Ten Year Site Plan: 2018-2027

City of Tallahassee Utilities

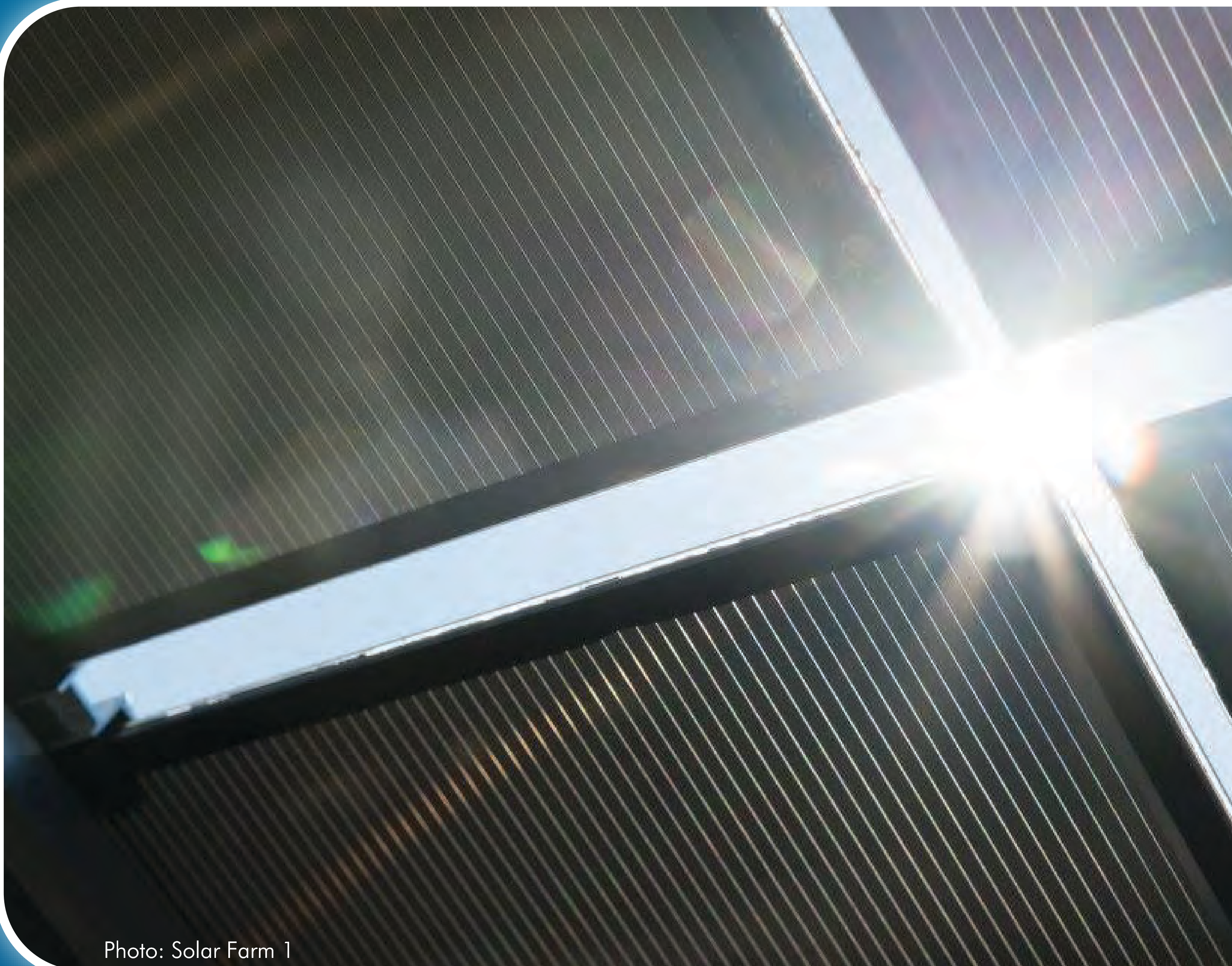
Photo: Solar Farm 1

Report prepared by: City of Tallahassee Electric System Integrated Planning

#1 Public Utility in America

City of Tallahassee
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CITY OF TALLAHASSEE
TEN YEAR SITE PLAN FOR ELECTRICAL GENERATING FACILITIES
AND ASSOCIATED TRANSMISSION LINES
2018-2027
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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 120,000 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 700 megawatts (MW).

The City has two fossil-fueled generating stations, which contain combined cycle (CC), steam and combustion turbine (CT) electric generating facilities. The Sam O. Purdom Generating Station, located in the City of St. Marks, Florida has been in operation since 1952; and the Arvah B. Hopkins Generating Station, located on Geddie Road west of the City, has been in commercial operation since 1970. 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.

1.1 SYSTEM CAPABILITY

The City maintains six points of interconnection with Duke Energy Florida ("Duke", formerly Progress Energy Florida); two 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 and 10 MW (net summer rating) of CT generation facilities are 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, 76 MW (net summer rating) of steam generation and 92 MW (net summer rating) of CT generation facilities.

The City's Hopkins 1 steam generating unit can be fired with natural gas. The CC and CT units can be fired on either natural gas or diesel oil but cannot burn these fuels concurrently. The total capacity of the three units at the C.H. Corn Hydroelectric Station is 11 MW. However, because the 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.

