Photo: Solar Farm 4

City of Tallahassee Utilities
Ten Year Site Plan

Report prepared by: City of Tallahassee Electric System Integrated Planning

CITY OF TALLAHASSEE
TEN YEAR SITE PLAN FOR ELECTRICAL GENERATING FACILITIES AND ASSOCIATED TRANSMISSION LINES
2020-2029
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Cover photo: Solar Farm 4, located adjacent to the Tallahassee International Airport, is the world's largest airport-based solar facility

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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 123,500 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 706 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.

1.1 SYSTEM CAPABILITY

The City maintains four points of interconnection with Duke Energy Florida ("Duke", formerly Progress Energy Florida); one at 69 kV, two 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, 92 MW (net summer rating) of CT generation facilities and 74 MW (net summer rating) of RICE generation facilities. A fifth 18 MW RICE generator is expected to be placed into service at Hopkins in

April 2020. 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, 2019 the City's total net summer installed generating capability is 706 MW. The corresponding winter net peak installed generating capability is 776 MW. Table 1.1 contains the details of the individual generating units.

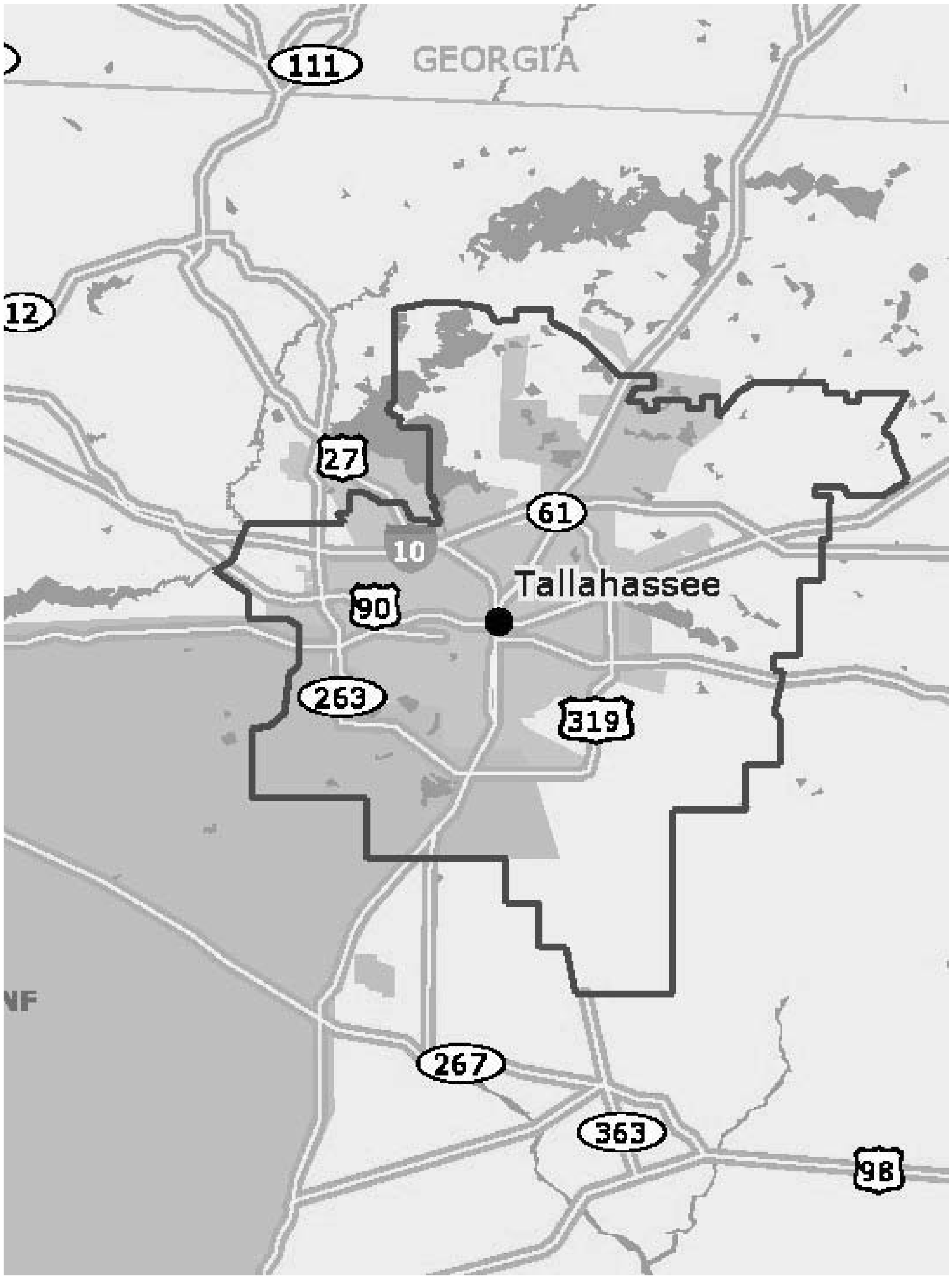
1.2 PURCHASED POWER AGREEMENTS

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 also entered into a second PPA with Origis (dba FL Solar 4, LLC) for a 42 MW_{ac} non-firm solar PV facility (Solar Farm 4). Solar Farm 4 is also located adjacent to the Tallahassee International Airport and interconnected with the City-owned 230 kV transmission system. Solar Farm 4, which is the world's largest airport-based solar facility, was placed into commercial operation on December 26, 2019.

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, 2019

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	
				Fuel		Fuel Transport		Alt. Fuel Days	Commercial In-Service	Expected Retirement	Gen. Max. Nameplate	Net Capability		
Plant	Unit No.	Location	Unit Type	Primary	Alternate	Primary	Alternate	Use	Month/Year	Month/Year	(kW)	Summer (MW)	Winter (MW)	
S. O. Purdom	8	Wakulla	CC	NG	FO2	PL	TK	[1, 2]	7/00	12/40	270,100	222	258	[5]
											Plant Total	222	258	
A. B. Hopkins	2	Leon	CC	NG	FO2	PL	TK	[2]	6/08 [3]	Unknown	458,100 [4]	300	330	[5]
	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	
	IC-1		IC	NG	NA	PL	NA		3/19	Unknown	18,700	18	18	
	IC-2		IC	NG	NA	PL	NA		2/19	Unknown	18,700	18	18	
	IC-3		IC	NG	NA	PL	NA		2/19	Unknown	18,700	18	18	
	IC-4		IC	NG	NA	PL	NA		2/19	Unknown	18,700	18	18	
											Plant Total	466	500	
Substation 12	IC-1	Leon	IC	NG	NA	PL	NA		10/18	Unknown	9,400	9	9	
	IC-2		IC	NG	NA	PL	NA		10/18	Unknown	9,400	9	9	
											Plant Total	18	18	
									Total System Capacity as of December 31, 2019			706	776	

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] Summer and winter ratings are based on 95 °F and 29 °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 2020 and the horizon year of 2029. 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 2019-2021 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 account for a significant percentage of the City's total annual 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 2020-2039 at an average annual growth rate (AAGR) of 0.68%. This growth rate is below that for the state of Florida (~1.1%) but is slightly higher than that for the United States (~0.64%).

