City of Tallahassee
Your Own Utilities℠

Electric & Gas Utility | 2602 Jackson Bluff Road | Tallahassee | FL | 32304 | 850-891-4968

March 29, 2019

Clerk's Office
State of Florida Public Service Commission

Dear Sir/Madam:

The following pages are the City of Tallahassee Utilities' "Ten Year Site Plan: 2019-2028" report provided pursuant to Section 186.801, F.S. If you should have any questions regarding this report, please feel free to contact me at (850) 891-3130 or paul.clark@talgov.com. Thank you.

Sincerely,

Paul Clark

Paul D. Clark, II
Principal Engineer

Attachments

Ten Year Site Plan: 2019-2028

City of Tallahassee Utilities

Photo: Substation 12 Distributed Generation Facility

Report prepared by: City of Tallahassee Electric System Integrated Planning

#1 Public Utility in America

City of Tallahassee
Your Own Utilities

CITY OF TALLAHASSEE
TEN YEAR SITE PLAN FOR ELECTRICAL GENERATING FACILITIES
AND ASSOCIATED TRANSMISSION LINES
2019-2028
TABLE OF CONTENTS

I. Description of Existing Facilities

II. Forecast of Energy/Demand Requirements and Fuel Utilization

III. Projected Facility Requirements

IV. Proposed Plant Sites and Transmission Lines

Chapter I

Description of Existing Facilities

1.0 INTRODUCTION

The City of Tallahassee ("City") owns, operates, and maintains an electric generation, transmission, and distribution system that supplies electric power in and around the corporate limits of the City. The City was incorporated in 1825 and has operated since 1919 under the same charter. The City began generating its power requirements in 1902 and the City's Electric Utility presently serves approximately 122,000 customers located within a 221 square mile service territory (see Figure A). The Electric Utility operates three generating stations with a total summer season net generating capacity of 632 megawatts (MW).

The City has three fossil-fueled generating stations, which contain combined cycle (CC), combustion turbine (CT) and reciprocating internal combustion engine (RICE or IC) electric generating facilities. The Sam O. Purdom Generating Station, located in the City of St. Marks, Florida has been in operation since 1952; the Arvah B. Hopkins Generating Station, located on Geddie Road west of the City, has been in commercial operation since 1970; and the Substation 12 Distributed Generation Facility, located on Medical Drive, has been in operation since late 2018. The City has also been generating electricity at the C.H. Corn Hydroelectric Station, located on Lake Talquin west of Tallahassee, since August of 1985. The Corn facility has recently been decommissioned and is no longer generating electricity.

1.1 SYSTEM CAPABILITY

The City maintains five points of interconnection with Duke Energy Florida ("Duke", formerly Progress Energy Florida); one at 69 kV, three at 115 kV, and one at 230 kV; and a 230 kV interconnection with Georgia Power Company (a subsidiary of the Southern Company ("Southern")).

As shown in Table 1.1 (Schedule 1), 222 MW (net summer rating) of CC generation facility is located at the City's Sam O. Purdom Generating Station. The Arvah B. Hopkins Generating Station includes 300 MW (net summer rating) of CC generation and 92 MW (net summer rating) of CT generation facilities. The Substation 12 Distributed Generation Facility includes 18 MW (net summer rating) of RICE generation facilities. The CC and CT units can be fired on either natural gas or diesel oil but cannot burn these fuels concurrently. The RICE generators can only be fired on natural gas.

As of December 31, 2018 the City's total net summer installed generating capability is 632 MW. The corresponding winter net peak installed generating capability is 702 MW. Table 1.1 contains the details of the individual generating units.

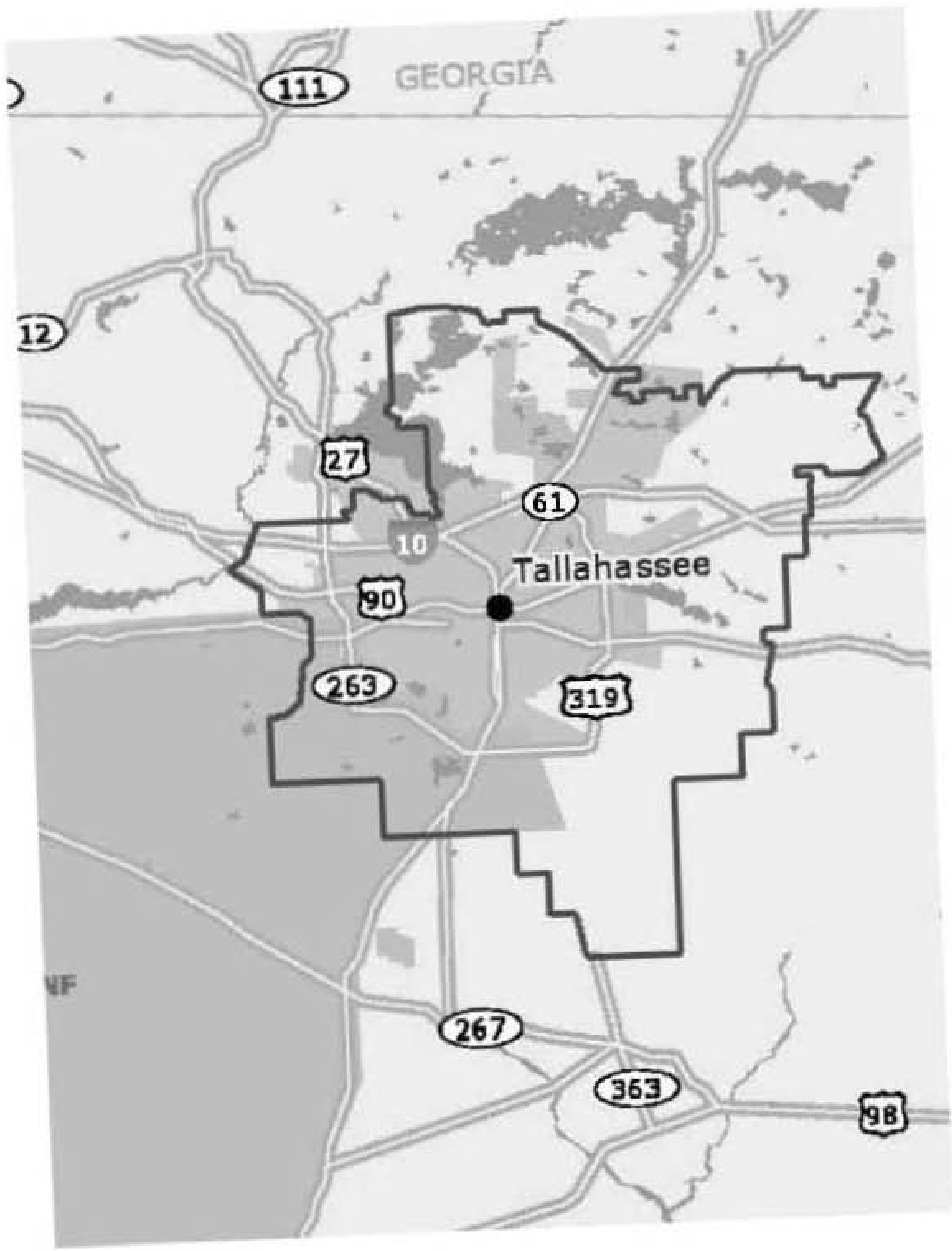
1.2 PURCHASED POWER AGREEMENTS

The City has no long-term firm wholesale capacity and energy purchase agreements. On July 24, 2016, the City executed a PPA for 20 MW_{ac} of non-firm solar PV with Origis Energy USA ("Origis"), doing business as FL Solar 1, LLC (Solar Farm 1). Solar Farm 1 is located adjacent to the Tallahassee International Airport and delivers power to City-owned distribution facility. The City declared commercial operations of the project on December 13, 2017. The City has entered into a second PPA with Origis for a 40 MW_{ac} facility (Solar Farm 2). Solar Farm 2 will also be located adjacent to the Tallahassee International Airport and will deliver power to the City-owned 230 kV transmission system. Solar Farm 2 is expected to be in commercial operation in late 2019 or early 2020.

Firm retail electric service is purchased from and provided by the Talquin Electric Cooperative ("Talquin") to City customers served by the Talquin electric system. Similarly, firm retail electric service is sold to and provided by the City to Talquin customers served by the City electric system. In accordance with their territorial agreement certain Talquin facilties within the geographic boundaries of the City electric system service territory will be transferred to the City over the coming years. It is anticipated that these transfers will soon be completed after which time some City customers will continue to be served via Talquin facilities. Reciprocal service will continue to be provided to all Talquin customers currently served by the City electric system and those served by the facilities to be transferred to the City who choose to retain Talquin as their electric service provider. Payments for electric service provided to and received from Talquin and the transfer of customers and electric facilities is governed by the territorial agreement between the City and Talquin.

City of Tallahassee, Electric Utility

Service Territory Map



City Of Tallahassee

Schedule 1
Existing Generating Facilities
As of December 31, 2018

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
								Alt.				Net Capability	
								Fuel	Commercial	Expected	Gen. Max.		
	Unit		Unit	Fuel		Fuel Transport		Days	In-Service	Retirement	Nameplate	Summer	Winter
Plant	No.	Location	Type	Primary	Alternate	Primary	Alternate	Use	Month/Year	Month/Year	(kW)	(MW)	(MW)
S. O. Purdom	8	Wakulla	CC	NG	FO2	PL	TK	[1, 2]	7/00	12/40	270,100	222	258 [6]
											Plant Total	222	258
A. B. Hopkins	2	Leon	CC	NG	FO2	PL	TK	[2]	6/08 [3]	Unknown	458,100 [4]	300	330 [6]
	GT-3		GT	NG	FO2	PL	TK	[2]	9/05	Unknown	60,500	46	48
	GT-4		GT	NG	FO2	PL	TK	[2]	11/05	Unknown	60,500	46	48
											Plant Total	392	426
Substation 12	IC-1	Leon	IC	NG	NA	PL	TK	NA	10/18	Unknown	9,400	9	9
	IC-2		IC	NG	NA	PL	TK	NA	10/18	Unknown	9,400	9	9
											Plant Total	18	18
C. H. Corn	1	Leon	HY	WAT	NA	WAT	NA	NA	9/85	2/19	4,440	0	0
Hydro Station	2		HY	WAT	NA	WAT	NA	NA	8/85	2/19	4,440	0	0
[5]	3		HY	WAT	NA	WAT	NA	NA	1/86	2/19	3,430	0	0
											Plant Total	0	0
									Total System Capacity as of December 31, 2018			632	702

Notes

[1] Due to the Purdom facility-wide emissions caps, utilization of liquid fuel at this facility is limited.

[2] The City maintains a minimum distillate fuel oil storage capacity sufficient to operate the Purdom plant approximately 9 days and the Hopkins plant and approximately 3 days at maximum output.

[3] Reflects the commercial operations date of Hopkins 2 repowered to a combined cycle generating unit with a new General Electric Frame 7A combustion turbine. The original commercial operations date of the existing steam turbine generator was October 1977.

[4] Hopkins 2 nameplate rating is the sum of the combustion turbine generator (CTG) nameplate rating of 198.9 MW and steam turbine generator (STG) nameplate rating of 259.2 MW. However, in the current 1x1 combined cycle (CC) configuration with supplemental duct firing the repowered STG's maximum output is steam limited to about 150 MW.

[5] Because the C. H. Corn hydroelectric generating units are effectively run-of-river (dependent upon rainfall, reservoir and downstream conditions), the City considers these units as "energy only" and not as dependable capacity for planning purposes.

[6] Summer and winter ratings are based on 95 ^{o}F and 29 ^{o}F ambient temperature, respectively.

CHAPTER II

Forecast of Energy/Demand Requirements and Fuel Utilization

2.0 INTRODUCTION

Chapter II includes the City's forecasts of demand and energy requirements, energy sources and fuel requirements. This chapter also explains the impacts attributable to the City's current Demand Side Management (DSM) plan. The City is not subject to the requirements of the Florida Energy Efficiency and Conservation Act (FEECA) and, therefore, the Florida Public Service Commission (FPSC) does not set numeric conservation goals for the City. However, the City expects to continue its commitment to the DSM programs that prove beneficial to the City's ratepayers.

2.1 SYSTEM DEMAND AND ENERGY REQUIREMENTS

Historical and forecast energy consumption and customer information are presented in Tables 2.1, 2.2 and 2.3 (Schedules 2.1, 2.2, and 2.3). Figure B1 shows the historical total energy sales and forecast energy sales by customer class. Figure B2 shows the percentage of energy sales by customer class (excluding the impacts of DSM) for the base year of 2019 and the horizon year of 2028. Tables 2.4 through 2.12 (Schedules 3.1.1 - 3.3.3) contain historical and base, high, and low forecasts of seasonal peak demands and net energy for load. Table 2.13 (Schedule 4) compares actual and two-year forecast peak demand and energy values by month for the 2018-2020 period.