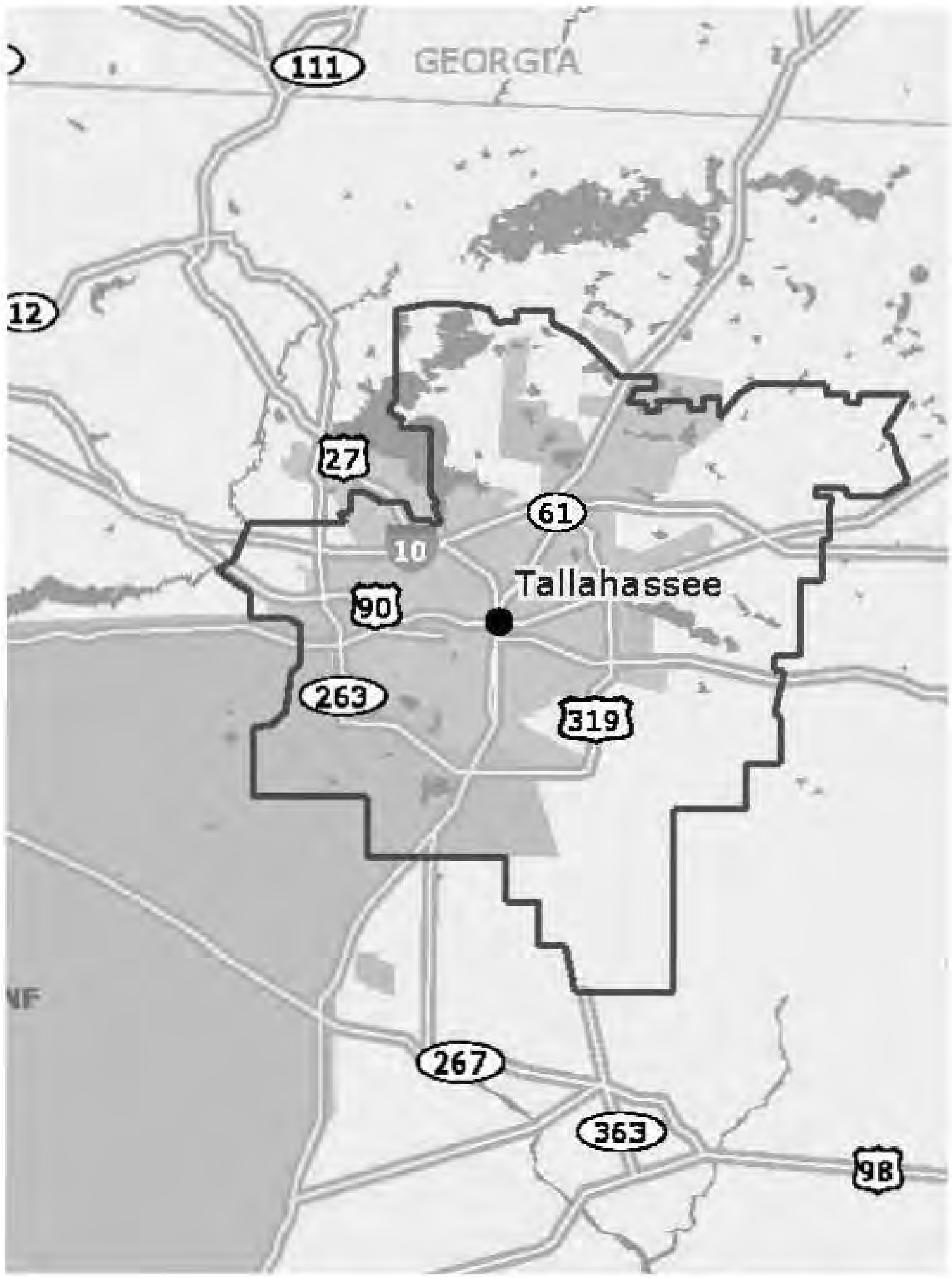
The City’s current total net summer installed generating capability is 700 MW. The corresponding winter net peak installed generating capability is 772 MW. Table 1.1 contains the details of the individual generating units.

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 MWac of non-firm solar PV with Origis Energy USA (“Origis”). The project is located adjacent to the Tallahassee International Airport and will deliver power to City-owned distribution facility. The City delcared commercial operations of the project on December 13, 2017. Firm retail electric service is purchased from and provided by the Talquin Electric Cooperative (“Talquin”) to City customers served by the Talquin electric system. The projected amounts of electric service to be purchased from Talquin is included in the “Annual Firm Interchange” values provided in Table 2.19 (Schedule 6.1). 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 currently anticipated that these transfers will be completed by 2027 at which time all City customers will be served via City 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, 2017

(1) Plant	(2) Unit No.	(3) Location	(4) Unit Type	(5) Fuel Primary	(6) Fuel Alternate	(7) Fuel Transport Primary	(8) Fuel Transport Alternate	(9) Alt. Fuel Days Use	(10) Commercial In-Service Month/Year	(11) Expected Retirement Month/Year	(12) Gen. Max. Nameplate (kW)	(13) Net Capability Summer (MW)	(14) Net Capability Winter (MW)
S. O. Purdom	8	Wakulla	CC	NG	FO2	PL	TK	[1, 2]	7/00	12/40	270,100	222	258 [7]
	GT-2		GT	NG	FO2	PL	TK	[1, 2]	5/64	10/18	15,000	10	10
											Plant Total	232	268
A. B. Hopkins	1	Leon	ST	NG	NA	PL	NA	[3]	5/71	10/18	75,000	76	78
	2		CC	NG	FO2	PL	TK	[2]	6/08 [4]	Unknown	458,100 [5]	300	330 [7]
	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	468	504
C. H. Corn Hydro Station [6]	1	Leon	HY	WAT	NA	WAT	NA	NA	9/85	Unknown	4,440	0	0
	2		HY	WAT	NA	WAT	NA	NA	8/85	Unknown	4,440	0	0
	3		HY	WAT	NA	WAT	NA	NA	1/86	Unknown	3,430	0	0
											Plant Total	0	0
									Total System Capacity as of December 31, 2017			700	772

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] Hopkins 1 is a "gas only" unit.
[4] 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.
[5] 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.
[6] 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.
[7] 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 2018 and the horizon year of 2027. 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 2017-2019 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 acquisition of certain 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 2017 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 2018-2037 at an average annual growth rate (AAGR) of 0.94%. This growth rate is below that for the state of Florida (~1.2%) 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 2018 base forecasts for annual total retail sales/net energy for load that are generally comparable to the corresponding 2017 base forecasts while the seasonal peak demand forecasts 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 capacity 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.

In early 2018, the City entered a contract for continued demand response (DR) implementation to build on the City's PeakSmart program and expand it to residential and small commercial customers. Up to that point, PeakSmart was available only to large commercial customers. The City has nearly 3 MW of commercial DR capacity enrolled. The new DR implementation vendor will pilot PeakSmart offerings for small and medium busineses as well as residential customers in Summer 2018. Upon successful demonstration, the City will consider expanding PeakSmart to achieve 20+ MW of summer DR capacity by 2023. The balance of 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. History has shown that post-recession energy use generally rebounds to pre-recession levels. 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 impact on forecasts of future demand and energy requirements.

Estimates of the actual demand and energy savings realized from 2007-2017 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 gradual true-up of DSM need 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 2018-2027. Figure B4 displays the percentage of energy by fuel type in 2018 and 2027.

The City's generation portfolio includes combustion turbine/combined cycle, combustion turbine/simple cycle, conventional steam and hydroelectric units. The City's combustion turbine/combined cycle and combustion turbine/simple cycle units are capable of generating energy using natural gas or distillate fuel oil. 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
2008	274,926	-	1,054	94,640	11,132	1,625	18,597	87,396
2009	275,059	-	1,050	94,827	11,071	1,611	18,478	87,185
2010	275,783	-	1,136	95,268	11,928	1,618	18,426	87,811
2011	276,799	-	1,113	95,794	11,619	1,598	18,418	86,763
2012	277,935	-	1,021	96,479	10,586	1,572	18,445	85,226
2013	279,468	-	1,014	97,145	10,442	1,544	18,558	83,199
2014	282,471	-	1,089	97,985	11,119	1,548	18,723	82,690
2015	285,651	-	1,088	99,007	10,989	1,567	18,820	83,263
2016	288,972	-	1,080	100,003	10,801	1,559	19,002	82,065
2017	287,899	-	1,059	100,921	10,497	1,558	19,130	81,426
2018	295,333	-	1,086	102,176	10,625	1,585	19,352	81,922
2019	298,871	-	1,084	103,659	10,457	1,626	19,518	83,311
2020	302,416	-	1,082	105,054	10,298	1,644	19,703	83,441
2021	305,792	-	1,079	106,362	10,141	1,658	19,882	83,413
2022	309,175	-	1,076	107,641	9,996	1,673	20,057	83,410
2023	312,564	-	1,075	108,922	9,871	1,687	20,232	83,395
2024	315,959	-	1,078	110,213	9,780	1,701	20,404	83,386
2025	319,358	-	1,080	111,491	9,691	1,714	20,576	83,320
2026	322,395	-	1,083	112,693	9,610	1,727	20,742	83,250
2027	325,434	-	1,086	113,828	9,537	1,739	20,899	83,186