Per customer demand and energy requirements have decreased in recent years and this trend is expected to continue in the near future. 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. And the Clean Energy Plan resolution signed in 2019 (discussed later in this chapter and further in Chapter III) promotes electrification which may further offset the observed decrease in demand and energy per customer as down the road. Therefore, it is not currently clear if/when expected that base demand and energy growth might 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:

<u>Residential Measures</u>

Energy Efficiency Loans
Gas New Construction Rebates
Gas Appliance Conversion Rebates
Information and Energy Audits
Ceiling Insulation Grants
Low Income Ceiling Insulation Grants
Low Income HVAC/Water Heater Repair Grants
Low Income Duct Leak Repair Grants
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
Smart Thermostat Rebate

<u>Commercial Measures</u>

Energy Efficiency Loans
Demonstrations
Information and Energy Audits
Commercial Gas Conversion Rebates
Ceiling Insulation Grants
Solar Water Heater Rebates
Solar PV Net Metering

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. Based on initial findings, the City launched the Smart Thermostat Rebate program in 2019, providing incentives for electric customers to purchase and install eligible WiFi-enable thermostats. Additional program offerings will be evaluated. 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 2007-2019 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 has adopted a Clean Energy Plan resolution with the goal to achieve 100% renewable by 2050. This will likely impact the City's DSM programs and offerings. 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 2020-2029. Figure B4 displays the percentage of energy by fuel type in 2020 and 2029.

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 Class

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
2010	276,000	-	1,136	95,268	11,928	1,618	18,426	87,812
2011	278,300	-	1,113	95,794	11,619	1,598	18,418	86,772
2012	283,600	-	1,021	96,479	10,586	1,572	18,445	85,240
2013	281,900	-	1,014	97,145	10,442	1,544	18,558	83,196
2014	283,900	-	1,089	97,985	11,119	1,548	18,723	82,703
2015	286,100	-	1,088	99,007	10,989	1,567	18,820	83,274
2016	287,000	-	1,080	100,003	10,801	1,559	19,002	82,070
2017	290,800	-	1,059	100,921	10,497	1,558	19,130	81,453
2018	292,700	-	1,122	102,395	10,962	1,552	19,282	80,506
2019	295,300	-	1,152	104,104	11,063	1,565	19,434	80,505
2020	298,000	-	1,114	104,504	10,661	1,584	19,676	80,527
2021	300,600	-	1,113	105,428	10,559	1,605	19,830	80,948
2022	303,200	-	1,114	106,402	10,466	1,625	19,995	81,249
2023	305,800	-	1,113	107,396	10,365	1,638	20,160	81,250
2024	308,400	-	1,113	108,413	10,263	1,651	20,322	81,225
2025	311,000	-	1,112	109,424	10,164	1,662	20,485	81,122
2026	313,300	-	1,114	110,379	10,096	1,673	20,642	81,041
2027	315,600	-	1,116	111,282	10,031	1,683	20,789	80,967
2028	317,900	-	1,119	112,187	9,974	1,694	20,928	80,938
2029	320,100	-	1,121	113,072	9,918	1,704	21,065	80,876

[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) [1]	Other Sales to Public Authorities (GWh) [2]	Total Sales to Ultimate Consumers (GWh) [3]
Year	(GWh)	Average No. of Customers	Average kWh Consumption Per Customer	Railroads and Railways (GWh)			
2010	0	0	0	0	0	0	2,754
2011	0	0	0	0	0	(1)	2,710
2012	0	0	0	0	0	(7)	2,587
2013	0	0	0	0	0	(5)	2,553
2014	0	0	0	0	0	(7)	2,631
2015	0	0	0	0	0	1	2,656
2016	0	0	0	0	0	4	2,643
2017	0	0	0	0	0	17	2,634
2018	0	0	0	0	0	23	2,698
2019	0	0	0	0	0	22	2,739
2020	0	0	0	0	0	21	2,720
2021	0	0	0	0	0	21	2,740
2022	0	0	0	0	0	21	2,759
2023	0	0	0	0	0	21	2,772
2024	0	0	0	0	0	21	2,785
2025	0	0	0	0	0	21	2,795
2026	0	0	0	0	0	21	2,808
2027	0	0	0	0	0	21	2,821
2028	0	0	0	0	0	21	2,834
2029	0	0	0	0	0	21	2,846

[1] As of 2007 Security Lights and Street & Highway Lighting use is included with Commercial on Schedule 2.1.
[2] Reflects net of Talquin sales (for Talquin customers served by the City) and Talquin purchases (for City customers served by Talquin).
[3] Sales served by City electric system. Values include DSM Impacts.