2.1.1 SYSTEM LOAD AND ENERGY FORECASTS

The peak demand and energy forecasts contained in this plan are the results of the load and energy forecasting study performed by the City. The forecast is developed utilizing essentially the same methodology that the City first employed in 1980 that has since been updated and revised every one or two years. The methodology consists of a combination of multi-variable regression models and other models that utilize subjective escalation assumptions and known incremental additions. All models are based on detailed examination of the system's historical growth, usage patterns and population statistics. Several key regression formulas utilize econometric variables.

Table 2.14 lists the econometric-based regression forecasting models that are used as predictors. Note that the City uses regression models with the capability of separately predicting commercial customers and consumption by rate sub-class: general service non-demand (GS), general service demand (GSD), and general service large demand (GSLD). These, along with the residential class, represent the major classes of the City's electric customers. In addition to these customer class models, the City's forecasting methodology also incorporates into the demand and energy projections estimated reductions from interruptible and curtailable customers. The key explanatory variables used in each of the models are indicated by an "X" on the table.

Table 2.15 documents the City's internal and external sources for historical and forecast economic, weather and demographic data. These tables summarize the details of the models used to generate the system customer, consumption and seasonal peak load forecasts. In addition to those explanatory variables listed, a component is also included in the models that reflect the transfers of certain City and Talquin Electric Cooperative (Talquin) customers over the study period consistent with the territorial agreement negotiated between the City and Talquin and approved by the FPSC.

The customer models are used to predict the number of customers by customer class, some of which in turn serve as input into their respective customer class consumption models. The customer class consumption models are aggregated to form a total base system sales forecast. The effects of DSM programs and system losses are incorporated in this base forecast to produce the system net energy for load (NEL) requirements.

The seasonal peak demand forecasts are developed first by forecasting expected system load factor. Table 2.14 also shows the key explanatory variables used in developing the monthly load factor model. Based on the historical relationship of seasonal peaks to annual NEL, system load factors are projected separately relative to both summer and winter peak demand. The projected monthly load factors for January and August (the typical winter and summer peak demand months, respectively) are then multiplied by the forecast of NEL to obtain the summer and winter peak demand forecasts.

Some of the most significant input assumptions for the forecast are the incremental load modifications at Florida State University (FSU), Florida A&M University (FAMU), Tallahassee Memorial Hospital (TMH) and the State Capitol Center. These four customers represented approximately 17% of the City's 2018 energy sales. Their incremental additions are highly dependent upon annual economic and budget constraints, which would cause fluctuations in their demand projections if they were projected using a model. Therefore, each entity submits their proposed incremental additions/reductions to the City and these modifications are included as submitted in the load and energy forecast.

The rate of growth in residential and commercial customers is driven by the projected growth in Leon County population. While population growth projections decreased in the years immediately following the 2008-2009 recession the current projection shows a slightly higher growth in population versus last year. Leon County population is projected to grow from 2019-2038 at an average annual growth rate (AAGR) of 0.82%. This growth rate is below that for the state of Florida (~1.3%) but is higher than that for the United States (~0.6%).

Per customer demand and energy requirements have decreased in recent years and this trend is expected to continue. There are several reasons for this decrease including but not limited to the historical and expected future issuances of more stringent federal appliance and equipment efficiency standards and modifications to the State of Florida Energy Efficiency Code for Building Construction. It is also noteworthy that Florida has experienced a more pronounced decline in average usage than the rest of the U.S. and was one of the epicenters of the housing crisis. Anecdotal evidence suggests that a significant portion of homes in the City's service area have yet to be fully occupied and that, as a result, there may be some potential upside to average consumption as those homes are taken up by full-time residents. The City's energy efficiency and demand-side management (DSM) programs (discussed in Section 2.1.3) have also contributed to these decreases. The decreases in per customer residential and commercial demand and energy requirements are projected to somewhat offset the increased growth rate in residential and commercial customers. Therefore, it is not expected that base demand and energy growth will return to pre-recession levels in the near future.

The City believes that the routine update of forecast model inputs, coefficients and other minor model refinements continue to improve the accuracy of its forecast so that they are more consistent with the historical trend of growth in seasonal peak demand and energy consumption.

The changes made to the forecast models for load and energy requirements have resulted in 2019 base forecasts for annual total retail sales/net energy for load and seasonal peak demand forecasts that are slightly lower than previously projected.

2.1.2 LOAD FORECAST UNCERTAINTY & SENSITIVITIES

To provide a sound basis for planning, forecasts are derived from projections of the driving variables obtained from reputable sources. However, there is significant uncertainty in the future level of such variables. To the extent that economic, demographic, weather, or other conditions occur that are different from those assumed or provided, the actual load can be expected to vary from the forecast. For various purposes, it is important to understand the amount by which the forecast can be in error and the sources of error.

To capture this uncertainty, the City produces high and low range results that address potential variance in driving population and economic variables from the values assumed in the base case. The base case forecast relies on a set of assumptions about future population and economic activity in Leon County. However, such projections are unlikely to exactly match actual experience.

Population and economic uncertainty tends to result in a deviation from the trend over the long term. Accordingly, separate high and low forecast results were developed to address population and economic uncertainty. These ranges are intended to represent an 80% confidence interval, implying only a 10% chance each of being higher or lower than the resulting bounds. The high and low forecasts shown in this year's report were developed based on varied inputs of economic and demographic variables within the forecast models by the City's load forecasting consultant, nFront Consulting LLC, to capture approximately 80% of potential outcomes. These statistics were then applied to the base case to develop the high and low load forecasts presented in Tables 2.5, 2.6, 2.8, 2.9, 2.11 and 2.12 (Schedules 3.1.2, 3.1.3, 3.2.2, 3.2.3, 3.3.2 and 3.3.3).

Sensitivities on the peak demand forecasts are useful in planning for future power supply resource needs. The graph shown in Figure B3 compares summer peak demand (multiplied by 117% for reserve margin requirements) for the three forecast sensitivity cases with reductions from proposed DSM portfolio and the base forecast without proposed DSM reductions against the City's existing and planned power supply resources. This graph allows for the review of the effect of load growth and DSM performance variations on the timing of new resource additions. The highest probability weighting, of course, is placed on the base case assumptions, and the low and high cases are given a smaller likelihood of occurrence.

2.1.3 Energy Efficiency and Demand Side Management Programs

The City currently offers a variety of conservation and DSM measures to its residential and commercial customers, which are listed below:

Residential Measures	Commercial Measures
Energy Efficiency Loans	Energy Efficiency Loans
Gas New Construction Rebates	Demonstrations
Gas Appliance Conversion Rebates	Information and Energy Audits
Information and Energy Audits	Commercial Gas Conversion Rebates
Ceiling Insulation Grants	Ceiling Insulation Grants
Low Income Ceiling Insulation Grants	Solar Water Heater Rebates
Low Income HVAC/Water Heater Repair Grants	Solar PV Net Metering
Low Income Duct Leak Repair Grants	Demand Response (PeakSmart)
Neighborhood REACH Weatherization Assistance	
Energy Star Appliance Rebates	
High Efficiency HVAC Rebates	
Energy Star New Home Rebates	
Solar Water Heater Rebates	
Solar PV Net Metering	
Variable Speed Pool Pump Rebates	
Nights & Weekends Pricing Plan	

The City has a goal to improve the efficiency of customers' end-use of energy resources when such improvements provide a measurable economic and/or environmental benefit to the customers and the City utilities. During the City's last Integrated Resource Planning (IRP) Study completed in 2006 potential DSM measures (conservation, energy efficiency, load management, and demand response) were tested for cost-effectiveness utilizing an integrated approach that is based on projections of total achievable load and energy reductions and their associated annual costs developed specifically for the City. The measures were combined into bundles affecting similar end uses and /or having similar costs per kWh saved.

In 2012 the City contracted with a consultant to review its efforts with DSM and renewable resources with a focus on adjusting resource costs for which additional investment and overall market changes impacted the estimates used in the IRP Study. DSM and renewable resource alternatives were evaluated on a levelized cost basis and prioritized on geographic and demographic suitability, demand savings potential and cost. From this prioritized list the consultant identified a combination of DSM and renewable resources that could be cost-effectively placed into service by 2016. The total demand savings potential for the resources identified compared well with that identified in the IRP Study providing some assurance that the City's ongoing DSM and renewable efforts remained cost-effective.

In 2017 the City contracted with an engineering consultant to build upon the 2006 and 2012 studies and recommend DSM opportunities that are cost-effective alternatives to the City's evolving supply-side resources. The study concluded that many of the existing measures in the City's DSM program are cost-effective and several new measures related to demand response (DR) appear to be promising based on the benefit-cost evaluation. Battery storage and thermal storage do not appear to be cost-effective at this time, based on the high capital cost, but may be in the future combined with time-of-use rates with a large differential between the on-peak cost and off-peak cost. Storage may also serve as a means for mitigating the intermittency of solar PV and/or its non-coincidence with load requirements, particularly on sunny days with mild weather.

In 2018, the City entered into a multi-year contract for continued DR implementation to build on the City's PeakSmart program and expand it to residential and small commercial customers. The vendor team conducted a series of tests over the summer to demonstrate the potential of the new demand response optimization and management system (DROMS) and several WiFi-enabled thermostats. The City plans to continue its evaluation of the DR software platform and consider other controllable loads such as grid-interactive water heaters and battery energy storage systems before launching new program offerings. The balance of existing DSM programs, including energy audits, rebates, loans, outreach and education continue to be managed in-house by City staff.

As discussed in Section 2.1.1 the growth in customers and energy use has slowed in recent years due in part to the economic conditions observed during and following the 2008-2009 recession as well as due to changes in the federal appliance/equipment efficiency standards and state building efficiency code. It appears that many customers have taken steps on their own to reduce their energy use and costs in response to the changing economy - without taking advantage of the incentives provided through the City's DSM program – as well as in response to the aforementioned standards and code changes. These "free drivers" effectively reduce potential participation in the DSM program in the future. It is uncertain whether these customers' energy use reductions will persist beyond the economic recovery. In the meantime, however, demand and energy reductions achieved as a result of these voluntary customer actions as well as those achieved by customer participation in City-sponsored DSM measures appear to have had a considerable and lasting impact on forecasts of future demand and energy requirements.

Estimates of the actual demand and energy savings realized from 2007-2018 attributable to the City's DSM efforts are below those projected in the last IRP study. Due to reduced load and energy forecasts, the latest projections reflect a revised outlook for DSM needs over the coming years. Future DSM activities will be based in part on the recommendations in the 2017 DSM study. The City will provide further updates regarding progress with and any changes in future expectations of its DSM program in subsequent TYSP reports.

Energy and demand reductions attributable to the DSM portfolio have been incorporated into the future load and energy forecasts. Tables 2.16 and 2.17 display, respectively, the cumulative potential impacts of the proposed DSM portfolio on system annual energy and seasonal peak demand requirements. Based on the anticipated limits on annual control events it is expected that DR/DLC will be predominantly utilized in the summer months. Therefore, Tables 2.7-2.9 and 2.17 reflect no expected utilization of DR/DLC capability to reduce winter peak demand.

2.2 ENERGY SOURCES AND FUEL REQUIREMENTS

Tables 2.18 (Schedule 5), 2.19 (Schedule 6.1), and 2.20 (Schedule 6.2) present the projections of fuel requirements, energy sources by resource/fuel type in gigawatt-hours, and energy sources by resource/fuel type in percent, respectively, for the period 2019-2028. Figure B4 displays the percentage of energy by fuel type in 2019 and 2028.

The City's generation portfolio includes combustion turbine/combined cycle (CC), combustion turbine/simple cycle (CT), and reciprocating internal combustion engine (RICE or IC) generators. The City's CC and CT units are capable of generating energy using natural gas or distillate fuel oil. The RICE units utilize natural gas only. This mix of generation types coupled with purchase opportunities allows the City to satisfy total energy requirements while balancing the cost of power with the environmental quality of our community.

The projections of fuel requirements and energy sources are taken from the results of computer simulations using the ABB Portfolio Optimization production simulation model and are based on the resource plan described in Chapter III.