[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						
Year	(GWh)	Average No. of Customers [1]	Average kWh Consumption Per Customer	Railroads and Railways (GWh)	Street & Highway Lighting (GWh) [2]	Other Sales to Public Authorities (GWh) [3]	Total Sales to Ultimate Consumers (GWh) [4]
2008	-	-	-		0		2,679
2009	-	-	-		0		2,661
2010	-	-	-		0		2,754
2011	-	-	-		0		2,711
2012	-	-	-		0		2,593
2013	-	-	-		0		2,558
2014	-	-	-		0		2,638
2015	-	-	-		0		2,655
2016	-	-	-		0		2,640
2017	-	-	-		0		2,617
2018	-	-	-		0	16	2,687
2019	-	-	-		0	19	2,729
2020	-	-	-		0	22	2,748
2021	-	-	-		0	25	2,762
2022	-	-	-		0	28	2,777
2023	-	-	-		0	31	2,793
2024	-	-	-		0	34	2,813
2025	-	-	-		0	37	2,832
2026	-	-	-		0	40	2,849
2027	-	-	-		0	42	2,866

[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.

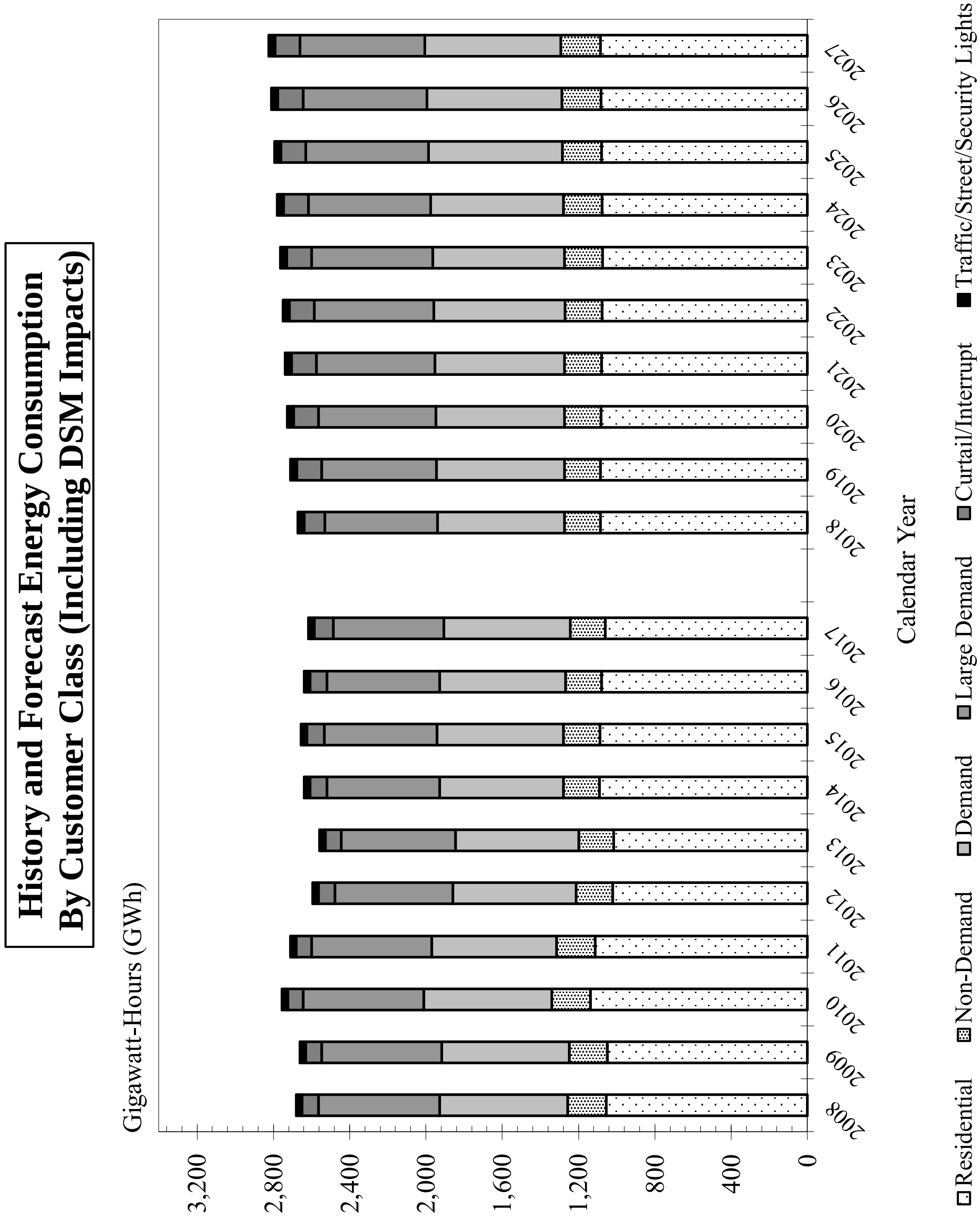
City Of Tallahassee

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

Base Load Forecast

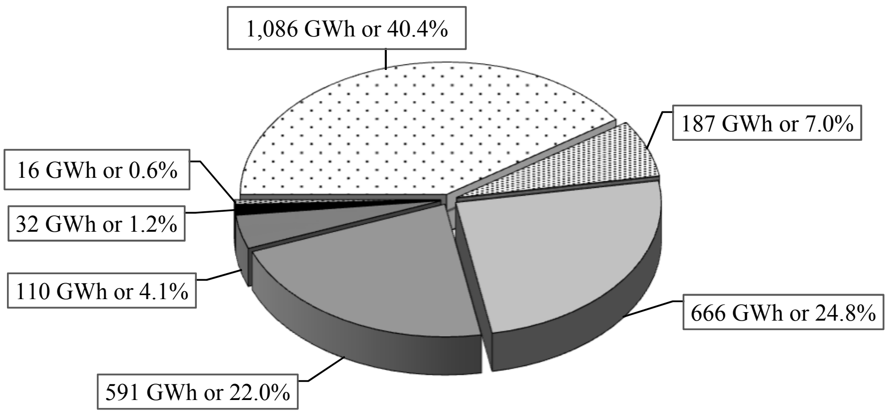
(1)	(2)	(3)	(4)	(5)	(6)
Year	Sales for Resale (GWh)	Utility Use & Losses (GWh)	Net Energy for Load (GWh) [1]	Other Customers (Average No.)	Total No. of Customers [2]
2008	0	155	2,834	0	113,237
2009	0	140	2,801	0	113,305
2010	0	177	2,931	0	113,694
2011	0	88	2,799	0	114,212
2012	0	117	2,710	0	114,924
2013	0	126	2,684	0	115,703
2014	0	114	2,751	0	116,708
2015	0	121	2,776	0	117,827
2016	0	139	2,779	0	119,005
2017	0	141	2,758	0	120,051
2018	0	143	2,830	0	121,528
2019	0	145	2,875	0	123,177
2020	0	153	2,901	0	124,756
2021	0	147	2,909	0	126,244
2022	0	148	2,925	0	127,698
2023	0	149	2,942	0	129,154
2024	0	156	2,970	0	130,617
2025	0	151	2,982	0	132,067
2026	0	152	3,001	0	133,434
2027	0	152	3,018	0	134,726