City Of Tallahassee

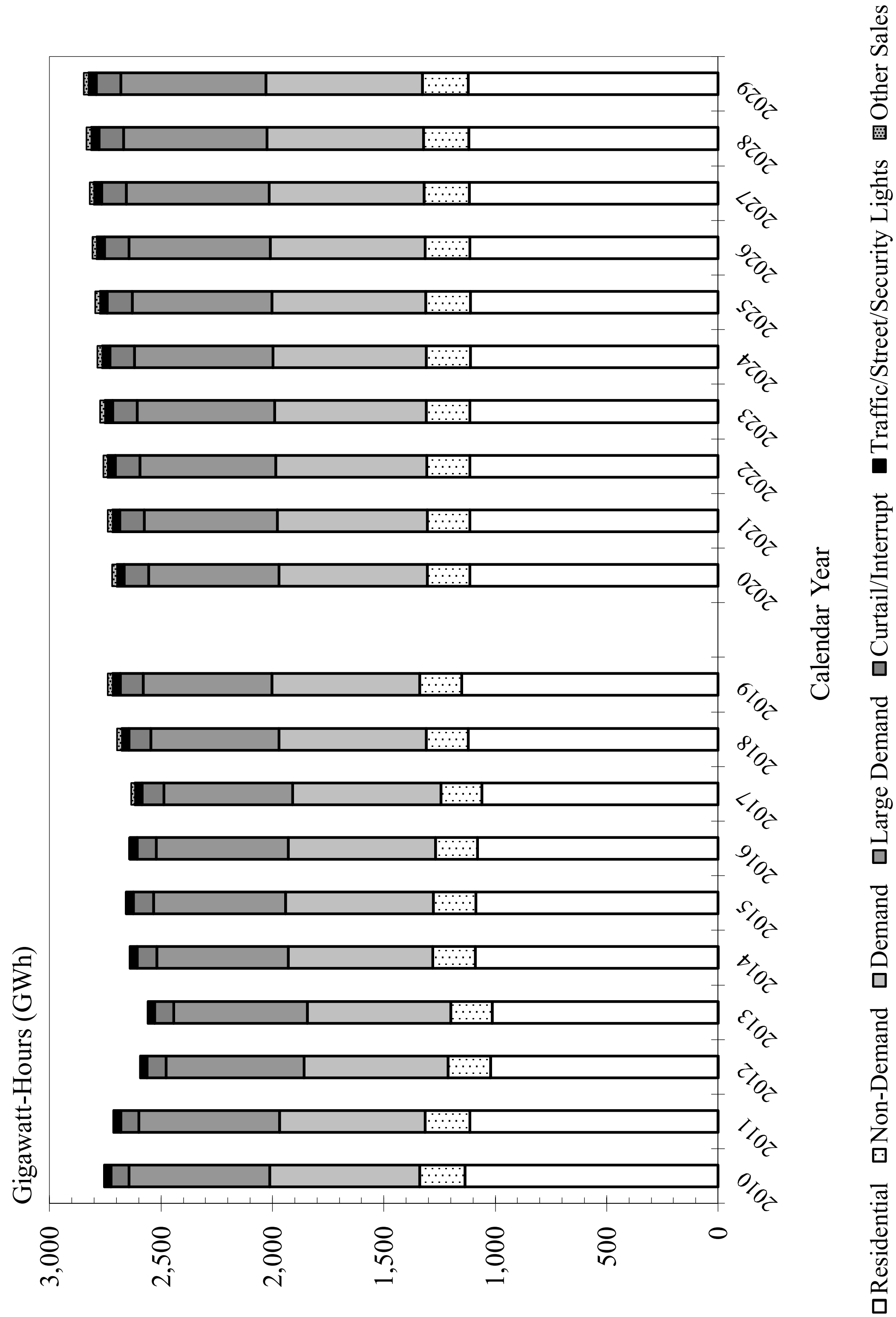
Schedule 2.3
History and Forecast of Energy Consumption and Number of Customers by Customer Class

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]
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	122	2,820	0	121,677
2019	0	114	2,852	0	123,538
2020	0	131	2,851	0	124,179
2021	0	126	2,866	0	125,258
2022	0	127	2,886	0	126,397
2023	0	128	2,900	0	127,556
2024	0	135	2,919	0	128,735
2025	0	129	2,924	0	129,910
2026	0	129	2,938	0	131,021
2027	0	130	2,951	0	132,071
2028	0	137	2,971	0	133,115
2029	0	131	2,977	0	134,136

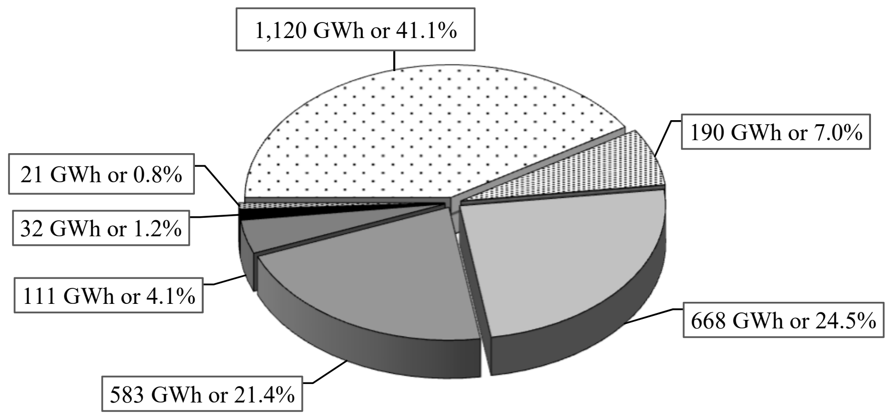
[1] Reflects NEL served by City electric system. Values include DSM Impacts.
[2] Average number of customers for the calendar year.

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



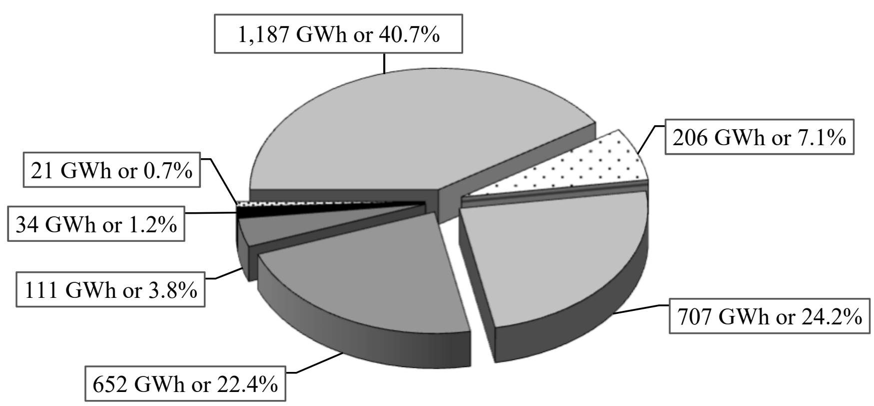
Energy Consumption By Customer Class (Excluding DSM Impacts)

Calendar Year 2020



2020 Total Sales = 2,725

Calendar Year 2029



2029 Total Sales = 2,919 GWh

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

Note: Total Sales values reflect sales to City and Talquin customers served by the City electric system.

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]
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	596		596						596
2019	617		617		0	1	0	0	616
2020	612		612		0	1	0	0	611
2021	617		617		1	2	1	0	613
2022	624		624		2	3	3	1	615
2023	629		629		4	5	5	1	615
2024	634		634		5	6	7	2	615
2025	639		639		7	7	8	3	614
2026	643		643		7	8	8	3	617
2027	647		647		7	9	9	4	618
2028	651		651		7	11	9	5	620
2029	655		655		7	12	9	5	622

[1] Values include DSM Impacts.
[2] Reduction estimated at busbar. 2019 DSM is actual at peak.
[3] 2019 values reflect incremental increase from 2018.

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]
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	596		596						596
2019	617		617		0	1	0	0	616
2020	619		619		0	1	0	0	618
2021	632		632		1	2	1	0	628
2022	644		644		2	3	3	1	635
2023	654		654		4	5	5	1	639
2024	663		663		5	6	7	2	643
2025	671		671		7	7	8	3	647
2026	679		679		7	8	8	3	653
2027	687		687		7	9	9	4	658
2028	694		694		7	11	9	5	664
2029	702		702		7	12	9	5	669

[1] Values include DSM Impacts.
[2] Reduction estimated at busbar. 2019 DSM is actual at peak.
[3] 2019 values reflect incremental increase from 2018.