City Of Tallahassee

Schedule 2.1
History and Forecast of Energy Consumption and
Number of Customers by Customer Clas

Base Load Forecast

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Rural & Residential					Commercial		
Year	Population [1]	Members Per Household	(GWh) [2]	Average No. of Customers	Average kWh Consumption Per Customer	(GWh) [2]	Average No. of Customers	Average kWh Consumption Per Customer
2009	273,263	-	1,050	94,827	11,071	1,611	18,478	87,180
2010	275,986	-	1,136	95,268	11,928	1,618	18,426	87,812
2011	278,362	-	1,113	95,794	11,619	1,598	18,418	86,772
2012	283,808	-	1,021	96,479	10,586	1,572	18,445	85,235
2013	282,071	-	1,014	97,145	10,442	1,544	18,558	83,183
2014	284,053	-	1,089	97,985	11,119	1,548	18,723	82,690
2015	286,187	-	1,088	99,007	10,989	1,567	18,820	83,263
2016	287,822	-	1,080	100,003	10,801	1,559	19,002	82,065
2017	290,466	-	1,059	100,921	10,497	1,558	19,130	81,439
2018	292,245	-	1,122	102,395	10,962	1,552	19,282	80,506
2019	295,235	-	1,086	102,995	10,546	1,602	19,512	82,099
2020	298,237	-	1,085	104,122	10,421	1,618	19,698	82,143
2021	301,129	-	1,083	105,242	10,291	1,636	19,879	82,322
2022	304,032	-	1,080	106,341	10,155	1,655	20,048	82,549
2023	306,946	-	1,078	107,456	10,034	1,666	20,210	82,451
2024	309,871	-	1,079	108,603	9,935	1,678	20,365	82,394
2025	312,801	-	1,082	109,737	9,864	1,689	20,518	82,322
2026	315,513	-	1,085	110,816	9,793	1,700	20,665	82,261
2027	318,229	-	1,088	111,863	9,724	1,711	20,807	82,211
2028	320,944	-	1,091	112,910	9,664	1,722	20,946	82,192

[1] Population data represents Leon County population.
[2] Values include DSM Impacts.

City Of Tallahassee

Schedule 2.2
History and Forecast of Energy Consumption and Number of Customers by Customer Class

Base Load Forecast

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Industrial				Street & Highway Lighting (GWh) [2]	Other Sales to Public Authorities (GWh) [3]	Total Sales to Ultimate Consumers (GWh) [4]
Year	(GWh)	Average No. of Customers [1]	Average kWh Consumption Per Customer	Railroads and Railways (GWh)			
2009	-	-	-		0	2	2,663
2010	-	-	-		0	0	2,754
2011	-	-	-		0	(1)	2,710
2012	-	-	-		0	(7)	2,587
2013	-	-	-		0	(5)	2,553
2014	-	-	-		0	(7)	2,631
2015	-	-	-		0	1	2,656
2016	-	-	-		0	4	2,643
2017	-	-	-		0	17	2,634
2018	-	-	-		0	23	2,698
2019	-	-	-		0	24	2,712
2020	-	-	-		0	24	2,728
2021	-	-	-		0	24	2,744
2022	-	-	-		0	24	2,759
2023	-	-	-		0	24	2,769
2024	-	-	-		0	24	2,781
2025	-	-	-		0	24	2,796
2026	-	-	-		0	24	2,810
2027	-	-	-		0	24	2,823
2028	-	-	-		0	24	2,837

[1] Average end-of-month customers for the calendar year.
[2] As of 2007 Security Lights and Street & Highway Lighting use is included with Commercial on Schedule 2.1.
[3] Reflects net of Talquin sales (for Talquin customers served by the City) and Talquin purchases (for City customers served by Talquin).
[4] History is total sales to City customers. Forecast is sales served by City electric system. Values include DSM Impacts.

City Of Tallahassee

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

Base Load Forecast

(1)	(2)	(3)	(4)	(5)	(6)
Year	Sales for Resale (GWh)	Utility Use & Losses (GWh)	Net Energy for Load (GWh) [1]	Other Customers (Average No.)	Total No. of Customers [2]
2009	0	138	2,801	0	113,305
2010	0	177	2,931	0	113,693
2011	0	89	2,799	0	114,212
2012	0	124	2,710	0	114,924
2013	0	131	2,684	0	115,703
2014	0	121	2,751	0	116,708
2015	0	119	2,776	0	117,827
2016	0	135	2,779	0	119,005
2017	0	124	2,758	0	120,051
2018	0	123	2,820	0	121,677
2019	0	143	2,856	0	122,508
2020	0	151	2,878	0	123,821
2021	0	145	2,889	0	125,121
2022	0	146	2,905	0	126,389
2023	0	146	2,915	0	127,665
2024	0	154	2,935	0	128,968
2025	0	148	2,944	0	130,255
2026	0	148	2,958	0	131,482
2027	0	149	2,972	0	132,669
2028	0	157	2,994	0	133,856

[1] Reflects NEL served by City electric system. Values include DSM Impacts.
[2] Average number of customers for the calendar year.

History and Forecast Energy Consumption By Customer Class (Including DSM Impacts)

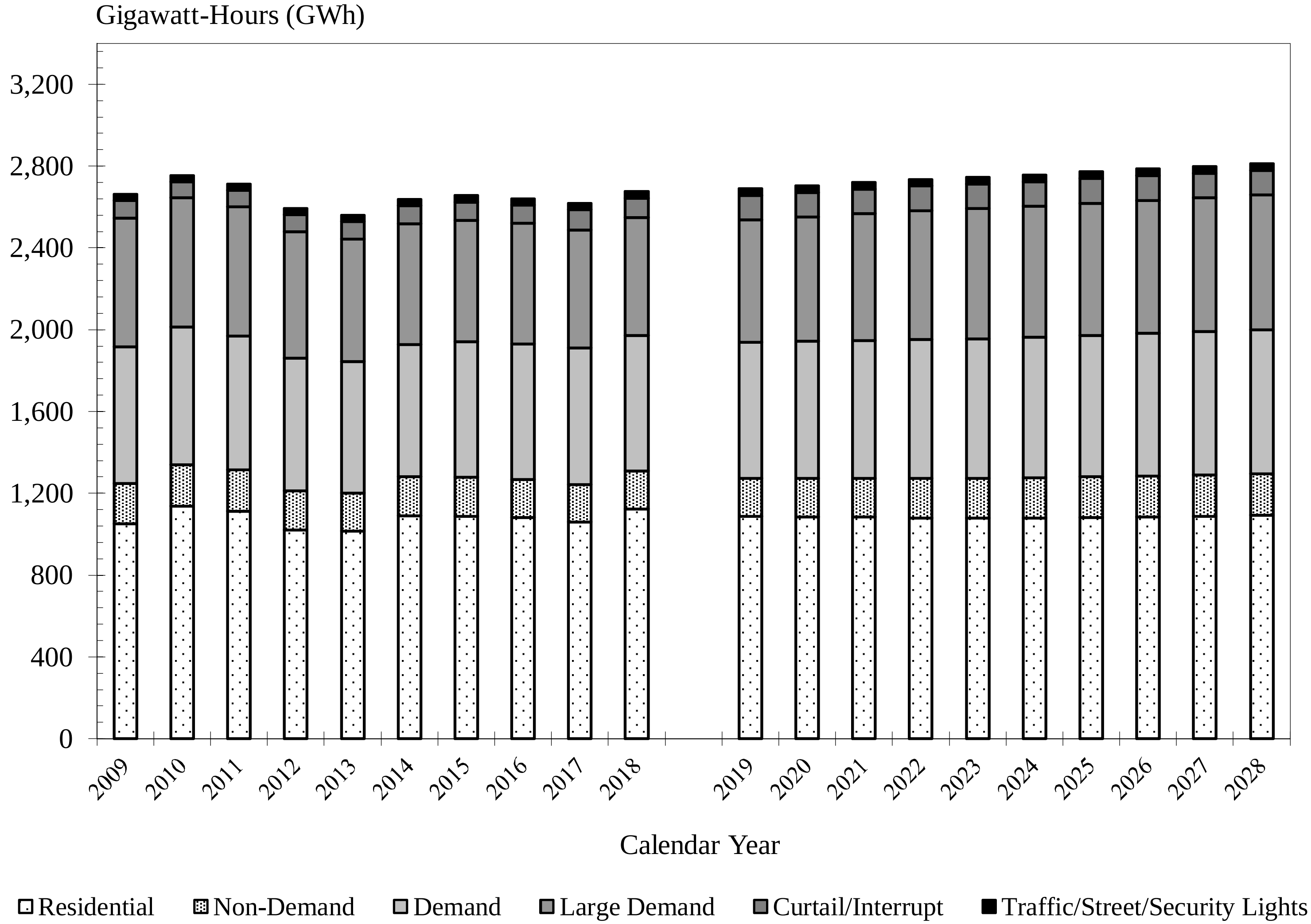
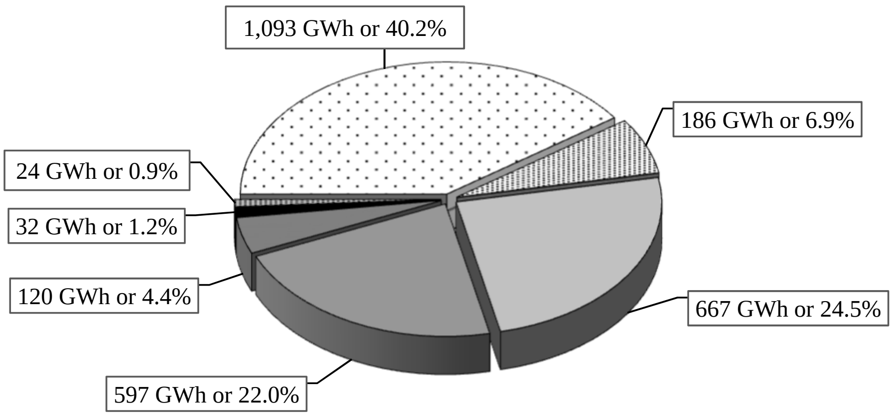


Figure B1

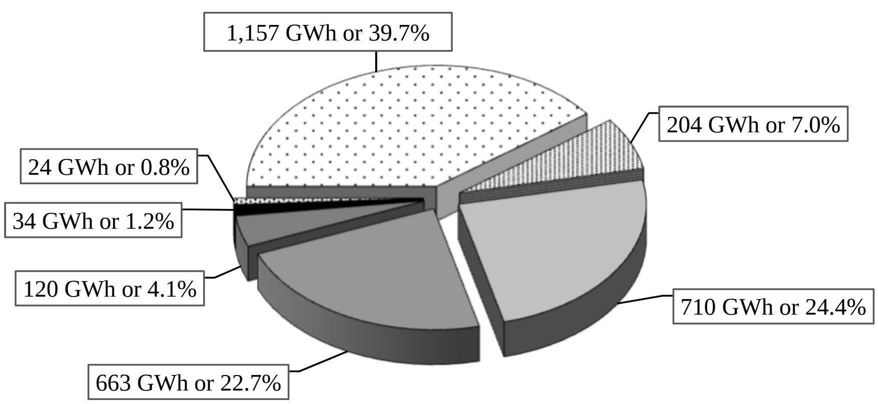
Energy Consumption By Customer Class (Excluding DSM Impacts)

Calendar Year 2019



2019 Total Sales = 2,720

Calendar Year 2028



2028 Total Sales = 2,913 GWh

Residential | Non-Demand | Demand
Large Demand | Curtail/Interrupt | Traffic/Street/Security Lights
Other Sales

City Of Tallahassee

Schedule 3.1.1
History and Forecast of Summer Peak Demand
Base Forecast
(MW)

(1) Year	(2) Total	(3) Wholesale	(4) Retail	(5) Interruptible	(6) Residential Load Management [2]	(7) Residential Conservation [2], [3]	(8) Comm./Ind Load Management [2]	(9) Comm./Ind Conservation [2], [3]	(10) Net Firm Demand [1]
2009	605		605						605
2010	601		601						601
2011	590		590						590
2012	557		557						557
2013	543		543						543
2014	565		565						565
2015	600		600						600
2016	597		597						597
2017	598		598						598
2018	597		597		0	1	0	0	596
2019	605		605		0	1	0	0	603
2020	610		610		1	3	2	1	604
2021	615		615		2	4	4	1	604
2022	621		621		4	5	6	2	604
2023	625		625		5	7	8	3	603
2024	631		631		7	8	9	3	603
2025	636		636		7	9	9	4	606
2026	639		639		7	10	10	5	608
2027	643		643		7	12	10	5	610
2028	648		648		7	13	10	6	612

[1] Values include DSM Impacts.
[2] Reduction estimated at busbar. 2018 DSM is actual at peak.
[3] 2018 values reflect incremental increase from 2017.