[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)
Gigawatt-Hours (GWh)
3,200
2,800
2,400
2,000
1,600
1,200
800
400
0
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
Calendar Year
Residential
Non-Demand
Demand
Large Demand
Curtail/Interrupt
Traffic/Street/Security Lights

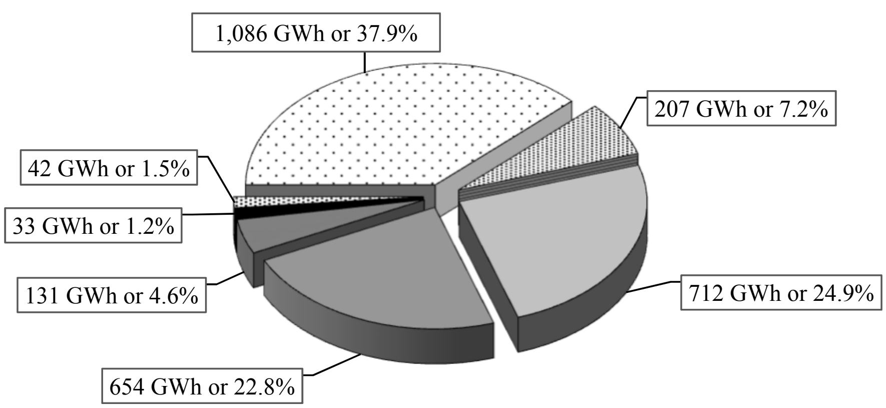
Energy Consumption By Customer Class (Excluding DSM Impacts)

Calendar Year 2018



2018 Total Sales = 2,687

Calendar Year 2027



2027 Total Sales = 2,866 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) Comm./Ind Residential Conservation [2], [3]	(8) Load Management [2]	(9) Comm./Ind Conservation [2], [3]	(10) Net Firm Demand [1]
2008	587		587						587
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	599		599		0	1	0	0	598
2018	598		598		0	2	3	0	593
2019	611		611		3	4	5	1	598
2020	617		617		6	6	8	2	596
2021	623		623		10	8	10	2	593
2022	627		627		10	9	10	3	595
2023	634		634		10	11	10	4	598
2024	639		639		10	13	10	5	601
2025	644		644		11	14	10	5	604
2026	649		649		11	15	10	6	607
2027	654		654		11	17	10	7	610

[1] Values include DSM Impacts.
[2] Reduction estimated at busbar. 2017 DSM is actual at peak.
[3] 2017 values reflect incremental increase from 2016.

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) Comm./Ind Residential Conservation [2], [3]	(8) Load Management [2]	(9) Comm./Ind Conservation [2], [3]	(10) Net Firm Demand [1]
2008	587		587						587
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	599		599		0	1	0	0	598
2018	605		605		0	2	3	0	599
2019	625		625		3	4	5	1	612
2020	636		636		6	6	8	2	614
2021	645		645		10	8	10	2	616
2022	653		653		10	9	10	3	621
2023	662		662		10	11	10	4	628
2024	671		671		10	13	10	5	634
2025	680		680		11	14	9	5	640
2026	688		688		11	15	10	6	646
2027	696		696		11	17	10	7	653

[1] Values include DSM Impacts.
[2] Reduction estimated at busbar. 2017 DSM is actual at peak.
[3] 2017 values reflect incremental increase from 2016.

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) Comm./Ind Residential Conservation [2], [3]	(8) Load Management [2]	(9) Comm./Ind Conservation [2], [3]	(10) Net Firm Demand [1]
2008	587		587						587
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	599		599		0	1	0	0	598
2018	591		591		0	2	3	0	586
2019	597		597		3	4	5	1	584
2020	599		599		6	6	8	2	577
2021	600		600		10	8	10	2	571
2022	601		601		10	9	10	3	569
2023	603		603		11	11	10	4	568
2024	605		605		10	13	10	5	568
2025	607		607		11	14	9	5	567
2026	609		609		11	15	10	6	567
2027	611		611		11	17	10	7	567

[1] Values include DSM Impacts.
[2] Reduction estimated at busbar. 2017 DSM is actual at peak.
[3] 2017 values reflect incremental increase from 2016.

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) Comm./Ind Residential Conservation [2], [4]	(8) Load Management [2], [3]	(9) Comm./Ind Conservation [2], [4]	(10) Net Firm Demand [1]
2008 -2009	579		579						579
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	623		623		0	1	0	0	621
2018 -2019	554		554		0	4	0	0	549
2019 -2020	561		561		0	7	0	1	553
2020 -2021	566		566		0	9	0	1	557
2021 -2022	572		572		0	11	0	2	559
2022 -2023	577		577		0	13	0	2	562
2023 -2024	582		582		0	14	0	2	565
2024 -2025	587		587		0	16	0	2	569
2025 -2026	593		593		0	17	0	3	573
2026 -2027	598		598		0	19	0	3	576
2027 -2028	602		602		0	20	0	3	578

[1] Values include DSM Impacts.
[2] Reduction estimated at busbar. 2017-2018 DSM is actual at peak.
[3] Reflects no expected utilization of demand response (DR) resources in winter.
[4] 2017-2018 values reflect incremental increase from 2016-2017.

City Of Tallahassee

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

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Year	Total	Wholesale	Retail	Interruptible	Residential Load Management [2], [3]	Comm./Ind Residential Conservation [2], [4]	Load Management [2], [3]	Comm./Ind Conservation [2], [4]	Net Firm Demand [1]
2008 -2009	579		579						579
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	623		623		0	1	0	0	621
2018 -2019	564		564		0	4	0	0	559
2019 -2020	575		575		0	7	0	1	568
2020 -2021	585		585		0	9	0	1	576
2021 -2022	594		594		0	11	0	2	582
2022 -2023	602		602		0	13	0	2	588
2023 -2024	611		611		0	14	0	2	595
2024 -2025	620		620		0	16	0	2	601
2025 -2026	628		628		0	17	0	3	608
2026 -2027	636		636		0	19	0	3	614
2027 -2028	643		643		0	20	0	3	619

[1] Values include DSM Impacts.
[2] Reduction estimated at busbar. 2017-2018 DSM is actual at peak.
[3] Reflects no expected utilization of demand response (DR) resources in winter.
[4] 2017-2018 values reflect incremental increase from 2016-2017.