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]
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	596		596						596
2019	617		617		0	1	0	0	616
2020	605		605		0	1	0	0	604
2021	603		603		1	2	1	0	599
2022	605		605		2	3	3	1	595
2023	605		605		4	5	5	1	590
2024	606		606		5	6	7	2	586
2025	606		606		7	7	8	3	582
2026	607		607		7	8	8	3	580
2027	607		607		7	9	9	4	578
2028	608		608		7	11	9	5	577
2029	608		608		7	12	9	5	575

[1] Values include DSM Impacts.
[2] Reduction estimated at busbar. 2019 DSM is actual at peak.
[3] 2019 values reflect incremental increase from 2018.

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]
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	508		508						508
2019 -2020	529		529		0	1	0	0	528
2020 -2021	560		560		0	2	0	0	557
2021 -2022	566		566		0	4	0	1	561
2022 -2023	570		570		0	6	0	1	563
2023 -2024	575		575		0	8	0	1	566
2024 -2025	579		579		0	9	0	2	568
2025 -2026	583		583		0	11	0	2	570
2026 -2027	587		587		0	12	0	2	572
2027 -2028	591		591		0	13	0	3	575
2028 -2029	595		595		0	14	0	3	578
2029 -2030	598		598		0	15	0	3	580

[1] Values include DSM Impacts.
[2] Reduction estimated at busbar. 2019-2020 DSM is actual at peak.
[3] Reflects no expected utilization of demand response (DR) resources in winter.
[4] 2019-2020 values reflect incremental increase from 2018-2019.

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]
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	508		508						508
2019 -2020	529		529		0	1	0	0	528
2020 -2021	570		570		0	2	0	0	567
2021 -2022	581		581		0	4	0	1	577
2022 -2023	591		591		0	6	0	1	584
2023 -2024	599		599		0	8	0	1	590
2024 -2025	608		608		0	9	0	2	597
2025 -2026	615		615		0	11	0	2	602
2026 -2027	622		622		0	12	0	2	608
2027 -2028	629		629		0	13	0	3	614
2028 -2029	637		637		0	14	0	3	620
2029 -2030	644		644		0	15	0	3	626

[1] Values include DSM Impacts.
[2] Reduction estimated at busbar. 2019-2020 DSM is actual at peak.
[3] Reflects no expected utilization of demand response (DR) resources in winter.
[4] 2019-2020 values reflect incremental increase from 2018-2019.

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]
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	508		508						508
2019 -2020	529		529		0	1	0	0	528
2020 -2021	550		550		0	2	0	0	547
2021 -2022	550		550		0	4	0	1	545
2022 -2023	550		550		0	6	0	1	543
2023 -2024	550		550		0	8	0	1	541
2024 -2025	551		551		0	9	0	2	539
2025 -2026	551		551		0	11	0	2	538
2026 -2027	552		552		0	12	0	2	537
2027 -2028	552		552		0	13	0	3	536
2028 -2029	552		552		0	14	0	3	535
2029 -2030	552		552		0	15	0	3	534

[1] Values include DSM Impacts.
[2] Reduction estimated at busbar. 2019-2020 DSM is actual at peak.
[3] Reflects no expected utilization of demand response (DR) resources in winter.
[4] 2019-2020 values reflect incremental increase from 2018-2019.

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 [4]	Utility Use & Losses	Net Energy for Load [3], [5]	Load Factor % [3]
2010	2,754			2,754	0	177	2,931	56
2011	2,711			2,711	(1)	89	2,799	54
2012	2,594			2,594	(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	2,618			2,618	17	124	2,758	53
2018	2,675			2,675	23	122	2,820	52
2019	2,720	3	0	2,717	22	114	2,852	53
2020	2,704	5	0	2,699	21	131	2,851	53
2021	2,731	12	1	2,718	21	126	2,866	53
2022	2,759	19	1	2,738	21	127	2,886	54
2023	2,781	28	2	2,751	21	128	2,900	54
2024	2,804	37	3	2,763	21	135	2,919	54
2025	2,824	45	4	2,774	21	129	2,924	54
2026	2,843	51	5	2,787	21	129	2,938	54
2027	2,861	56	6	2,799	21	130	2,951	54
2028	2,880	61	6	2,813	21	137	2,971	55
2029	2,898	65	7	2,825	21	131	2,977	55

[1] Reduction estimated at customer meter. 2019 DSM is actual incremental increase from 2018.
[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 [4]	(7) Utility Use & Losses	(8) Net Energy for Load [3], [5]	(9) Load Factor % [3]
2010	2,754			2,754	0	177	2,931	56
2011	2,711			2,711	(1)	89	2,799	54
2012	2,594			2,594	(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	2,618			2,618	17	124	2,758	53
2018	2,675			2,675	23	122	2,820	52
2019	2,720	3	0	2,717	22	114	2,852	53
2020	2,730	5	0	2,725	21	132	2,878	53
2021	2,792	12	1	2,780	21	129	2,930	53
2022	2,844	19	1	2,824	21	131	2,976	54
2023	2,888	28	2	2,858	21	132	3,012	54
2024	2,930	37	3	2,889	21	141	3,051	54
2025	2,967	45	4	2,918	21	135	3,074	54
2026	3,003	51	5	2,947	21	137	3,105	54
2027	3,037	56	6	2,975	21	138	3,134	54
2028	3,071	61	6	3,004	21	146	3,172	55
2029	3,105	65	7	3,032	21	141	3,194	54

[1] Reduction estimated at customer meter. 2019 DSM is actual incremental increase from 2018.
[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 [4]	Utility Use & Losses	Net Energy for Load [3], [5]	Load Factor % [3]
2010	2,754			2,754	0	177	2,931	56
2011	2,711			2,711	(1)	89	2,799	54
2012	2,594			2,594	(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	2,618			2,618	17	124	2,758	53
2018	2,675			2,675	23	122	2,820	52
2019	2,720	3	0	2,717	22	114	2,852	53
2020	2,664	5	0	2,658	21	149	2,828	53
2021	2,645	12	1	2,633	21	148	2,802	53
2022	2,643	19	1	2,623	21	154	2,798	54
2023	2,646	28	2	2,616	21	152	2,790	54
2024	2,646	37	3	2,605	21	162	2,788	54
2025	2,648	45	4	2,598	21	154	2,774	54
2026	2,651	51	5	2,595	21	154	2,770	54
2027	2,654	56	6	2,592	21	153	2,766	55
2028	2,655	61	6	2,588	21	160	2,769	55
2029	2,659	65	7	2,586	21	151	2,759	55

[1] Reduction estimated at customer meter. 2019 DSM is actual incremental increase from 2018.
[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)
	2019 Actual		**2020 Forecast [1][2]**		**2021 Forecast [1]**	
Month	Peak Demand (MW)	NEL (GWh)	Peak Demand (MW)	NEL (GWh)	Peak Demand (MW)	NEL (GWh)
January	508	228	553	231	557	233
February	407	185	504	210	509	205
March	447	200	443	204	446	205
April	449	204	440	209	444	211
May	592	263	531	247	535	248
June	580	270	570	265	574	267
July	578	284	581	282	585	284
August	616	293	611	293	613	295
September	599	288	558	261	561	263
October	565	246	483	226	487	228
November	409	193	453	203	457	205
December	455	200	476	219	480	221
TOTAL		2,852		2,851		2,866

[1] Peak Demand and NEL include DSM Impacts.
[2] Represents forecast values for 2020.