City Of Tallahassee

Schedule 3.1.2
History and Forecast of Summer Peak Demand
High Forecast
(MW)

(1) Year	(2) Total	(3) Wholesale	(4) Retail	(5) Interruptible	(6) Residential Load Management [2]	(7) Residential Conservation [2], [3]	(8) Comm./Ind Load Management [2]	(9) Comm./Ind Conservation [2], [3]	(10) Net Firm Demand [1]
2009	605		605						605
2010	601		601						601
2011	590		590						590
2012	557		557						557
2013	543		543						543
2014	565		565						565
2015	600		600						600
2016	597		597						597
2017	598		598						598
2018	597		597		0	1	0	0	596
2019	613		613		0	1	0	0	612
2020	626		626		1	3	2	1	620
2021	637		637		2	4	4	1	626
2022	648		648		4	5	6	2	631
2023	657		657		5	7	8	3	634
2024	665		665		7	8	9	3	638
2025	674		674		7	9	9	4	645
2026	682		682		7	10	10	5	651
2027	690		690		7	12	10	5	656
2028	698		698		7	13	10	6	662

[1] Values include DSM Impacts.
[2] Reduction estimated at busbar. 2018 DSM is actual at peak.
[3] 2018 values reflect incremental increase from 2017.

City Of Tallahassee

Schedule 3.1.3
History and Forecast of Summer Peak Demand
Low Forecast
(MW)

(1) Year	(2) Total	(3) Wholesale	(4) Retail	(5) Interruptible	(6) Residential Load Management [2]	(7) Residential Conservation [2], [3]	(8) Comm./Ind Load Management [2]	(9) Comm./Ind Conservation [2], [3]	(10) Net Firm Demand [1]
2009	605		605						605
2010	601		601						601
2011	590		590						590
2012	557		557						557
2013	543		543						543
2014	565		565						565
2015	600		600						600
2016	597		597						597
2017	598		598						598
2018	597		597		0	1	0	0	596
2019	597		597		0	1	0	0	595
2020	593		593		1	3	2	1	587
2021	593		593		2	4	4	1	582
2022	594		594		4	5	6	2	577
2023	594		594		5	7	8	3	572
2024	594		594		7	8	9	3	567
2025	595		595		7	9	9	4	566
2026	596		596		7	10	10	5	564
2027	596		596		7	12	10	5	563
2028	597		597		7	13	10	6	561

[1] Values include DSM Impacts.
[2] Reduction estimated at busbar. 2018 DSM is actual at peak.
[3] 2018 values reflect incremental increase from 2017.

City Of Tallahassee

Schedule 3.2.1
History and Forecast of Winter Peak Demand
Base Forecast
(MW)

(1) Year	(2) Total	(3) Wholesale	(4) Retail	(5) Interruptible	(6) Residential Load Management [2], [3]	(7) Residential Conservation [2], [4]	(8) Comm./Ind Load Management [2], [3]	(9) Comm./Ind Conservation [2], [4]	(10) Net Firm Demand [1]
2009 -2010	633		633						633
2010 -2011	584		584						584
2011 -2012	516		516						516
2012 -2013	480		480						480
2013 -2014	574		574						574
2014 -2015	556		556						556
2015 -2016	511		511						511
2016 -2017	533		533						533
2017 -2018	621		621						621
2018 -2019	509		509		0	1	0	0	508
2019 -2020	553		553		0	4	0	0	548
2020 -2021	558		558		0	7	0	1	551
2021 -2022	563		563		0	8	0	1	554
2022 -2023	568		568		0	10	0	2	555
2023 -2024	572		572		0	12	0	2	557
2024 -2025	575		575		0	14	0	2	559
2025 -2026	579		579		0	15	0	3	561
2026 -2027	583		583		0	17	0	3	563
2027 -2028	587		587		0	18	0	4	566
2028 -2029	591		591		0	18	0	4	569

[1] Values include DSM Impacts.
[2] Reduction estimated at busbar. 2018-2019 DSM is actual at peak.
[3] Reflects no expected utilization of demand response (DR) resources in winter.
[4] 2018-2019 values reflect incremental increase from 2017-2018.

City Of Tallahassee

Schedule 3.2.2
History and Forecast of Winter Peak Demand
High Forecast
(MW)

(1) Year	(2) Total	(3) Wholesale	(4) Retail	(5) Interruptible	(6) Residential Load Management [2], [3]	(7) Residential Conservation [2], [4]	(8) Comm./Ind Load Management [2], [3]	(9) Comm./Ind Conservation [2], [4]	(10) Net Firm Demand [1]
2009 -2010	633		633						633
2010 -2011	584		584						584
2011 -2012	516		516						516
2012 -2013	480		480						480
2013 -2014	574		574						574
2014 -2015	556		556						556
2015 -2016	511		511						511
2016 -2017	533		533						533
2017 -2018	621		621						621
2018 -2019	509		509		0	1	0	0	508
2019 -2020	565		565		0	4	0	0	560
2020 -2021	576		576		0	7	0	1	569
2021 -2022	586		586		0	8	0	1	577
2022 -2023	594		594		0	10	0	2	582
2023 -2024	602		602		0	12	0	2	588
2024 -2025	611		611		0	14	0	2	594
2025 -2026	618		618		0	15	0	3	600
2026 -2027	626		626		0	17	0	3	606
2027 -2028	633		633		0	18	0	4	612
2028 -2029	640		640		0	18	0	4	618

[1] Values include DSM Impacts.
[2] Reduction estimated at busbar. 2018-2019 DSM is actual at peak.
[3] Reflects no expected utilization of demand response (DR) resources in winter.
[4] 2018-2019 values reflect incremental increase from 2017-2018.

City Of Tallahassee

Schedule 3.2.3
History and Forecast of Winter Peak Demand
Low Forecast
(MW)

(1) Year	(2) Total	(3) Wholesale	(4) Retail	(5) Interruptible	(6) Residential Load Management [2], [3]	(7) Residential Conservation [2], [4]	(8) Comm./Ind Load Management [2], [3]	(9) Comm./Ind Conservation [2], [4]	(10) Net Firm Demand [1]
2009 -2010	633		633						633
2010 -2011	584		584						584
2011 -2012	516		516						516
2012 -2013	480		480						480
2013 -2014	574		574						574
2014 -2015	556		556						556
2015 -2016	511		511						511
2016 -2017	533		533						533
2017 -2018	621		621						621
2018 -2019	509		509		0	1	0	0	508
2019 -2020	541		541		0	4	0	0	536
2020 -2021	540		540		0	7	0	1	533
2021 -2022	540		540		0	8	0	1	531
2022 -2023	539		539		0	10	0	2	527
2023 -2024	539		539		0	12	0	2	525
2024 -2025	540		540		0	14	0	2	523
2025 -2026	540		540		0	15	0	3	522
2026 -2027	540		540		0	17	0	3	520
2027 -2028	541		541		0	18	0	4	519
2028 -2029	541		541		0	18	0	4	519

[1] Values include DSM Impacts.
[2] Reduction estimated at busbar. 2018-2019 DSM is actual at peak.
[3] Reflects no expected utilization of demand response (DR) resources in winter.
[4] 2018-2019 values reflect incremental increase from 2017-2018.

City Of Tallahassee

Schedule 3.3.1
History and Forecast of Annual Net Energy for Load
Base Forecast
(GWh)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Year	Total Sales	Residential Conservation [1]	Comm./Ind Conservation [1]	Retail Sales [2], [3]	Wholesale/ Other Sales [4]	Utility Use & Losses	Net Energy for Load [3], [5]	Load Factor % [3]
2009	2,661			2,661	2	138	2,801	53
2010	2,754			2,754	0	177	2,931	53
2011	2,711			2,711	(1)	89	2,799	54
2012	2,593			2,593	(7)	124	2,710	56
2013	2,558			2,558	(5)	131	2,684	56
2014	2,638			2,638	(7)	121	2,751	55
2015	2,655			2,655	1	119	2,776	53
2016	2,640			2,640	4	135	2,779	53
2017	2,617			2,617	17	124	2,758	53
2018	2,678	3	0	2,675	23	123	2,820	52
2019	2,695	7	1	2,688	24	143	2,856	54
2020	2,718	13	1	2,703	24	151	2,878	54
2021	2,744	21	3	2,720	24	145	2,889	55
2022	2,768	29	4	2,735	24	146	2,905	55
2023	2,787	37	5	2,745	24	146	2,915	55
2024	2,809	45	7	2,757	24	154	2,935	56
2025	2,830	51	7	2,772	24	148	2,944	55
2026	2,849	56	8	2,785	24	148	2,958	56
2027	2,869	62	9	2,798	24	149	2,972	56
2028	2,888	66	9	2,813	24	157	2,994	56

[1] Reduction estimated at customer meter. 2018 DSM is actual incremental increase from 2017.
[2] History is total sales to City customers. Forecast is sales served by City electric system.
[3] Values include DSM Impacts.
[4] Reflects net of Talquin sales (for Talquin customers served by the City) and Talquin purchases (for City customers served by Talquin).
[5] Reflects NEL served by City electric system.

City Of Tallahassee

Schedule 3.3.2
History and Forecast of Annual Net Energy for Load
High Forecast
(GWh)

(1) Year	(2) Total Sales	(3) Residential Conservation [1]	(4) Comm./Ind Conservation [1]	(5) Retail Sales [2], [3]	(6) Wholesale/ Other Sales [4]	(7) Utility Use & Losses	(8) Net Energy for Load [3], [5]	(9) Load Factor % [3]
2009	2,661			2,661	2	138	2,801	53
2010	2,754			2,754	0	177	2,931	53
2011	2,711			2,711	(1)	89	2,799	54
2012	2,593			2,593	(7)	124	2,710	56
2013	2,558			2,558	(5)	131	2,684	56
2014	2,638			2,638	(7)	121	2,751	55
2015	2,655			2,655	1	119	2,776	53
2016	2,640			2,640	4	135	2,779	53
2017	2,617			2,617	17	124	2,758	53
2018	2,678	3	0	2,675	23	123	2,820	52
2019	2,725	7	1	2,718	24	144	2,887	54
2020	2,788	13	1	2,773	24	154	2,952	54
2021	2,839	21	3	2,815	24	150	2,989	55
2022	2,886	29	4	2,853	24	152	3,029	55
2023	2,925	37	5	2,882	24	153	3,060	55
2024	2,965	45	7	2,913	24	162	3,100	55
2025	3,003	51	7	2,945	24	157	3,126	55
2026	3,040	56	8	2,976	24	158	3,159	55
2027	3,076	62	9	3,006	24	160	3,190	55
2028	3,112	66	9	3,036	24	169	3,229	56

[1] Reduction estimated at customer meter. 2018 DSM is actual incremental increase from 2017.
[2] History is total sales to City customers. Forecast is sales served by City electric system.
[3] Values include DSM Impacts.
[4] Reflects net of Talquin sales (for Talquin customers served by the City) and Talquin purchases (for City customers served by Talquin).
[5] Reflects NEL served by City electric system.

City Of Tallahassee

Schedule 3.3.3
History and Forecast of Annual Net Energy for Load
Low Forecast
(GWh)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Year	Total Sales	Residential Conservation [1]	Comm./Ind Conservation [1]	Retail Sales [2], [3]	Wholesale/ Other Sales [4]	Utility Use & Losses	Net Energy for Load [3], [5]	Load Factor % [3]
2009	2,661			2,661	2	138	2,801	53
2010	2,754			2,754	0	177	2,931	53
2011	2,711			2,711	(1)	89	2,799	54
2012	2,593			2,593	(7)	124	2,710	56
2013	2,558			2,558	(5)	131	2,684	56
2014	2,638			2,638	(7)	121	2,751	55
2015	2,655			2,655	1	119	2,776	53
2016	2,640			2,640	4	135	2,779	53
2017	2,617			2,617	17	124	2,758	53
2018	2,678	3	0	2,675	23	123	2,820	52
2019	2,665	7	1	2,658	24	142	2,824	54
2020	2,647	13	1	2,633	24	147	2,804	55
2021	2,647	21	3	2,623	24	140	2,787	55
2022	2,649	29	4	2,616	24	139	2,780	55
2023	2,648	37	5	2,605	24	139	2,769	55
2024	2,650	45	7	2,598	24	145	2,768	56
2025	2,653	51	7	2,595	24	138	2,758	56
2026	2,656	56	8	2,592	24	138	2,754	56
2027	2,658	62	9	2,588	24	138	2,750	56
2028	2,662	66	9	2,586	24	144	2,755	56

[1] Reduction estimated at customer meter. 2018 DSM is actual incremental increase from 2017.
[2] History is total sales to City customers. Forecast is sales served by City electric system.
[3] Values include DSM Impacts.
[4] Reflects net of Talquin sales (for Talquin customers served by the City) and Talquin purchases (for City customers served by Talquin).
[5] Reflects NEL served by City electric system.