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) Comm./Ind Residential Conservation [2], [4]	(8) Load Management [2], [3]	(9) Comm./Ind Conservation [2], [4]	(10) Net Firm Demand [1]
2008 -2009	579		579						579
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	623		623		0	1	0	0	621
2018 -2019	544		544		0	4	0	0	539
2019 -2020	545		545		0	7	0	1	538
2020 -2021	547		547		0	9	0	1	537
2021 -2022	548		548		0	11	0	2	536
2022 -2023	550		550		0	13	0	2	535
2023 -2024	552		552		0	14	0	2	536
2024 -2025	555		555		0	16	0	2	536
2025 -2026	557		557		0	17	0	3	537
2026 -2027	559		559		0	19	0	3	537
2027 -2028	561		561		0	20	0	3	537

[1] Values include DSM Impacts.
[2] Reduction estimated at busbar. 2017-2018 DSM is actual at peak.
[3] Reflects no expected utilization of demand response (DR) resources in winter.
[4] 2017-2018 values reflect incremental increase from 2016-2017.

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	Utility Use & Losses	Net Energy for Load [3], [4]	Load Factor % [3]
2008	2,679			2,679		155	2,834	55
2009	2,661			2,661		140	2,801	53
2010	2,754			2,754		177	2,931	53
2011	2,711			2,711		88	2,799	54
2012	2,593			2,593		117	2,710	56
2013	2,558			2,558		126	2,684	56
2014	2,638			2,638		114	2,751	55
2015	2,655			2,655		121	2,776	53
2016	2,640			2,640		139	2,779	53
2017	2,620	3	0	2,617		141	2,758	53
2018	2,696	8	1	2,687		143	2,830	52
2019	2,749	17	2	2,729		145	2,875	55
2020	2,780	27	4	2,748		153	2,901	56
2021	2,805	37	6	2,762		147	2,909	56
2022	2,828	44	7	2,777		148	2,925	56
2023	2,852	51	8	2,793		149	2,942	56
2024	2,879	58	9	2,813		156	2,970	56
2025	2,905	64	9	2,832		151	2,982	56
2026	2,930	70	10	2,849		152	3,001	56
2027	2,953	76	11	2,866		152	3,018	56

[1] Reduction estimated at customer meter. 2017 DSM is actual incremental increase from 2016.
[2] History is total sales to City customers. Forecast is sales served by City electric system.
[3] Values include DSM Impacts.
[4] 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	(7) Utility Use & Losses	(8) Net Energy for Load [3], [4]	(9) Load Factor % [3]
2008	2,679			2,679		155	2,834	55
2009	2,661			2,661		140	2,801	53
2010	2,754			2,754		177	2,931	53
2011	2,711			2,711		88	2,799	54
2012	2,593			2,593		117	2,710	56
2013	2,558			2,558		126	2,684	56
2014	2,638			2,638		114	2,751	55
2015	2,655			2,655		121	2,776	53
2016	2,640			2,640		139	2,779	53
2017	2,620	3	0	2,617		141	2,758	53
2018	2,723	8	1	2,714		144	2,858	53
2019	2,808	17	2	2,788		148	2,937	55
2020	2,861	27	4	2,829		157	2,986	56
2021	2,904	37	6	2,862		152	3,014	56
2022	2,944	44	7	2,893		154	3,047	56
2023	2,984	51	8	2,925		156	3,081	56
2024	3,027	58	9	2,960		165	3,125	56
2025	3,067	64	9	2,993		159	3,152	56
2026	3,105	70	10	3,025		161	3,186	56
2027	3,142	76	11	3,055		163	3,218	56

[1] Reduction estimated at customer meter. 2017 DSM is actual incremental increase from 2016.
[2] History is total sales to City customers. Forecast is sales served by City electric system.
[3] Values include DSM Impacts.
[4] 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) Year	(2) Total Sales	(3) Residential Conservation [1]	(4) Comm./Ind Conservation [1]	(5) Retail Sales [2], [3]	(6) Wholesale	(7) Utility Use & Losses	(8) Net Energy for Load [3], [4]	(9) Load Factor % [3]
2008	2,679			2,679		155	2,834	55
2009	2,661			2,661		140	2,801	53
2010	2,754			2,754		177	2,931	53
2011	2,711			2,711		88	2,799	54
2012	2,593			2,593		117	2,710	56
2013	2,558			2,558		126	2,684	56
2014	2,638			2,638		114	2,751	55
2015	2,655			2,655		121	2,776	53
2016	2,640			2,640		139	2,779	53
2017	2,620	3	0	2,617		141	2,758	53
2018	2,670	8	1	2,661		141	2,802	51
2019	2,690	17	2	2,670		142	2,812	55
2020	2,698	27	4	2,667		148	2,815	56
2021	2,705	37	6	2,662		142	2,804	56
2022	2,711	44	7	2,660		142	2,801	56
2023	2,719	51	8	2,660		142	2,802	56
2024	2,731	58	9	2,664		148	2,813	57
2025	2,742	64	9	2,668		142	2,810	57
2026	2,752	70	10	2,671		142	2,814	57
2027	2,761	76	11	2,674		142	2,816	57

[1] Reduction estimated at customer meter. 2017 DSM is actual incremental increase from 2016.
[2] History is total sales to City customers. Forecast is sales served by City electric system.
[3] Values include DSM Impacts.
[4] 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)
	2017 Actual		**2018 Forecast [1][2]**		**2019 Forecast [1]**	
Month	Peak Demand (MW)	NEL (GWh)	Peak Demand (MW)	NEL (GWh)	Peak Demand (MW)	NEL (GWh)
January	533	211	541	232	549	236
February	378	182	490	204	497	207
March	444	209	434	203	443	207
April	477	216	422	205	430	209
May	510	241	514	243	524	247
June	550	252	559	265	568	270
July	584	285	569	281	579	286
August	598	290	593	291	598	296
September	522	245	542	258	552	262
October	528	234	466	223	469	225
November	404	184	455	209	458	210
December	501	209	451	217	454	219
TOTAL		2,758		2,830		2,875

[1] Peak Demand and NEL include DSM Impacts.
[2] Represents forecast values for 2018.

City of Tallahassee, Florida

2018 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 CDD[1]	Adjusted R-Squared[2]
1	Residential Customers	X					X	X							0.999
2	Residential Consumption				X	X			X	X	X	X			0.920
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			0.927
6	General Service Demand Consumption	X									X				0.951
7	General Service Large Demand Consumption			X							X				0.902
8	Monthly Load Factor[3]										X	X	X	X	0.658

[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.

