

Schedule 9.1: Status Report and Specifications of Approved Generating Facilities (McIntosh RICE Engines)

(1)	Plant Name and Unit Number:	McIntosh MAN IC Engines, ME1-6
(2)	Nameplate Capacity:	120 MW (6 units)
(3)	Firm Summer MW	120 MW
(4)	Firm Winter MW	120 MW
(5)	Technology Type:	Reciprocating Internal Combustion Engine (RICE)
(6)	Anticipated Construction Timing:	
(7)	Field Construction Start-date:	2022
(8)	Commercial In-Service date:	2024
(9)	Fuel	
(10)	Primary	Natural Gas
(11)	Alternate	N/A
(12)	Air Pollution Control Strategy:	Dry-Low NOx
(13)	Cooling Method:	N/A
(14)	Total Site Area (Acres):	7.2
(15)	Construction Status:	Under Construction
(16)	Certification Status:	Air Construction permit in place from FDEP.
(17)	Status with Federal Agencies:	N/A
(18)	***Projected*** Unit Performance Data:	
(19)	Planned Outage Factor (POF):	2%
(20)	Forced Outage Factor (FOF):	2%
(21)	Equivalent Availability Factor (EAF):	98%
(22)	Resulting Capacity Factor (%):	20-30% (expected)
(23)	Average Net Operating Heat Rate (ANOHR):	8300 Btu/KWh
(24)	***Projected*** Unit Financial Data:	
(25)	Book Life:	30
(26)	Total Installed Cost* (2021 $/kW):	1188
(27)	Direct Construction Cost ($/kW):	1119
(28)	[1]AFUDC Amount (2021$/kW):	50
(29)	[2]Escalation ($/kW):	71
(30)	Fixed O&M ($/kW-yr):	135
	Variable O&M ($/MWh):	4
(31)	K-Factor	No Calculation

Note: *overnight cost without finance and escalation. , [1]Allowance for fund during construction. , [2]Based on escalation or inflation.

Table 8-16
Schedule 10: Status Report and Specifications of Proposed
Directly Associated Transmission Lines

(1)	Point of Origin and Termination:	Hamilton S/S to Dranefield S/S
(2)	Number of Lines:	1
(3)	Right of Way:	Lakeland Electric owned
(4)	Line Length:	5.5
(5)	Voltage:	69 KV
(6)	Anticipated Construction Time:	Anticipated Commercial In Service by Aug 2024
(7)	Anticipated Capital Investment ($):	$4.5 Million
(8)	Substations:	Hamilton, Dranefield
(9)	Participation with Other Utilities:	None

8.1 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	Combined Cycle 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
RT	To be Retired
SB	Cold Standby (Reserve)
TS	Construction Complete, not yet in commercial operation
U	Under Construction
P	Planned for installation

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