City Of Tallahassee

Schedule 4
Previous Year and 2-Year Forecast of Retail Peak Demand and Net Energy for Load by Montl

(1)	(2)	(3)	(4)	(5)	(6)	(7)
	2018 Actual		**2019 Forecast [1][2]**		**2020 Forecast [1]**	
Month	Peak Demand (MW)	NEL (GWh)	Peak Demand (MW)	NEL (GWh)	Peak Demand (MW)	NEL (GWh)
January	621	257	546	234	548	235
February	433	183	501	208	500	216
March	416	201	443	208	445	209
April	390	198	430	208	432	209
May	494	242	526	248	530	250
June	596	269	563	266	566	267
July	560	278	573	282	575	284
August	558	277	603	294	604	296
September	581	278	547	259	550	261
October	507	225	461	221	464	223
November	457	202	452	208	455	210
December	505	209	461	218	463	219
TOTAL		2,820		2,856		2,878

[1] Peak Demand and NEL include DSM Impacts.
[2] Represents forecast values for 2019.

City of Tallahassee, Florida

2019 Electric System Load Forecast

Key Explanatory Variables

Ln. No.	Model Name	Leon County Population	Leon County Personal Income	Leon County Gross Product	Tallahassee Per Capita Taxable Sales	Residential Customers	Florida Mortgage Originations	Florida Home Vacancies	Energy Efficiency Standards	Price of Electricity	Cooling Degree Days [1]	Heating Degree Days [1]	Winter Peak and Prior Day HDD [1]	Summer Peak and Prior Day HDD [1]	Adjusted R-Squared [2]
1	Residential Customers	X					X	X							0.999
2	Residential Consumption				X	X			X	X	X	X			0.923
3	General Service Non-Demand Customers		X												0.998
4	General Service Demand Customers	X													0.990
5	General Service Non-Demand Consumption	X			X						X	X			0.928
6	General Service Demand Consumption	X									X				0.951
7	General Service Large Demand Consumption			X							X				0.897
8	Monthly Load Factor [3]										X	X	X	X	0.694

[1] The base from which monthly heating and cooling degree days (HDD/CDD, respectively) are computed is 65 degrees Fahrenheit (dF). Peak day HDD and CDD reflect differing bases. For winter peak HDD, the base is 55 degrees Fahrenheit (dF); for summer peak CDD, 70 dF.

[2] R-Squared, sometimes called the coefficient of determination, is a commonly used measure of goodness of fit of a linear model. If all observations fall on the model regression line, R Squared is 1. If there is no linear relationship between the dependent and independent variable, R Squared is 0. Adjusted R-Squared reflects a downward adjustment to penalize R-squared for the addition of regressors that do not contribute to the explanatory power of the model.

[3] As monthly load factor is essentially a stationary series, indicators of goodness of fit should be viewed differently. In combination with estimates of NEL, forecasted peak demands from this equation will have far better fit than the Adjusted R-Squared here indicates. The equation also includes daytype variables.

City of Tallahassee

2019 Electric System Load Forecast

Sources of Forecast Model Input Information

Energy Model Input Data	Source
1. Leon County Population	Bureau of Economic and Business Research Woods and Poole Economics
2. Leon County Personal Income	Woods and Poole Economics
3. Leon County Gross Product	Woods and Poole Economics
4. Cooling Degree Days	NOAA
5. Heating Degree Days	NOAA
6. AC Saturation Rate	Appliance Saturation Study; EIA
7. Heating Saturation Rate	Appliance Saturation Study; EIA
8. Real Tallahassee Taxable Sales	Florida Department of Revenue, CPI Woods and Poole Economics
9. Florida Population	Bureau of Economic and Business Research Woods and Poole Economics
10. Florida Home Vacancy Rate	U.S. Bureau of the Census
11. Florida Mortgage Originations	IHS Global Insight (now IHS Markit)
10. State Capitol Incremental	Department of Management Services
12. FSU Incremental Additions	FSU Planning Department
13. FAMU Incremental Additions	FAMU Planning Department
14. GSLD Incremental Additions	City Utility Services
15. Other Commercial Customers	City Utility Services
16. Tall. Memorial Curtailable	City Utility Services
17. System Peak Historical Data	City System Planning
18. Historical Customer Projections by Class	City Utility Services
19. Historical Customer Class Energy	City Utility Services
20. Interruptible, Traffic Light Sales, &	City Utility Services
21. Security Light Additions	
22. Residential/Commercial Real Price of Electricity	Calculated from Revenues, kWh sold and CPI per 2018 Annual Energy Outlook, FRCC Region

Banded Summer Peak Load Forecast Vs. Supply Resources (Load Includes 17% Reserve Margin)

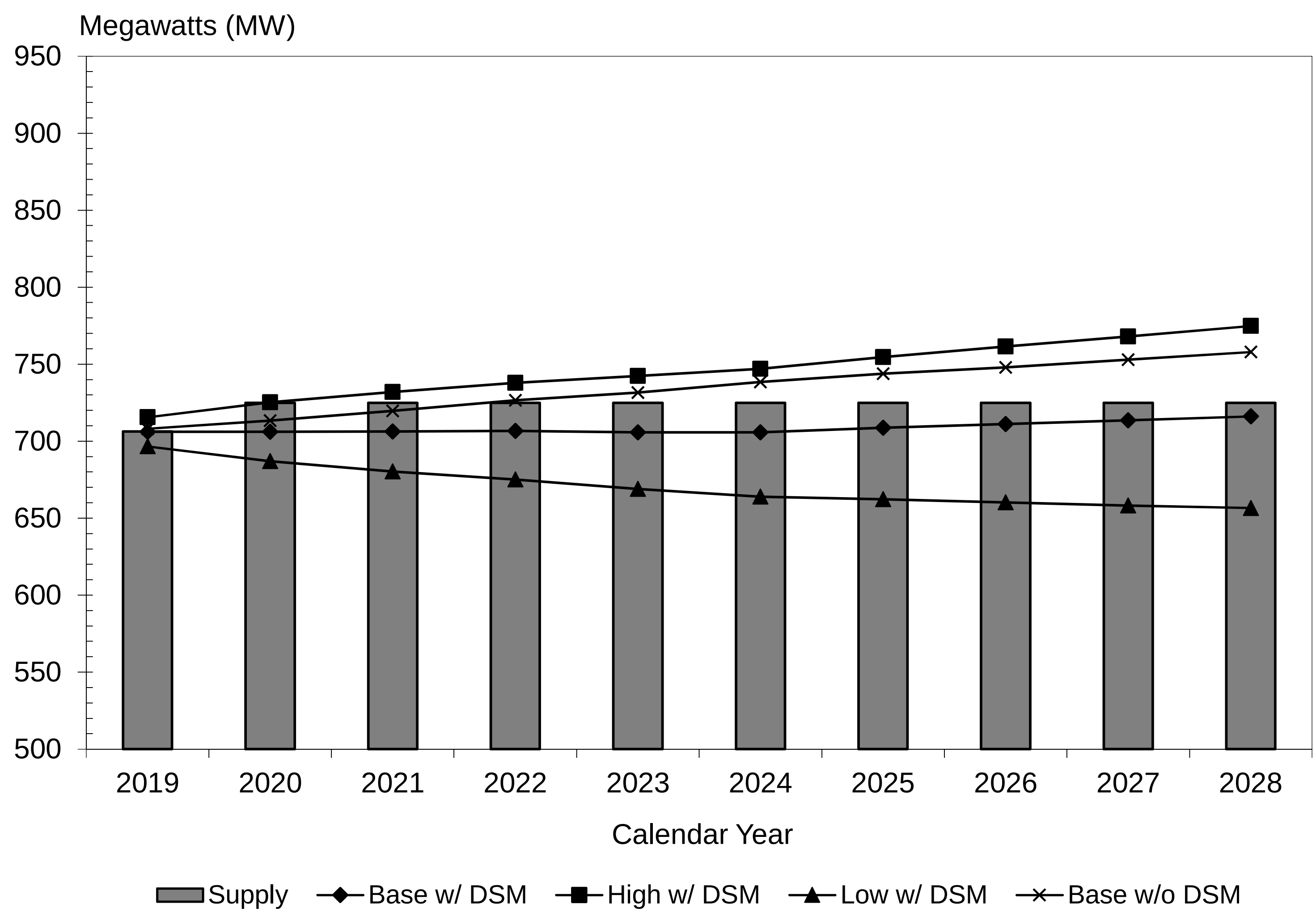


Figure B3

City Of Tallahassee

2019 Electric System Load Forecast

Projected Demand Side Management
Energy Reductions [1]

Calendar Year Basis

Year	Residential Impact (MWh)	Commercial Impact (MWh)	Total Impact (MWh)
2019	6,768	637	7,405
2020	13,392	1,437	14,829
2021	21,274	2,741	24,015
2022	28,952	4,024	32,976
2023	36,983	5,285	42,267
2024	45,402	6,508	51,910
2025	50,839	7,223	58,062
2026	56,237	7,917	64,154
2027	61,636	8,610	70,246
2028	66,256	9,209	75,465

[1] Reductions estimated at generator busbar.

City Of Tallahassee

2019 Electric System Load Forecast

Projected Demand Side Management
Seasonal Demand Reductions [1]

Year		Residential Energy Efficiency Impact		Commercial Energy Efficiency Impact		Residential Demand Response Impact		Commercial Demand Response Impact		Demand Side Management Total	
Summer	Winter	Summer (MW)	Winter (MW)	Summer (MW)	Winter (MW)	Summer (MW)	Winter [2] (MW)	Summer (MW)	Winter [2] (MW)	Summer (MW)	Winter (MW)
2019	2019-2020	1	4	0	0	0	0	0	0	2	5
2020	2020-2021	3	7	1	1	1	0	2	0	6	7
2021	2021-2022	4	8	1	1	2	0	4	0	12	10
2022	2022-2023	5	10	2	2	4	0	6	0	17	12
2023	2023-2024	7	12	3	2	5	0	8	0	22	14
2024	2024-2025	8	14	3	2	7	0	9	0	27	16
2025	2025-2026	9	15	4	3	7	0	9	0	29	18
2026	2026-2027	10	17	5	3	7	0	10	0	31	20
2027	2027-2028	12	18	5	4	7	0	10	0	34	21
2028	2028-2029	13	18	6	4	7	0	10	0	36	23

[1] Reductions estimated at busbar.

[2] Reflects no expected utilization of demand response (DR) resources in winter.

City Of Tallahassee

Schedule 5
Fuel Requirements

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Fuel Requirements		Units	Actual 2017	Actual 2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
(1)	Nuclear		Billion Btu	0	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	0
(3)	Residual	Total	1000 BBL	0	0	0	0	0	0	0	0	0	0	0	0
(4)		Steam	1000 BBL	0	0	0	0	0	0	0	0	0	0	0	0
(5)		CC	1000 BBL	0	0	0	0	0	0	0	0	0	0	0	0
(6)		CT	1000 BBL	0	0	0	0	0	0	0	0	0	0	0	0
(7)		Diesel	1000 BBL	0	0	0	0	0	0	0	0	0	0	0	0
(8)	Distillate	Total	1000 BBL	0	2	0	0	0	0	0	0	0	0	0	0
(9)		Steam	1000 BBL	0	0	0	0	0	0	0	0	0	0	0	0
(10)		CC	1000 BBL	0	0	0	0	0	0	0	0	0	0	0	0
(11)		CT	1000 BBL	0	2	0	0	0	0	0	0	0	0	0	0
(12)		Diesel	1000 BBL	0	0	0	0	0	0	0	0	0	0	0	0
(13)	Natural Gas	Total	1000 MCF	21,499	22,988	21,430	21,000	20,892	21,268	21,348	21,291	21,522	21,601	21,433	21,769
(14)		Steam	1000 MCF	2,180	2,345	0	0	0	0	0	0	0	0	0	0
(15)		CC	1000 MCF	17,673	18,576	20,514	19,679	19,375	20,412	20,411	19,757	20,545	20,610	19,696	20,407
(16)		CT	1000 MCF	1,646	2,068	915	1,322	1,517	856	937	1,534	976	991	1,737	1,362
(17)		Diesel	1000 MCF	0	0	0	0	0	0	0	0	0	0	0	0
(18)	Other (Specify)		Trillion Btu	0	0	0	0	0	0	0	0	0	0	0	0