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 (°F). Peak day HDD and CDD reflect differing bases. For winter peak HDD, the base is 55°F; for summer peak CDD, 70° F.

[2] R-Squared, sometimes called the coefficient of determination, is a commonly used measure of goodness of fit of a multi-variable model. If all observations fall on the model regression line, R Squared is 1. If there is no relationship between the dependent and independent variables, 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.

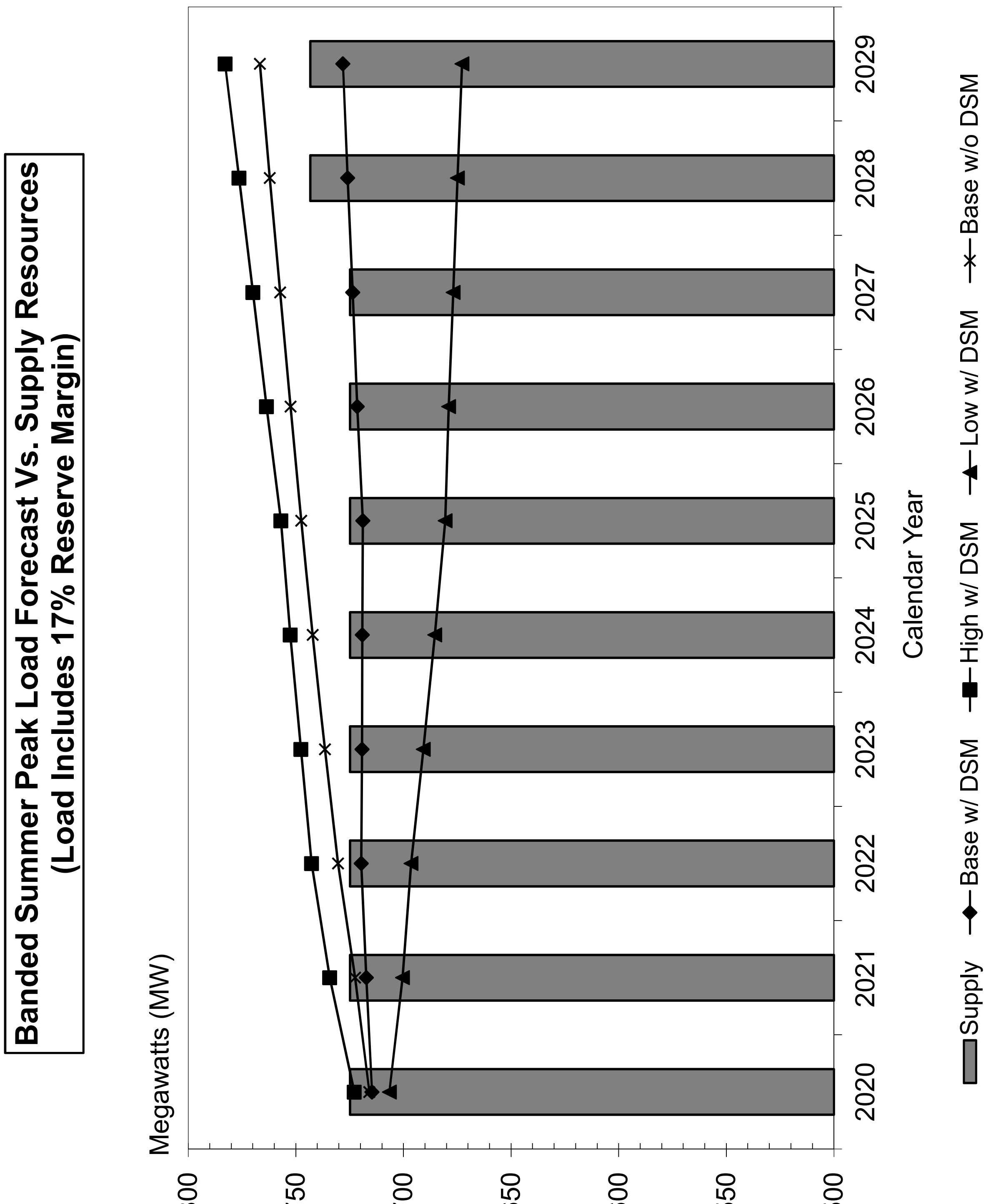
[3] As monthly load factor is essentially a stationary series, indicators of goodness of fit should be viewed differently. In combination with estimates of NEL, forecasted peak demands from this equation will have far better fit than the Adjusted R-Squared here indicates. The equation also includes day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

City of Tallahassee

2020 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.	Leon County E-Commerce	Woods and Poole Economics
5.	Cooling Degree Days	NOAA
6.	Heating Degree Days	NOAA
7.	AC Saturation Rate	Appliance Saturation Study; EIA
8.	Heating Saturation Rate	Appliance Saturation Study; EIA
9.	Real Tallahassee Taxable Sales	Florida Department of Revenue, CPI Woods and Poole Economics
10.	Florida Population	Bureau of Economic and Business Research Woods and Poole Economics
11.	Florida Home Vacancy Rate	U.S. Bureau of the Census
10.	Florida Mortgage Originations	IHS Global Insight (now IHS Markit)
12.	State Capitol Incremental	Department of Management Services
13.	FSU Incremental Additions	FSU Planning Department
14.	FAMU Incremental Additions	FAMU Planning Department
15.	GSLD Incremental Additions	City Utility Services
16.	Other Commercial Customers	City Utility Services
17.	Tall. Memorial Curtailable	City Utility Services
18.	System Peak Historical Data	City System Planning
19.	Historical Customer Projections by Class	City Utility Services
20.	Historical Customer Class Energy	City Utility Services
21.	Interruptible, Traffic Light Sales, & Security Light Additions	City Utility Services
22.	Residential/Commercial Real Price of Electricity	Calculated from Revenues, kWh sold, CPI per 2019 Annual Energy Outlook-FRCC Region


Banded Summer Peak Load Forecast Vs. Supply Resources
(Load Includes 17% Reserve Margin)
Megawatts (MW)
800
750
700
650
600
550
500
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
Calendar Year
Supply
Base w/ DSM
High w/ DSM
Low w/ DSM
Base w/o DSM

City Of Tallahassee

2020 Electric System Load Forecast

Projected Demand Side Management Energy Reductions [1]

Calendar Year Basis

Year	Residential Impact (MWh)	Commercial Impact (MWh)	Total Impact (MWh)
2020	5,676	174	5,850
2021	12,130	598	12,728
2022	20,163	1,077	21,240
2023	29,496	2,019	31,515
2024	38,852	3,306	42,158
2025	47,517	4,556	52,073
2026	53,164	5,282	58,446
2027	58,812	6,007	64,819
2028	63,784	6,648	70,432
2029	68,477	7,350	75,827

[1] Reductions estimated at generator busbar.