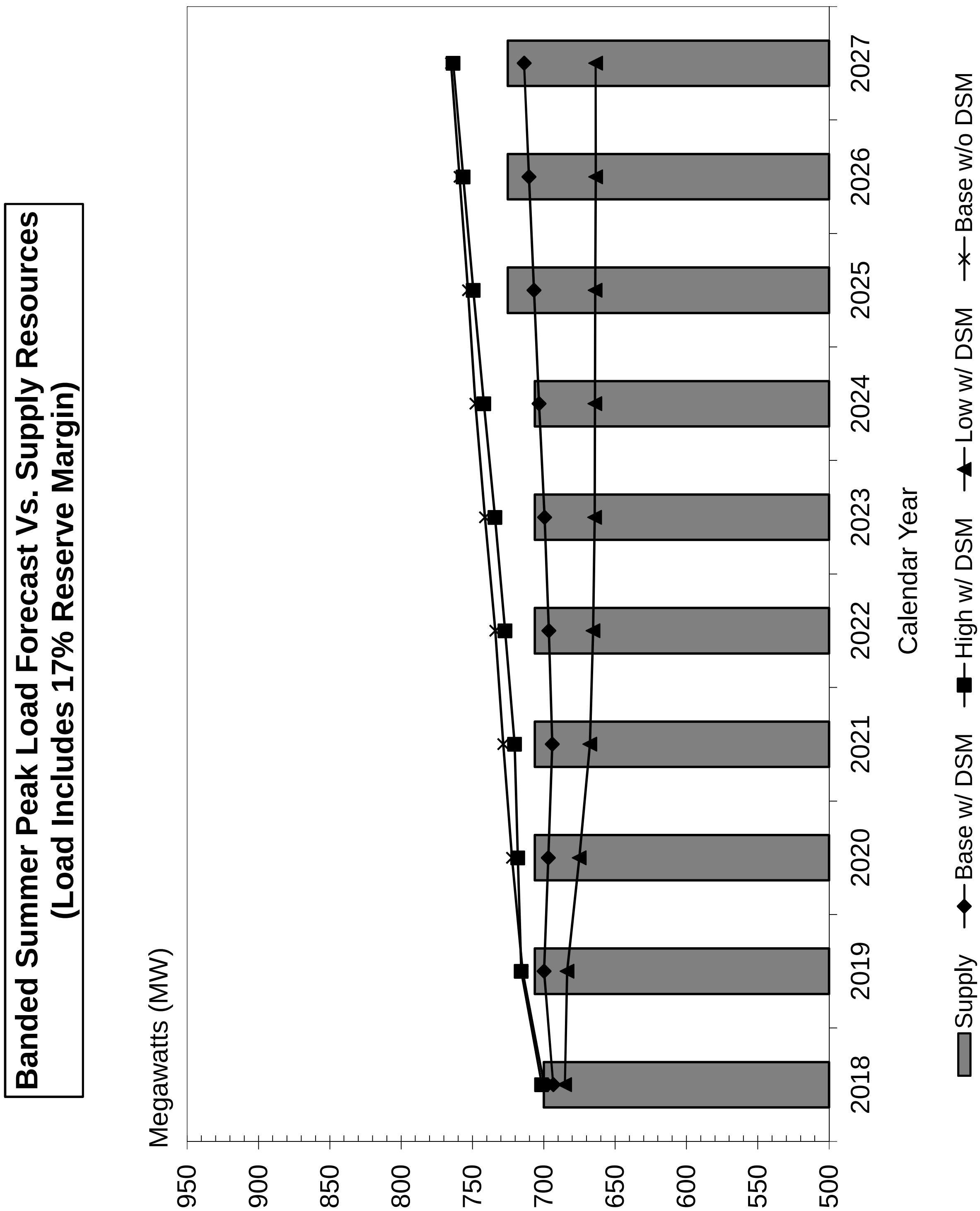
[3] As monthly load factor is essentially a stationary series, indicators of goodness of fit should be viewed differently. In combination with estimates of NEL, forecasted peak demands from this equation will have far better fit than the Adjusted R-Squared here indicates.

City of Tallahassee

2018 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 reports
5. Heating Degree Days	NOAA reports
6. AC Saturation Rate	Appliance Saturation Study
7. Heating Saturation Rate	Appliance Saturation Study
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 Real Price of Electricity	Calculated from Revenues, kWh sold, CPI 2017 Annual Energy Outlook - FRCC Region
23. Commercial Real Price Of Electricity	Calculated from Revenues, kWh sold, CPI 2017 Annual Energy Outlook - FRCC Region


Banded Summer Peak Load Forecast Vs. Supply Resources
(Load Includes 17% Reserve Margin)
Megawatts (MW)
950
900
850
800
750
700
650
600
550
500
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
Calendar Year
Supply
Base w/ DSM
High w/ DSM
Low w/ DSM
Base w/o DSM

City Of Tallahassee

2018 Electric System Load Forecast

Projected Demand Side Management Energy Reductions [1]

Calendar Year Basis

Year	Residential Impact (MWh)	Commercial Impact (MWh)	Total Impact (MWh)
2018	8,435	1,024	9,458
2019	18,321	2,626	20,947
2020	28,896	4,552	33,449
2021	38,645	6,369	45,015
2022	46,235	7,307	53,542
2023	53,750	8,144	61,894
2024	60,774	8,961	69,735
2025	67,503	9,704	77,207
2026	73,793	10,465	84,258
2027	79,967	11,194	91,161

[1] Reductions estimated at generator busbar.

City Of Tallahassee

2018 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)
2018	2018-2019	2	4	0	0	0	0	3	0	5	5
2019	2019-2020	4	7	1	1	3	0	5	0	13	7
2020	2020-2021	6	9	2	1	6	0	8	0	22	10
2021	2021-2022	8	11	2	2	10	0	10	0	29	12
2022	2022-2023	9	13	3	2	10	0	10	0	32	14
2023	2023-2024	11	14	4	2	10	0	10	0	35	16
2024	2024-2025	13	16	5	2	10	0	10	0	37	18
2025	2025-2026	14	17	5	3	11	0	10	0	40	20
2026	2026-2027	15	19	6	3	11	0	10	0	42	22
2027	2027-2028	17	20	7	3	11	0	10	0	44	24

[1] Reductions estimated at busbar.

[2] Represents projected winter peak reduction capability associated with demand response (DR) resource. However, as reflected on Schedules 3.1.1-3.2.3 (Tables 2.4-2.9), DR utilization expected to be predominantly in the summer months.

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 2016	Actual 2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
(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	2	0	0	0	0	0	0	0	0	0	0	0
(11)		CT	1000 BBL	0	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	21,081	21,499	21,440	21,271	20,816	20,707	21,065	21,208	21,189	21,425	21,538	21,424
(14)		Steam	1000 MCF	2,240	2,180	1,226	0	0	0	0	0	0	0	0	0
(15)		CC	1000 MCF	16,434	17,673	19,787	20,525	19,818	19,606	20,468	20,502	20,028	20,684	20,767	19,992
(16)		CT	1000 MCF	2,408	1,646	427	746	998	1,102	597	706	1,161	740	771	1,431
(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 2016	Actual 2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
(1)	Annual Firm Interchange		GWh	0	0	13	11	10	8	7	5	4	2	1	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	0	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	0	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	2562	2635	2,812	2,856	2,795	2,797	2,828	2,846	2,864	2,885	2,903	2,907
(15)		Steam	GWh	181	175	106	0	0	0	0	0	0	0	0	0
(16)		CC	GWh	2,145	2,298	2,666	2,768	2,676	2,663	2,756	2,761	2,721	2,794	2,809	2,732
(17)		CT	GWh	236	162	41	89	120	134	72	85	143	90	95	175
(18)		Diesel	GWh	0	0	0	0	0	0	0	0	0	0	0	0
(19)	Hydro		GWh	21	13	14	14	14	14	14	14	14	14	14	14
(20)	Economy Interchange[1]		GWh	195	110	-50	-48	-40	-32	-45	-44	-32	-38	-36	-21
(21)	Renewables		GWh	0	0	41	41	122	122	121	121	120	119	118	118
(22)	Net Energy for Load		GWh	2,778	2,758	2,830	2,875	2,901	2,909	2,925	2,942	2,970	2,982	3,001	3,018