City Of Tallahassee

Schedule 6.1
Energy Sources

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Energy Sources		Units	Actual 2017	Actual 2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
(1)	Annual Firm Interchange		GWh	0	0	7	5	8	2	4	7	2	2	8	2
(2)	Coal		GWh	0	0	0	0	0	0	0	0	0	0	0	0
(3)	Nuclear		GWh	0	0	0	0	0	0	0	0	0	0	0	0
(4)	Residual	Total	GWh	0	0	0	0	0	0	0	0	0	0	0	0
(5)		Steam	GWh	0	0	0	0	0	0	0	0	0	0	0	0
(6)		CC	GWh	0	0	0	0	0	0	0	0	0	0	0	0
(7)		CT	GWh	0	0	0	0	0	0	0	0	0	0	0	0
(8)		Diesel	GWh	0	0	0	0	0	0	0	0	0	0	0	0
(9)	Distillate	Total	GWh	0	1	0	0	0	0	0	0	0	0	0	0
(10)		Steam	GWh	0	0	0	0	0	0	0	0	0	0	0	0
(11)		CC	GWh	0	0	0	0	0	0	0	0	0	0	0	0
(12)		CT	GWh	0	1	0	0	0	0	0	0	0	0	0	0
(13)		Diesel	GWh	0	0	0	0	0	0	0	0	0	0	0	0
(14)	Natural Gas	Total	GWh	2635	2808	2,829	2,769	2,772	2,805	2,814	2,823	2,843	2,857	2,855	2,889
(15)		Steam	GWh	175	190	0	0	0	0	0	0	0	0	0	0
(16)		CC	GWh	2,298	2,411	2,718	2,609	2,586	2,699	2,699	2,635	2,723	2,735	2,643	2,722
(17)		CT	GWh	162	207	111	161	186	105	115	188	120	122	213	167
(18)		Diesel	GWh	0	0	0	0	0	0	0	0	0	0	0	0
(19)	Hydro		GWh	13	21	3	0	0	0	0	0	0	0	0	0
(20)	Economy Interchange[1]		GWh	110	(48)	(24)	(19)	(14)	(23)	(23)	(15)	(21)	(20)	(10)	(15)
(21)	Renewables		GWh	0	38	41	123	122	121	121	120	119	119	118	118
(22)	Net Energy for Load		GWh	2,758	2,820	2,856	2,878	2,889	2,905	2,915	2,935	2,944	2,958	2,972	2,994

[1] Negative values reflect expected need to sell off-peak power to satisfy generator minimum load requirements, primarily in winter and shoulder mont

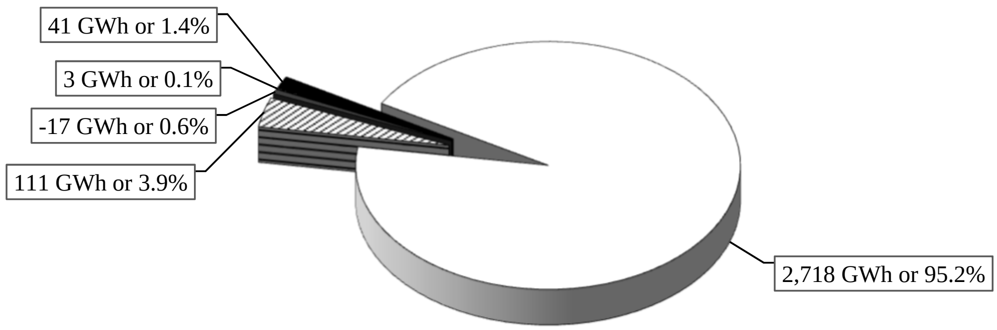
City Of Tallahassee

Schedule 6.2
Energy Sources

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Energy Sources		Units	Actual 2017	Actual 2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
(1)	Annual Firm Interchange		%	0.0	0.0	0.3	0.2	0.3	0.1	0.1	0.2	0.1	0.1	0.3	0.1
(2)	Coal		%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(3)	Nuclear		%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(4)	Residual	Total	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(5)		Steam	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(6)		CC	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(7)		CT	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(8)		Diesel	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(9)	Distillate	Total	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(10)		Steam	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(11)		CC	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(12)		CT	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(13)		Diesel	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(14)	Natural Gas	Total	%	95.5	99.6	99.1	96.2	96.0	96.5	96.5	96.2	96.6	96.6	96.1	96.5
(15)		Steam	%	6.4	6.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(16)		CC	%	83.3	85.5	95.2	90.6	89.5	92.9	92.6	89.8	92.5	92.5	88.9	90.9
(17)		CT	%	5.9	7.3	3.9	5.6	6.5	3.6	3.9	6.4	4.1	4.1	7.2	5.6
(18)		Diesel	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(19)	Hydro		%	0.5	0.8	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(20)	Economy Interchange		%	4.0	(1.7)	(0.9)	(0.6)	(0.5)	(0.8)	(0.8)	(0.5)	(0.7)	(0.7)	(0.3)	(0.5)
(21)	Renewables		%	0.0	1.3	1.4	4.3	4.2	4.2	4.1	4.1	4.1	4.0	4.0	3.9
(22)	Net Energy for Load		%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

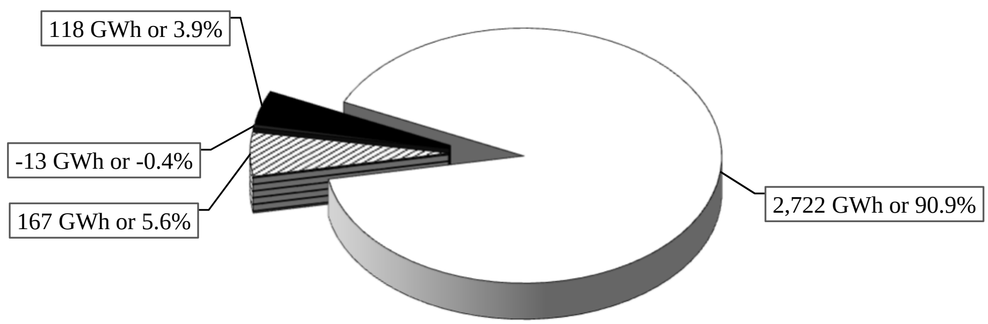
Generation By Resource/Fuel Type

Calendar Year 2019



2019 Total NEL = 2,856 GWh

Calendar Year 2028



2028 Total NEL = 2,994 GWh

CC-Gas	CT/Diesel-Gas	Net Interchange	Hydro	Renewables

Chapter III

Projected Facility Requirements

3.1 Planning Process

The City periodically reviews future DSM and power supply options that are consistent with the City's policy objectives. Included in these reviews are analyses of how the DSM and power supply alternatives perform under base and alternative assumptions. Revisions to the City's resource plan will be discussed in this chapter.

3.2 Projected Resource Requirements

3.2.1 Transmission Limitations

The City's projected transmission import and export capability continues to be a major determinant of the type and timing of future power supply resource additions. The City's internal transmission studies have reflected a gradual deterioration of the system's transmission import and export capability into the future, due to the expected configuration and use, both scheduled and unscheduled, of the City's transmission system and the surrounding regional transmission system. The City has worked with its neighboring utilities, Duke and Southern, to plan and maintain, at minimum, sufficient transmission import capability to allow the City to make emergency power purchases in the event of the most severe single contingency, the loss of the system's largest generating unit, and sufficient export capability to allow for the sale of incidental and/or economic excess local generation.

The prospects for significant expansion of the regional transmission system around Tallahassee hinges on the City's ongoing discussions with Duke and Southern, the Florida Reliability Coordinating Council's (FRCC) regional transmission planning process, and the evolving set of mandatory reliability standards issued by the North American Electric Reliability Corporation (NERC). However, no substantive improvements to the City's transmission import/export capability are expected absent the City's prospective purchase of transmission service. In consideration of the City's limited transmission import capability the results internal analysis of options tend to favor local generation alternatives as the means to satisfy future power supply requirements.

3.2.2 Reserve Requirements

For the purposes of this year's TYSP report the City uses a load reserve margin of 17% as its resource adequacy criterion. This margin was established in the 1990s then re-evaluated via a loss of load probability (LOLP) analysis of the City's system performed in 2002. The City periodically conducts probabilistic resource adequacy assessments to determine if conditions warrant a change to its resource adequacy criteria. The results of more recent analyses suggest that reserve margin may no longer be suitable as the City's sole resource adequacy criterion. This issue is discussed further in Section 3.2.4.

3.2.3 Recent and Near Term Resource Changes

Two generating unit retirements have taken place in the last year. Purdom CT 2 (10 MW summer net rating) and Hopkins Unit 1 (76 MW summer net rating) were retired in 2018. Both of these generating units were in excess of 40 years old. Expected future resource additions are discussed in Section 3.2.6, "Future Power Supply Resources".

In 2018, the City placed two 9.3 MW Wartsila natural gas-fired RICE generators into commercial operations at the its Substation 12. This substation has a single transmission feed. The addition of this generation at the substation will allow for back-up of critical community loads served from Substation 12 as well as provide additional generation resources to the system. Also in 2018, the City completed construction of four 18.6 MW Wartsila natural gas-fired RICE generators located at its Hopkins Generating Station. Three of these units were placed into commercial operations in February 2019 and the fourth unit is in the final stages of commissioning.

The RICE generators provide additional benefits including but not necessarily limited to:

- Multiple RICE generators provide greater dispatch flexibility.
- Additional RICE generators can be installed at either the City's Hopkins plant or split between the Hopkins plant and Purdom plant.
- The RICE generators are more efficient than the units that are being retired providing significant potential fuel savings.

- The RICE generators can be started and reach full load within 5-10 minutes. In addition, their output level can be changed very rapidly. This, coupled with the number and size of each unit, makes them excellent for responding to the changes in output from intermittent resources such as solar energy systems and may enable the addition of more solar resources in the future.
- The CO_2 emissions from the RICE generators are much lower than the units that have been retired.
- Hopkins Unit 1 had a minimum up time requirement of 100 hours. This at times required the unit to remain on line during daily off-peak periods when the unit's generation was not needed and/or represented excess generation that had to be sold, sometimes at a loss. Replacing Hopkins Unit 1 with the smaller, "quick start" RICE generators allows the City to avoid this uneconomic operating practice.
- By retiring Hopkins Unit 1 earlier and advancing the in-service dates of these RICE generators analyses indicated that some of the associated debt service would be offset by the fuel savings from the efficiency gains achieved.

The City has operated the C. H. Corn Hydroelectric facility located on Lake Talquin since 1985. This facility is an 11 MW run-of-river hydroelectric facility that is considered an energy only resource by the City. The facility is owned by the State of Florida and was leased to the City for the purpose of generating electricity. The facility operates under an operating license issued by the Federal Energy Regulatory Commission (FERC) that has a 2022 expiration date. Following a review of potential options for the facility, the City elected to not seek a renewal of the FERC license and seek an early surrender of the FERC operating license. In June of 2017, the City filed a surrender application with FERC and in December of 2018, FERC issued an order approving the decommissioning activities. All decommissioning activities have been completed and FERC issued a letter accepting the City's surrender of the operating license on March 13, 2019. Operational responsibility for the facility has now reverted to the State of Florida who will operate it to maintain Lake Talquin.

3.2.4 POWER SUPPLY DIVERSITY

Resource diversity, particularly with regard to fuels, has long been a priority concern for the City because of the system's heavy reliance on natural gas as its primary fuel source. This issue has received even greater emphasis due to the historical volatility in natural gas prices. The City has addressed this concern in part by implementing an Energy Risk Management (ERM) program to limit the City's exposure to energy price fluctuations. The ERM program established an organizational structure of interdepartmental committees and working groups and included the adoption of an Energy Risk Management Policy. This policy identifies acceptable risk mitigation products to prevent asset value losses, ensure price stability and provide protection against market volatility for fuels and energy to the City's electric and gas utilities and their customers.

Other important considerations in the City's planning process are the diversity of power supply resources in terms of their number, sizes and expected duty cycles as well as expected transmission import capabilities. To satisfy expected electric system requirements the City currently assesses the adequacy of its power supply resources versus the 17% load reserve margin criterion. But the evaluation of reserve margin is made only for the annual electric system peak demand and assuming all power supply resources are available. Resource adequacy must also be evaluated during other times of the year to determine if the City is maintaining the appropriate amount and mix of power supply resources.

Currently, about two-thirds of the City's power supply comes from two generating units, Purdom 8 and Hopkins 2. The outage of either of these units can present operational challenges especially when coupled with transmission limitations (as discussed in Section 3.2.1). Further, the replacement of older generating units has altered the number and sizes of power supply resources available to ensure resource adequacy throughout the reporting period. For these reasons the City has evaluated alternative and/or supplemental probabilistic metrics to its current load reserve margin criterion that may better balance resource adequacy and operational needs with utility and customer costs. The results of this evaluation confirmed that the City's current capacity mix and limited transmission import capability are the biggest determinants of the City's resource adequacy and suggest that there are risks of potential resource shortfalls during periods other than at the time of the system peak demand. Therefore, the City's current deterministic load reserve margin criterion may need to be increased and/or supplemented by a probabilistic criterion that takes these issues into consideration.