City Of Tallahassee

2020 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)
2020	2020-2021	1	2	0	0	0	0	0	0	1	3
2021	2021-2022	2	4	0	1	1	0	1	0	4	5
2022	2022-2023	3	6	1	1	2	0	3	0	9	7
2023	2023-2024	5	8	1	1	4	0	5	0	15	9
2024	2024-2025	6	9	2	2	5	0	7	0	20	11
2025	2025-2026	7	11	3	2	7	0	8	0	24	13
2026	2026-2027	8	12	3	2	7	0	8	0	27	15
2027	2027-2028	9	13	4	3	7	0	9	0	29	16
2028	2028-2029	11	14	5	3	7	0	9	0	31	17
2029	2029-2030	12	15	5	3	7	0	9	0	33	18

[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 2018	Actual 2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
(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	2	0	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	2	0	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	22,988	22,677	22,329	22,068	22,685	22,750	22,486	22,850	22,898	22,367	22,923	23,010
(14)		Steam	1000 MCF	2,345	0	0	0	0	0	0	0	0	0	0	0
(15)		CC	1000 MCF	18,576	20,185	20,630	20,303	21,664	21,656	20,738	21,756	21,799	20,410	21,519	21,987
(16)		CT	1000 MCF	2,068	2,492	1,699	1,765	1,021	1,094	1,748	1,094	1,099	1,957	1,404	1,023
(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 2018	Actual 2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
(1)	Annual Firm Interchange		GWh	0	0	0	0	0	0	0	0	0	0	0	0
(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	1	0	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	1	0	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	2808	2900	2,889	2,866	2,946	2,952	2,921	2,969	2,977	2,907	2,984	2,998
(15)		Steam	GWh	190	0	0	0	0	0	0	0	0	0	0	0
(16)		CC	GWh	2,411	2,615	2,690	2,657	2,825	2,824	2,715	2,840	2,847	2,675	2,818	2,876
(17)		CT	GWh	207	285	199	209	121	129	206	129	130	231	166	122
(18)		Diesel	GWh	0	0	0	0	0	0	0	0	0	0	0	0
(19)	Hydro		GWh	21	7	0	0	0	0	0	0	0	0	0	0
(20)	Economy Interchange[1]		GWh	(48)	(95)	(161)	(122)	(181)	(173)	(122)	(165)	(158)	(74)	(131)	(137)
(21)	Renewables		GWh	38	41	123	122	121	121	120	119	119	118	118	117
(22)	Net Energy for Load		GWh	2,820	2,852	2,851	2,866	2,886	2,900	2,919	2,924	2,938	2,951	2,971	2,977

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

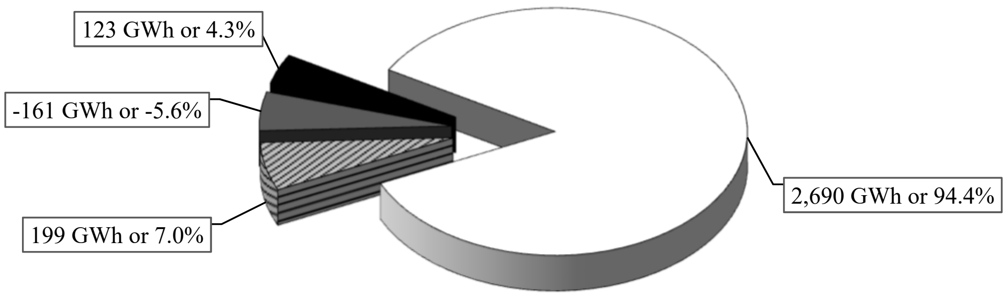
City Of Tallahassee

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 2018	Actual 2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
(1)	Annual Firm Interchange		%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(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	%	99.6	101.7	101.3	100.0	102.1	101.8	100.1	101.5	101.3	98.5	100.4	100.7
(15)		Steam	%	6.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(16)		CC	%	85.5	91.7	94.4	92.7	97.9	97.4	93.0	97.1	96.9	90.7	94.9	96.6
(17)		CT	%	7.3	10.0	7.0	7.3	4.2	4.4	7.1	4.4	4.4	7.8	5.6	4.1
(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		%	0.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(20)	Economy Interchange		%	(1.7)	(3.3)	(5.6)	(4.3)	(6.3)	(6.0)	(4.2)	(5.6)	(5.4)	(2.5)	(4.4)	(4.6)
(21)	Renewables		%	1.3	1.4	4.3	4.3	4.2	4.2	4.1	4.1	4.0	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

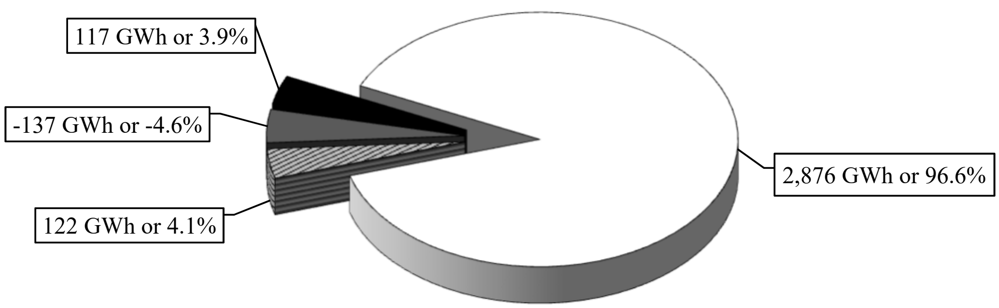
Generation By Resource/Fuel Type

Calendar Year 2020



2020 Total NEL = 2,851 GWh

Calendar Year 2029



2029 Total NEL = 2,977 GWh

CC-Gas CT/Diesel-Gas Net Interchange 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 power supply 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

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 18.5 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 in March 2019. A fifth 18.5 MW RICE unit is expected to be placed into commercial operations in April 2020.

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.

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. Further, consideration must be given to the adequacy of resources' ability to provide ancillary services (voltage control, frequency response, regulating/operating/contingency reserves, etc.). Because of the high variability of load requirements at the National High Magnetic Field Laboratory (NHMFL) and the increasing penetration of intermittent, utility-scale solar PV projects, ensuring ancillary service adequacy is becoming increasingly important.

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/criteria to its current load reserve margin criterion that may better balance resource and ancillary service adequacy 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 will need to be replaced and/or supplemented by other criteria 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 clean, renewable energy 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 entered into a PPA with Origis for a second project with an output of 42 MW_{ac} (Solar Farm 4). Solar Farm 4 project is sited on additional property adjacent to the Tallahassee International Airport and connected to the City's 230 kV transmission system. The commercial operations date for Solar Farm 4 was December 26, 2019 bringing the City's total utility-scale solar capacity to 62 MW_{ac}.