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

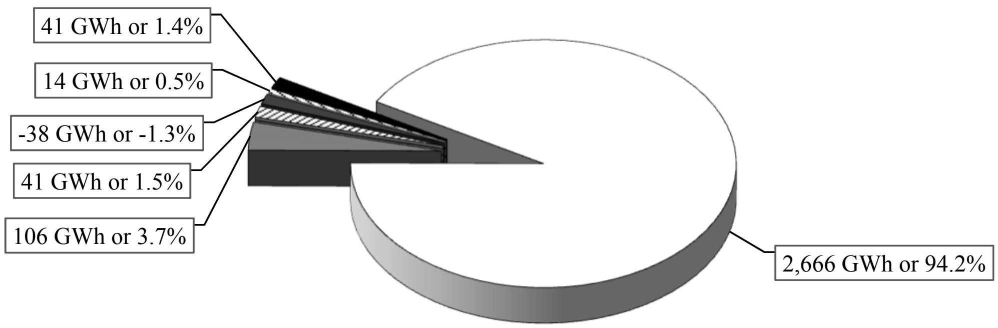
City Of Tallahassee

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 2016	Actual 2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
(1)	Annual Firm Interchange		%	0.0	0.0	0.4	0.4	0.3	0.3	0.2	0.2	0.1	0.1	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	%	92.2	95.5	99.4	99.4	96.4	96.2	96.7	96.7	96.4	96.7	96.7	96.3
(15)		Steam	%	6.5	6.4	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(16)		CC	%	77.2	83.3	94.2	96.3	92.2	91.6	94.2	93.9	91.6	93.7	93.6	90.5
(17)		CT	%	8.5	5.9	1.5	3.1	4.1	4.6	2.5	2.9	4.8	3.0	3.2	5.8
(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		%	0.7	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
(20)	Economy Interchange		%	7.0	4.0	-1.8	-1.7	-1.4	-1.1	-1.5	-1.5	-1.1	-1.3	-1.2	-0.7
(21)	Renewables		%	0.0	0.0	1.4	1.4	4.2	4.2	4.1	4.1	4.0	4.0	3.9	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

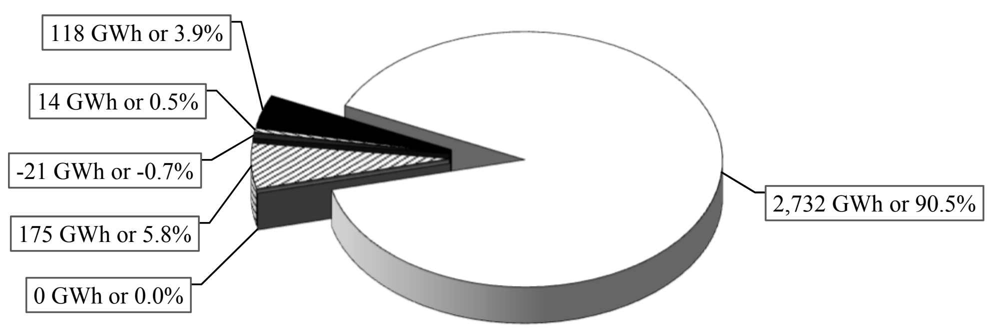
Generation By Resource/Fuel Type

Calendar Year 2018



2018 Total NEL = 2,830 GWh

Calendar Year 2027



2027 Total NEL = 3,018 GWh

CC - Gas | Steam - 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. To satisfy load, planning reserve and operational requirements in the reporting period, the City may need to either advance the in-service date of new power supply resources or procure firm transmission service from Duke and/or Southern.

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

Several generating unit retirements have taken place in the last year and others are scheduled in the near term. A total of 46 MW (summer net rating) of generating capacity provided by three (3) small combustion turbines (Hopkins CTs 1 & 2 and Purdom CT 1) were retired in 2017 and Purdom CT 2 (10 MW summer net rating) is planned for retirement by the fall of 2018. In addition, the City's Hopkins Unit 1, which first went into service in 1971, is also planned for retirement by the fall of 2018. All of these generating units were/are in excess of 40 years old. Expected future resource additions are discussed in Section 3.2.6, "Future Power Supply Resources".

The City currently operates the C. H. Corn Hydroelectric facility located on Lake Talquin. 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 Forida and leased to the City under a 30-year lease with two 10-year renewal options. The City is in the first of the two renewal option periods. The facility operates under an operating license issued by the Federal Energy Regulatory Commission (FERC). The FERC license is set to expire in June 2022. Following a review of potential options for the facility, the City has elected to not seek a renewal of the FERC license. In June of 2017, the City filed a surrender application with FERC to surrender the Operating license. This application is still pending before FERC. Once FERC approves the application, the City would expect the facility to cease operations in a fairly short order. The facility will then revert to the State of Florida who will operate it to maintain Lake Talquin unless the State finds a suitor to license the facility for electric generation.

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 will alter 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 purchases from conventional sources.

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, studies indicate that 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"). The project is located adjacent to the Tallahassee International Airport and will deliver power to City-owned distribution facility. The City delcared commercial operations of the project on December 13, 2017. In an effort to continue the increased use of renewables, the City Commission authorized the Electric Utlitity to enter into negotiations with Origis for a second project with an output of 40 MW_{ac}. If the negotiations are successful this would bring the City's total utility scale solar capacity to 60 MW_{ac}. The 40 MW_{ac} project will be sited on additional property adjacent to the Tallahassee International Airport, but not electrically connected to the 20 MW_{ac} project. The projected commercial operations date for the 40 MW_{ac} facility will be at the end of the third quarter of 2019.

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. One action being taken by the City is the replacement generation project (see Section 3.2.6) that will result in 92 MW of quick start generating resources being installed on the system. In addition to the ongoing modernization of the City's generation fleet, these units will provide reliability back up for the intermittent resources on the system.

As of the end of calendar year 2017 the City has a portfolio of 232 kW of solar PV operated and maintained by the Electric Utility and a cumulative total of 1,672 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.

3.2.6 FUTURE POWER SUPPLY RESOURCES

The City currently projects that replacement power supply resources will be needed to maintain electric system adequacy and reliability through the 2027 horizon year. This is being driven by the scheduled retirements of several generating units on the City's system discussed in Section 3.2.3. To support this need, the City Commission has authorized two replacement generation projects for a total of 92 MW.

The first generation project is currently under construction at the City's Substation 12. Standard industry practice is to have at least two transmission lines serving each substation to ensure electric service reliability. However, Substation 12 is currently only served via a single transmission line. Substation 12 serves a number of critical loads within the City's service territiory including, but not limited to, Tallahassee Memorial Hospital (TMH), a large number of community medical offices/facilities adjacent to TMH, and the Tallahassee Police Department. Due to the density of businesses, residences and roadways in the area, it is not cost feasible to interconnect another transmission line with this substation. As an alternative, a generation project located at the substation will provide 18 MW (in the form of two 9.2 MW natural gas fueled reciprocating internal combustion engines (RICE or IC)). These units will provide back up for the critical loads served from this substation in the event of a loss of the single transmission line. While this project is primarily intended as a solution to a transmission constraint, it will also provide firm, quick start resources available for dispatch to meet customer demand and load on the system..