Purchase contracts can provide some of the diversity desired in the City's power supply resource portfolio. The City has evaluated both short and long-term purchased power options based on conventional sources as well as power offers based on renewable resources. The potential reliability and economic benefits of prospectively increasing the City's transmission import (and export) capabilities has also been evaluated. These evaluations indicate the potential for some electric reliability improvement resulting from the addition of facilities to achieve more transmission import capability. However, the study's model of the Southern and Florida markets reflects, as with the City's generation fleet, natural gas-fired generation on the margin the majority of the time. Therefore, the cost of increasing the City's transmission import capability would not likely be offset by the potential economic benefit from increased power purchase/sale opportunities.

As an additional strategy to address the City's lack of power supply diversity, planning staff has investigated options for a significantly enhanced DSM portfolio. Commitment to this expanded DSM effort (see Section 2.1.3) and an increase in customer-sited renewable energy projects (primarily solar photovoltaics) improve the City's overall resource diversity. However, due to limited availability and uncertain performance, past studies have indicated that traditional DSM and solar projects would not improve resource adequacy (as measured by loss of load expectation (LOLE)) as much as the addition of conventional generation resources.

3.2.5 RENEWABLE RESOURCES

The City believes that offering "green power" alternatives to its customers is a sound business strategy: it will provide for a measure of supply diversification, reduce dependence on fossil fuels, promote cleaner energy sources, and enhance the City's already strong commitment to protecting the environment and the quality of life in Tallahassee. The City continues to seek suitable projects that utilize the renewable fuels available within the Florida Big Bend and panhandle regions. As part of its continuing commitment to explore clean energy alternatives, the City has continued to invest in opportunities to develop viable solar photovoltaic (PV) projects as part of our efforts to offer "green power" to our customers.

On July 24, 2016, the City executed a PPA for 20 MW_{ac} of solar PV with Origis Energy USA ("Origis"), doing business as FL Solar 1 (Solar Farm 1). The project is located adjacent to the Tallahassee International Airport and delivers power to a City-owned distribution facility.

The City declared commercial operations of the project on December 13, 2017. In an effort to increase the use of renewables, the City has entered into a PPA with Origis for a second project with an output of 40 MW_{ac} (Solar Farm 2). Solar Farm 2 project will be sited on additional property adjacent to the Tallahassee International Airport and connected to the City's 230 kV transmission system. The projected commercial operations date for Solar Farm 2 is late 2019 or early 2020. Once in commercial operations, Solar Farm 2 will bring the City's total utility-scale solar capacity to 60 MW_{ac}.

One of the negatives of the having both projects located adjacent to each other is that both systems will likely experience cloud cover at the same time. Due to the intermittent nature of solar PV, the PPAs for both projects are for energy only and will not be considered firm capacity. Although there are potential impacts on service reliability associated with reliance on a significant amount of intermittent resources like PV on the City's relatively small electric system, the City will continue to monitor the proliferation of PV and other intermittent resources and work to integrate them so that service reliability is not jeopardized. The "quick start" capability of the reciprocating engine/generators commissioned in 2018 and expected in 2019 will help mitigate the intermittency of the solar resources while contributing to the ongoing modernization of the City's generation fleet.

As of the end of calendar year 2018 the City has a portfolio of 229 kW of solar PV operated and maintained by the Electric Utility and a cumulative total of 1,481 kW of solar PV has been installed by customers. The City promotes and encourages environmental responsibility in our community through a variety of programs available to citizens. The commitment to renewable energy sources (and particularly to solar PV) by its customers is made possible through the Go Green Tallahassee initiative, that includes many options related to becoming a greener community such as the City's Solar PV Net Metering offer. Solar PV Net Metering promotes customer investment in renewable energy generation by allowing residential and commercial customers with small to moderate sized PV installations to return excess generated power back to the City at the full retail value.

The City has commissioned a study to determine the impacts of additional intermittent renewable resources being added to the City's system. The study will determine the maximum expected intermittent resource penetration the system can handle without adversely impacting the reliability of the system from both a bulk power and distribution perspective. In addition, the study will identify potential system modifications that may be available to increase the amount of intermittent resources that can be reliably added to the system.

On February 20, 2019, the City Commission adopted a Clean Energy Plan (CEP) Resolution. The CEP resolution outlined the City's continued commitment to sustainability and established the following specific goals:

- All City facilities to be 100% renewable no later than 2035.
- All City main line buses to be 100% electric no later than 2035.
- All City light duty vehicles to be 100% electric no later than 2035
- All City medium and heavy duty vehciles converted to 100% electric as technology allows.
- No later than 2050, have the Tallahassee community at 100% renewable, including all forms of energy. This would include the electric utility, natural gas utility and transportation.

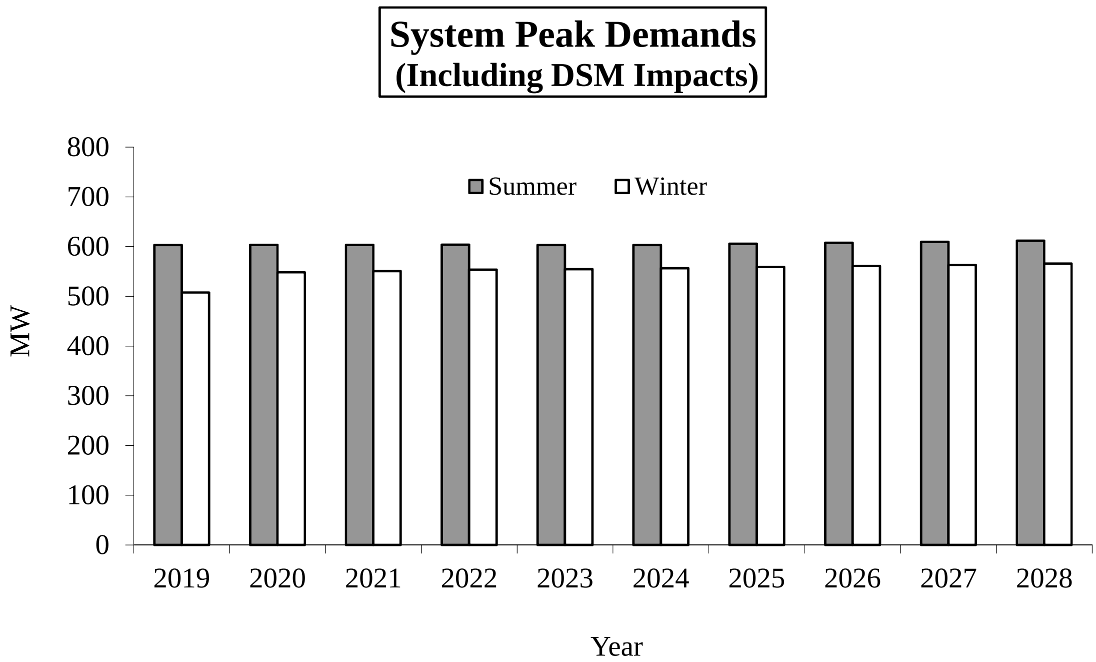
The City will be intiating an Energy Integrated Resource Planning (EIRP) process to identify the path forward to meet the 2050 100% renewable goal.

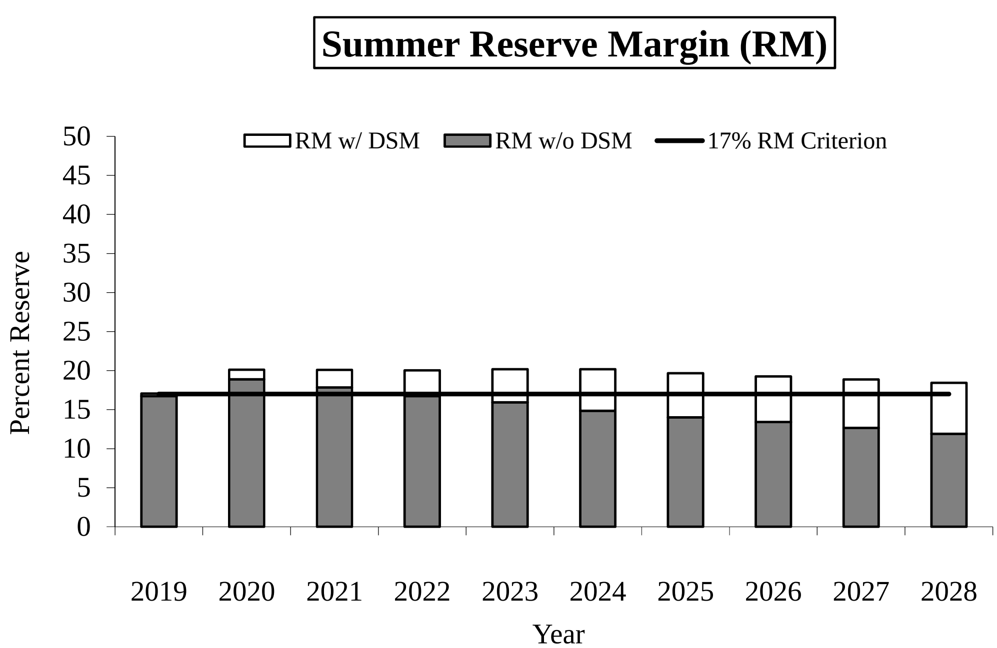
3.2.6 FUTURE POWER SUPPLY RESOURCES

The City's 2018 Ten Year Site Plan identified that additional power supply resources would be needed by the summer of 2025 to maintain electric system adequacy and reliability through the 2027 horizon year. In anticipation of this need and to take advantage of more favorable equipment pricing, in September 2018 the City Commission authorized a fifth 18.6 MW RICE generator to be located at the Hopkins Generating Station. Permitting is underway and the RICE unit is under contract. Commercial operations is expected by June 1, 2020.

The suitability of this resource plan is dependent on the performance of the City's DSM portfolio (described in Section 2.1.3 of this report) and the City's projected transmission import capability. If only 50% of the projected annual DSM peak demand reductions are achieved, the City would require about 15 MW of additional power supply resources to meet its load and planning reserve requirements through the horizon year of 2028. The City continues to monitor closely the performance of the DSM portfolio and, as mentioned in Section 2.1.3, will be revisiting and, where appropriate, updating assumptions regarding and re-evaluating cost-effectiveness of our current and prospective DSM measures. This will also allow a reassessment of expected demand and energy savings attributable to DSM.

Tables 3.1 and 3.2 (Schedules 7.1 and 7.2) provide information on the resources and reserve margins during the next ten years for the City's system. The City has specified its planned capacity changes on Table 3.3 (Schedule 8). These capacity resources have been incorporated into the City's dispatch simulation model in order to provide information related to fuel consumption and energy mix (see Tables 2.18, 2.19 and 2.20). Figure C compares seasonal net peak load and the system reserve margin based on summer peak load requirements. Table 3.4 provides the City's generation expansion plan for the period from 2019 through 2028.


System Peak Demands
(Including DSM Impacts)
Summer
Winter
MW
800
700
600
500
400
300
200
100
0
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
Year


Summer Reserve Margin (RM)
RM w/ DSM
RM w/o DSM
17% RM Criterion
Percent Reserve
50
45
40
35
30
25
20
15
10
5
0
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
Year

City Of Tallahassee

Schedule 7.1
Forecast of Capacity, Demand, and Scheduled Maintenance at Time of Summer Peak [1]

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Total Installed Capacity	Firm Capacity Import	Firm Capacity Export	QF	Total Capacity Available	System Firm Summer Peak Demand	Reserve Margin Before Maintenance		Scheduled Maintenance	Reserve Margin After Maintenance	
Year	(MW)	(MW)	(MW)	(MW)	(MW)	(MW)	(MW)	% of Peak	(MW)	(MW)	% of Peak
2019	706	0	0	0	706	603	103	17	0	103	17
2020	725	0	0	0	725	604	121	20	0	121	20
2021	725	0	0	0	725	604	121	20	0	121	20
2022	725	0	0	0	725	604	121	20	0	121	20
2023	725	0	0	0	725	603	122	20	0	122	20
2024	725	0	0	0	725	603	122	20	0	122	20
2025	725	0	0	0	725	606	119	20	0	119	20
2026	725	0	0	0	725	608	117	19	0	117	19
2027	725	0	0	0	725	610	115	19	0	115	19
2028	725	0	0	0	725	612	113	18	0	113	18

[1] All installed and firm import capacity changes are identified in the proposed generation expansion plan (Table 3.4).

City Of Tallahassee

Schedule 7.2
Forecast of Capacity, Demand, and Scheduled Maintenance at Time of Winter Peak [1]

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Total Installed Capacity	Firm Capacity Import	Firm Capacity Export	QF	Total Capacity Available	System Firm Winter Peak Demand	Reserve Margin Before Maintenance		Scheduled Maintenance	Reserve Margin After Maintenance	
Year	(MW)	(MW)	(MW)	(MW)	(MW)	(MW)	(MW)	% of Peak	(MW)	(MW)	% of Peak
2019/20	776	0	0	0	776	548	228	42	0	228	42
2020/21	795	0	0	0	795	551	244	44	0	244	44
2021/22	795	0	0	0	795	554	241	44	0	241	44
2022/23	795	0	0	0	795	555	240	43	0	240	43
2023/24	795	0	0	0	795	557	238	43	0	238	43
2024/25	795	0	0	0	795	559	236	42	0	236	42
2025/26	795	0	0	0	795	561	234	42	0	234	42
2026/27	795	0	0	0	795	563	232	41	0	232	41
2027/28	795	0	0	0	795	566	229	40	0	229	40
2028/29	795	0	0	0	795	569	226	40	0	226	40

[1] All installed and firm import capacity changes are identified in the proposed generation expansion plan (Table 3.4).