One of the potential 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 are not currently 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 2019 and expected in 2020 may 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 2019 the City has a portfolio of 223 kW of solar PV operated and maintained by the Electric Utility and a cumulative total of 2,248 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 Sustainability 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.

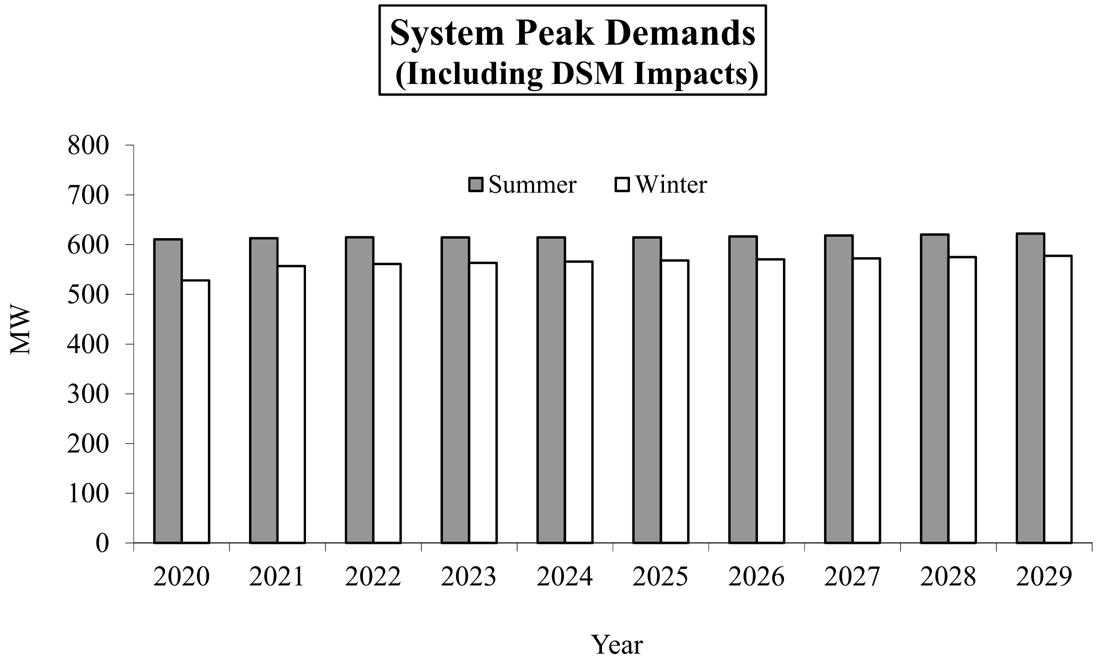
The City issued a Request for Proposals (RFP) for consulting services related to the Energy Integrated Resource Planning (EIRP) process and public engagement plan to identify the path forward to meet the 2050 100% clean, renewable energy goal. As of the time of this report, the City has identified and entered into contract negotiations with the top-ranked RFP respondent.

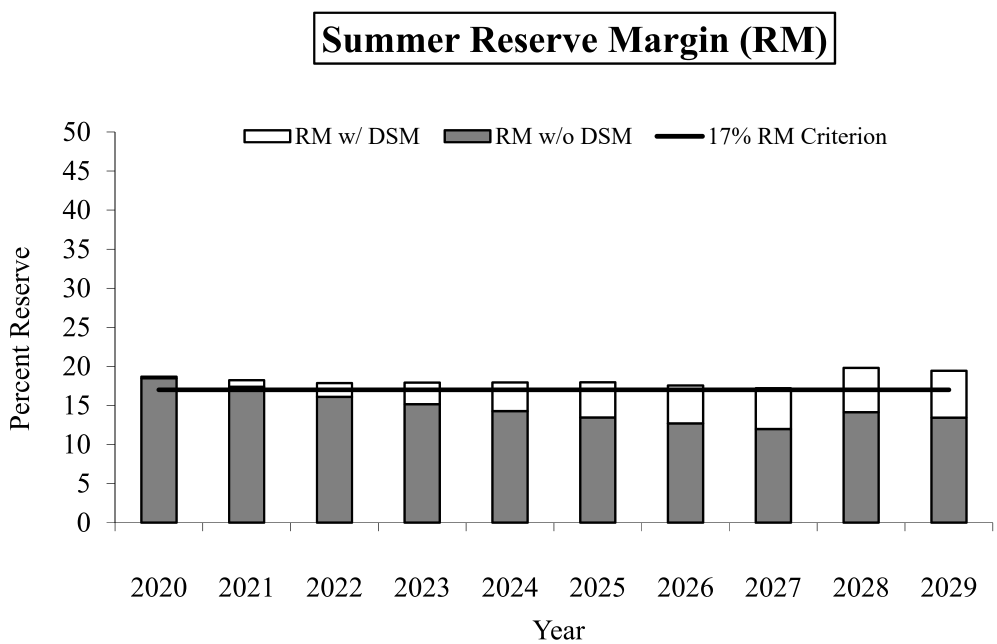
3.2.6 FUTURE POWER SUPPLY RESOURCES

The City's 2020 Ten Year Site Plan identifies that additional power supply resources would be needed by the summer of 2028 to maintain electric system adequacy and reliability through the 2029 horizon year. For the purposes of this report, the City has identified the addition of an 18.5 Wartsila RICE generator (similar to the City's existing Hopkins IC 1-5) at its existing Hopkins Plant site. The timing, site, type and size of this new power supply resource may vary as the nature of the need becomes better defined. Alternatively, this proposed addition could be a generator(s) of a different type/size at the same or different location or a peak season.

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 23 MW of additional power supply resources to meet its load and planning reserve requirements through the horizon year of 2029. 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 2020 through 2029.


System Peak Demands
(Including DSM Impacts)
Summer
Winter
MW
800
700
600
500
400
300
200
100
0
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
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
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
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)
Year	Total Installed Capacity (MW)	Firm Capacity Import (MW)	Firm Capacity Export (MW)	QF (MW)	Total Capacity Available (MW)	System Firm Summer Peak Demand (MW)	Reserve Margin Before Maintenance (MW)	Reserve Margin Before Maintenance % of Peak	Scheduled Maintenance (MW)	Reserve Margin After Maintenance (MW)	Reserve Margin After Maintenance % of Peak
2020	725	0	0	0	725	611	114	19	0	114	19
2021	725	0	0	0	725	613	112	18	0	112	18
2022	725	0	0	0	725	615	110	18	0	110	18
2023	725	0	0	0	725	615	110	18	0	110	18
2024	725	0	0	0	725	615	110	18	0	110	18
2025	725	0	0	0	725	614	110	18	0	110	18
2026	725	0	0	0	725	617	108	18	0	108	18
2027	725	0	0	0	725	618	106	17	0	106	17
2028	743	0	0	0	743	620	123	20	0	123	20
2029	743	0	0	0	743	622	121	19	0	121	19

[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
2020/21	795	0	0	0	795	557	238	43	0	238	43
2021/22	795	0	0	0	795	561	234	42	0	234	42
2022/23	795	0	0	0	795	563	231	41	0	231	41
2023/24	795	0	0	0	795	566	229	40	0	229	40
2024/25	795	0	0	0	795	568	227	40	0	227	40
2025/26	795	0	0	0	795	570	224	39	0	224	39
2026/27	795	0	0	0	795	572	222	39	0	222	39
2027/28	813	0	0	0	813	575	238	41	0	238	41
2028/29	813	0	0	0	813	578	236	41	0	236	41
2029/30	813	0	0	0	813	580	233	40	0	233	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
Hopkins	IC 5 [1]	Leon	IC	NG	NA	PL	NA	3/19	4/20	NA	18,759	18	18	P
Unsited	1 [2]	Leon	IC	NG	NA	PL	NA	6/26	6/28	NA	18,759	18	18	P

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

[2] For the purposes of this report, the City has identified the addition of a Wartsila 18V50SG reciprocating internal combustion engine (RICE) generator (similar to the City's existing Hopkins IC 1-4) to satisfy planning reserve requirements identified in 2028-2029. The timing, site, type and size of this new power supply resource may vary as the nature of the need becomes better defined. Alternatively, this addition could be a generator(s) of a different type/size at an existing or different site or a peak season purchase.

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 %
2020	612	1	611	706	0	0	18	725	19
2021	617	4	613	706	0	0	18	725	18
2022	624	9	615	706	0	0	18	725	18
2023	629	15	615	706	0	0	18	725	18
2024	634	20	615	706	0	0	18	725	18
2025	639	24	614	706	0	0	18	725	18
2026	643	27	617	706	0	0	18	725	18
2027	647	29	618	706	0	0	18	725	17
2028	651	31	620	706	0	0	37	743	20
2029	655	33	622	706	0	0	37	743	19

Notes
[1] Demand Side Management includes energy efficiency and demand response/control measures.
[2] 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 April 2020. For the purposes of this report, the City has identified the addition of a Wartsila 18V50SG reciprocating internal combustion engine (RICE) generator (similar to the City's existing Hopkins IC 1-4) to satisfy planning reserve requirements identified in 2028-2029. The timing, site, type and size of this new power supply resource may vary as the nature of the need becomes better defined. Alternatively, this addition could be a generator(s) of a different type/size at an existing or different site or a peak season purchase.

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.

On September 24, 2019, the City executed a co-location agreement with Gulf Power Company (Gulf) associated with a potential transmission line to directly connect the Gulf and Florida Power & Light (FPL) service territories. This 176-mile line, referred to as the "North Florida Resiliency Connection" (NFRC), 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. The NFRC would be co-located within the City's existing transmission corridors for 14 miles. The City, Gulf, FPL and neighboring electric systems Duke and Southern are currently studying the impacts the NFRC will have on their respective operations, including impacts on the ability to import and/or export power and access to the Southern/Florida interface, and developing prospective mitigation strategies.

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 2021 is currently ongoing, and any revisions to project budgets in the electric utility will not be finalized until the summer of 2020. 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 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	Apr-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:	>50% Complete	
(10)	Certification Status:	In Progress	
(11)	Status with Federal Agencies:	All Permits Received	
(12)	Projected Unit Performance Data		
	Planned Outage Factor (POF):	2.24	
	Forced Outage Factor (FOF):	1.76	
	Equivalent Availability Factor (EAF):	93.49	
	Resulting Capacity Factor (%):	23.5	[3]
	Average Net Operating Heat Rate (ANOHR):	8,532	[4]
(13)	Projected Unit Financial Data		
	Book Life (Years)	30	
	Total Installed Cost (In-Service Year $/kW)	1,571	[5]
	Direct Construction Cost ($/kW):	934	[5]
	AFUDC Amount ($/kW):	NA	
	Escalation ($/kW):	637	[5],[6]
	Fixed O & M ($kW-Yr):	35.89	[5]
	Variable O & M ($/MWH):	5.81	[5]
	K Factor:	NA	

Notes

[1] The City has committed to a fifth 18.492 MW RICE generating unit also to be located at its existing Hopkins Plant site and expected to be in service by April 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.

[6] Estimated total financing cost.

City Of Tallahassee

Schedule 9
Status Report and Specifications of Proposed Generating Facilities

(1)	Plant Name and Unit Number:	Unsited	[1]
(2)	Capacity		
	a.) Summer:	18.492	
	b.) Winter:	18.492	
(3)	Technology Type:	IC	
(4)	Anticipated Construction Timing		
	a.) Field Construction start - date:	Jun-26	
	b.) Commercial in-service date:	Jun-28	
(5)	Fuel		
	a.) Primary fuel:	NG	
	b.) Alternate fuel:		
(6)	Air Pollution Control Strategy:	BACT compliant	
(7)	Cooling Status:	Radiators	
(8)	Total Site Area:	Unknown	
(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):	2.24	
	Forced Outage Factor (FOF):	1.76	
	Equivalent Availability Factor (EAF):	93.49	
	Resulting Capacity Factor (%):	12.7	[2]
	Average Net Operating Heat Rate (ANOHR):	8,532	[3]
(13)	Projected Unit Financial Data		
	Book Life (Years)		
	Total Installed Cost (In-Service Year $/kW)	1,914	[4]
	Direct Construction Cost ($/kW):	1,138	[4]
	AFUDC Amount ($/kW):	NA	
	Escalation ($/kW):	776	[4],[5]
	Fixed O & M ($kW-Yr):	43.72	[5]
	Variable O & M ($/MWH):	7.08	[5]
	K Factor:		

Notes

[1] For the purposes of this report, the City has identified the addition of a Wartsila 18V50SG reciprocating internal combustion engine (RICE) generator (similar to the City's existing Hopkins IC 1-4) to satisfy planning reserve requirements identified in 2028-2029. The timing, site, type and size of this new power supply resource may vary as the nature of the need becomes better defined. Alternatively, this addition could be a generator(s) of a different type/size at an existing or different site or a peak season purchase.

[2] Expected 2029 capacity factor.

[3] Expected 2029 net average heat rate.

[4] Estimated 2028 dollars.

[5] Estimated total financing cost.

City Of Tallahassee

Planned Transmission Projects, 2020-2029

Project Type	Project Name	From Bus Name	From Bus Number	To Bus Name	To Bus Number	Expected In-Service Date	Voltage (kV)	Line Length (miles)
Reconductor	Line 3B Reconductor	Sub 11	7511	Sub 31	7531	6/1/20	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 2021 Ten Year Site Plan report.

Figure D-1 – Hopkins Plant Site

Figure D-2 – Purdom Plant Site