City Of Tallahassee

Schedule 8
Planned and Prospective Generating Facility Additions and Changes

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
								Const.	Commercial	Expected	Gen. Max.	Net Capability [1]		
	Unit		Unit	Fuel		Fuel Transportation		Start	In-Service	Retirement	Nameplate	Summer	Winter	
Plant Name	No.	Location	Type	Pri	Alt	Pri	Alt	Mo/Yr	Mo/Yr	Mo/Yr	(kW)	(MW)	(MW)	Status
Corn	1	Leon	HY	WAT	NA	WAT	NA	NA	9/85	2/19	4,440	0	0	RT
Corn	2	Leon	HY	WAT	NA	WAT	NA	NA	8/85	2/19	4,440	0	0	RT
Corn	3	Leon	HY	WAT	NA	WAT	NA	NA	1/86	2/19	3,430	0	0	RT
Hopkins	IC 2-4 [2]	Leon	IC	NG	NA	PL	NA	7/17	2/19	NA	18,759 [3]	55	55	OP
Hopkins	IC 1 [2]	Leon	IC	NG	NA	PL	NA	7/17	3/19	NA	18,759 [3]	18	18	TS
Hopkins	IC 5 [2]	Leon	IC	NG	NA	PL	NA	3/19	6/20	NA	18,759	18	18	P

[1] Because the C. H. Corn hydroelectric generating units are effectively run-of-river (dependent upon rainfall, reservoir and downstream conditions), the City considers these units as "energy only" and not as dependable capacity for planning purposes.

[2] As of December 31, 2018, the City had completed construction of four (4) 18.4 MW (summer net capability) reciprocating internal combustion engine (RICE) generating units at its existing Hopkins Plant site. Three of the four units were declared operational in February 2019 with the fourth expected to be declared operational in March 2019. The City has committed to a fifth 18.4 MW RICE generating unit also to be located at its existing Hopkins Plant site and expected to be in service by June 2020.

[3] Nameplate values are for each individual unit. Net capabilities are totals for units added at each site.

City Of Tallahassee

Generation Expansion Plan

	Load Forecast & Adjustments								
Year	Forecast Peak Demand (MW)	DSM [1] (MW)	Net Peak Demand (MW)	Existing Capacity Net (MW)	Firm Imports (MW)	Firm Exports (MW)	Resource Additions (Cumulative) (MW) [2]	Total Capacity (MW)	Res %
2019	605	2	603	632	0	0	74	706	17
2020	610	6	604	632	0	0	92	725	20
2021	615	12	604	632	0	0	92	725	20
2022	621	17	604	632	0	0	92	725	20
2023	625	22	603	632	0	0	92	725	20
2024	631	27	603	632	0	0	92	725	20
2025	636	29	606	632	0	0	92	725	20
2026	639	31	608	632	0	0	92	725	19
2027	643	34	610	632	0	0	92	725	19
2028	648	36	612	632	0	0	92	725	18

Notes

[1] Demand Side Management includes energy efficiency and demand response/control measures.

[2] As of December 31, 2018, the City had completed construction of four (4) 18.4 MW (summer net capability) reciprocating internal combustion engine (RICE) generating units at its existing Hopkins Plant site. Three of the four units were declared operational in February 2019 with the fourth expected to be declared operational in March 2019. The City has committed to a fifth 18.4 MW RICE generating unit also to be located at its existing Hopkins Plant site and expected to be in service by June 2020.

This page intentionally left blank.

Chapter IV

Proposed Plant Sites and Transmission Lines

4.1 PROPOSED PLANT SITE

Planned power supply resource additions required to meet future system needs are discussed in Chapter 3. The status and specifications for these planned power supply resource are provided Tables 4.1 and 4.2. The timing, site, type and size of any additional power supply resource requirements may vary as the nature of future needs become better defined.

4.2 TRANSMISSION LINE ADDITIONS/UPGRADES

Internal studies of the transmission system have identified a number of system improvements and additions that will be required to reliably serve future load. These improvements are planned for the City's 115 kV transmission network.

As discussed in Section 3.2, the City has been working with its neighboring utilities, Duke and Southern, to identify improvements to assure the continued reliability and commercial viability of the transmission systems in and around Tallahassee. At a minimum, the City attempts to plan for and maintain sufficient transmission import capability to allow for emergency power purchases in the event of the most severe single contingency, the loss of the system's largest generating unit. The City's internal transmission studies have reflected a gradual deterioration of the system's transmission import (and export) capability into the future. This reduction in capability is driven by the expected configuration and use, both scheduled and unscheduled, of facilities in the panhandle region as well as in the City's transmission system. The City is committed to continue to work with Duke and Southern as well as existing and prospective regulatory bodies in an effort to pursue improvements to the regional transmission systems that will allow the City to continue to provide reliable and affordable electric service to the citizens of Tallahassee in the future. The City will provide the FPSC with information regarding any such improvements as it becomes available.

The City has recently been notified by Gulf Power Company (Gulf) that they are in the routing and design phase for a potential transmission line to directly connect the Gulf and Florida Power & Light (FPL) service territories. This 176-mile line is expected to run from Gulf's Sinai Cemetery Substation in Jackson County to FPL's Raven Substation in Columbia County and pass through the City of Tallahassee's service territory. Gulf has requested the City's consideration of co-location of this new transmission line within the City's existing transmission corridors for 14 miles of the line. The City is currently studying what, if any, impacts this transmission line will have on its operations, including impacts on the ability to import and/or export power and access to the Southern/Florida interface.

Beyond assessing import and export capability, the City also conducts annual studies of its transmission system to identify further improvements and expansions to provide increased reliability and respond more effectively to certain critical contingencies both on the system and in the surrounding grid in the panhandle. These evaluations have indicated that additional infrastructure projects may be needed to address improvements in capability to deliver power from the Purdom Plant to the load center under certain contingencies.

The City's current transmission expansion plan includes a substation addition and 115 kV line reconductoring to ensure continued reliable service consistent with current and anticipated FERC and NERC requirements. Table 4.3 summarizes the proposed new facilities or improvements from the transmission planning study that are within this Ten Year Site Plan reporting period.

The City's budget planning cycle for FY 2020 is currently ongoing, and any revisions to project budgets in the electric utility will not be finalized until the summer of 2019. If any planned improvements do not remain on schedule the City will prepare operating solutions to mitigate adverse system conditions that might occur as a result of the delay in the in-service date of these improvements.

City Of Tallahassee

Schedule 9
Status Report and Specifications of Proposed Generating Facilities

(1)	Plant Name and Unit Number:	Hopkins IC 1-4	
(2)	Capacity		
	a.) Summer:	18.492	[1]
	b.) Winter:	18.492	[1]
(3)	Technology Type:	IC	
(4)	Anticipated Construction Timing		
	a.) Field Construction start - date:	Sep-17	
	b.) Commercial in-service date:	Feb-19, Mar-19	[1]
(5)	Fuel		
	a.) Primary fuel:	NG	
	b.) Alternate fuel:		
(6)	Air Pollution Control Strategy:	BACT compliant	
(7)	Cooling Status:	Radiators	
(8)	Total Site Area:	1.8 acres	[2]
(9)	Construction Status:	Completed	
(10)	Certification Status:	In Progress	
(11)	Status with Federal Agencies:	All Permits Received	
(12)	Projected Unit Performance Data		
	Planned Outage Factor (POF):	2.06	
	Forced Outage Factor (FOF):	1.68	
	Equivalent Availability Factor (EAF):	93.87	
	Resulting Capacity Factor (%):	16.9	[3]
	Average Net Operating Heat Rate (ANOHR):	8,136	[4]
(13)	Projected Unit Financial Data		
	Book Life (Years)	30	
	Total Installed Cost (In-Service Year $/kW)	1,711	[5]
	Direct Construction Cost ($/kW):	1,711	[6]
	AFUDC Amount ($/kW):	NA	
	Escalation ($/kW):	0	
	Fixed O & M ($kW-Yr):	33.93	[6]
	Variable O & M ($/MWH):	10.63	[6]
	K Factor:	NA	

Notes

[1] As of December 31, 2018, the City had completed construction of four (4) 18.4 MW (summer net capability) reciprocating internal combustion engine (RICE) generating units at its existing Hopkins Plant site. Three of the four units were declared operational in February 2019 with the fourth expected to be declared operational in March 2019.

[2] Approximate total site area for Hopkins IC 1-5.

[3] Expected 2020 capacity factor for the Hopkins IC 1-4 additions.

[4] Expected 2020 net average heat rate for the Hopkins IC 1-4 additions.

[5] Estimated 2019 dollars for the Hopkins IC 1-4 additions.

[6] Estimated 2019 dollars.

City Of Tallahassee

Schedule 9
Status Report and Specifications of Proposed Generating Facilities

(1)	Plant Name and Unit Number:	Hopkins IC 5	[1]
(2)	Capacity		
	a.) Summer:	18.492	
	b.) Winter:	18.492	
(3)	Technology Type:	IC	
(4)	Anticipated Construction Timing		
	a.) Field Construction start - date:	Mar-19	
	b.) Commercial in-service date:	Jun-20	
(5)	Fuel		
	a.) Primary fuel:	NG	
	b.) Alternate fuel:		
(6)	Air Pollution Control Strategy:	BACT compliant	
(7)	Cooling Status:	Radiators	
(8)	Total Site Area:	1.8 acres	[2]
(9)	Construction Status:	Not started	
(10)	Certification Status:	Not started	
(11)	Status with Federal Agencies:	Not started	
(12)	Projected Unit Performance Data		
	Planned Outage Factor (POF):	2.06	
	Forced Outage Factor (FOF):	1.68	
	Equivalent Availability Factor (EAF):	93.87	
	Resulting Capacity Factor (%):	18.8	[3]
	Average Net Operating Heat Rate (ANOHR):	8,137	[4]
(13)	Projected Unit Financial Data		
	Book Life (Years)	30	
	Total Installed Cost (In-Service Year $/kW)	2,034	[5]
	Direct Construction Cost ($/kW):	1,711	[6]
	AFUDC Amount ($/kW):	NA	
	Escalation ($/kW):	323	
	Fixed O & M ($kW-Yr):	33.93	[6]
	Variable O & M ($/MWH):	10.63	[6]
	K Factor:	NA	

Notes

[1] The City has committed to a fifth 18.4 MW RICE generating unit also to be located at its existing Hopkins Plant site and expected to be in service by June 2020.

[2] Approximate total site area for Hopkins IC 1-5.

[3] Expected 2021 capacity factor for the Hopkins IC 5 addition.

[4] Expected 2021 net average heat rate for the Hopkins IC 5 addition.

[5] Estimated 2020 dollars for the Hopkins IC 5 addition.

[6] Estimated 2019 dollars.

Figure D-1 – Hopkins Plant Site

Figure D-2 – Purdom Plant Site

City Of Tallahassee

Planned Transmission Projects, 2019-2028

		From Bus		To Bus		Expected		Line
Project Type	Project Name	Name	Number	Name	Number	In-Service Date	Voltage (kV)	Length (miles)
Substations	Sub 34 (Bus 7534)	NA	NA	NA	NA	11/1/19	230	NA
Reconductor	Line 3B Reconductor	Sub 11	7511	Sub 31	7531	12/31/22	115	2.17
Substations	Sub 22 (Bus 7522)	NA	NA	NA	NA	[1]	115	NA

[1] The need for this project is dependent on the timing of new construction in the service area for the City's existing temporary Substation 16 for which Substation 22 is intended to serve as a replacement. It is not currently anticipated that Substation 22 will be placed into service within the next five years. The City will provide an update on the status of this project in its 2020 Ten Year Site Plan report.

City Of Tallahassee

Schedule 10
Status Report and Specifications of Proposed
Directly Associated Transmission Lines

(1)	Point of Origin and Termination:	No facility additions or improvements to report at this time.
(2)	Number of Lines:	
(3)	Right-of -Way:	
(4)	Line Length:	
(5)	Voltage:	
(6)	Anticipated Capital Timing:	
(7)	Anticipated Capital Investment:	
(8)	Substations:	
(9)	Participation with Other Utilities:	

This page intentionally left blank.