In addition to the generating capacity to be added at Substation 12 new generating capacity is also being constructed at the Hopkins facility to offset the planned retirement of the City's Hopkins Unit 1 (76 MW). On September 28, 2016, the City Commission authorized staff to move forward with the purchase and installation of four (4) 18.5 MW RICE generators, similar to those being installed at Subsation 12, at the City's existing Hopkins plant site.

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

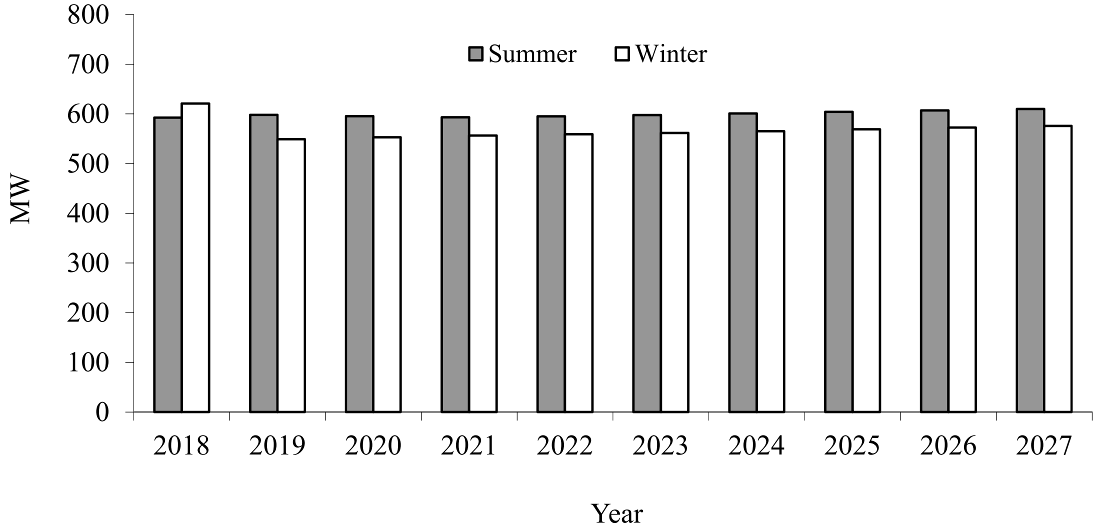
- Multiple RICE generators provide greater dispatch flexibility.
- Additional RICE generators can be installed at either the City's Hopkins plant or split between the Hopkins plant and Purdom plant.
- The RICE generators are more efficient than the units that are being retired providing significant potential 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 scheduled to be retired.
- Hopkins Unit 1 currently has a minimum up time requirement of 100 hours. This may at times require the unit to remain on line during daily off-peak periods when the unit's generation is not needed and/or may represent excess generation that must be sold, possibly at a loss. Replacing Hopkins Unit 1 with the smaller, "quick start" RICE generators would allow 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 indicate that some of the associated debt service could be offset by the fuel savings from the efficiency gains achieved.

Because of the slight decrease in forecast summer peak demand associated with the City's 2018 load forecast update, it is anticipated that additional capacity will be needed by the summer of 2025. For the purposes of this report it is assumed that another 18.5 MW RICE generator would be installed at the Hopkins site. The timing, site, type and size of this new power supply resource may vary dependent upon the metric(s) used to determine resource adequacy and as the nature of the need becomes better defined. Any proposed addition could be a generator or a peak season purchase.

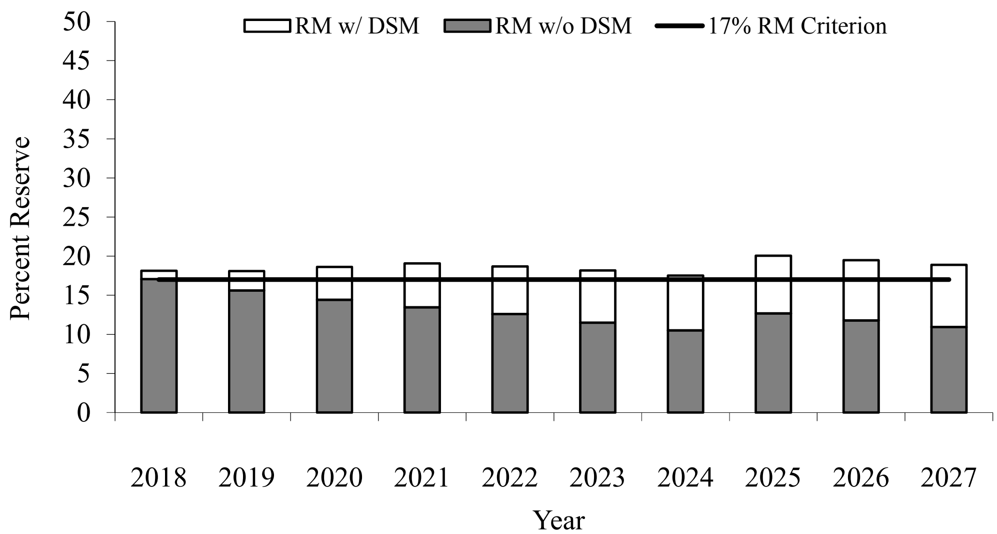
The suitability of this resource plan is dependent on the performance of the City's DSM portfolio (described in Section 2.1.3 of this report) and the City's projected transmission import capability. If only 50% of the projected annual DSM peak demand reductions are achieved, the City would require about 20 MW of additional power supply resources to meet its load and planning reserve requirements through the horizon year of 2027. 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 2018 through 2027.

System Peak Demands (Including DSM Impacts)



Summer Reserve Margin (RM)



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)
							Reserve Margin Before Maintenance			Reserve Margin After Maintenance	
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)	(MW)	% of Peak	Scheduled Maintenance (MW)	(MW)	% of Peak
2018	700	0	0	0	700	593	107	18	0	107	18
2019	706	0	0	0	706	598	108	18	0	108	18
2020	706	0	0	0	706	596	111	19	0	111	19
2021	706	0	0	0	706	593	113	19	0	113	19
2022	706	0	0	0	706	595	111	19	0	111	19
2023	706	0	0	0	706	598	109	18	0	109	18
2024	706	0	0	0	706	601	105	18	0	105	18
2025	725	0	0	0	725	604	121	20	0	121	20
2026	725	0	0	0	725	607	118	19	0	118	19
2027	725	0	0	0	725	610	115	19	0	115	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
2018/19	776	0	0	0	776	549	227	41	0	227	41
2019/20	776	0	0	0	776	553	223	40	0	223	40
2020/21	776	0	0	0	776	557	220	39	0	220	39
2021/22	776	0	0	0	776	559	217	39	0	217	39
2022/23	776	0	0	0	776	562	215	38	0	215	38
2023/24	776	0	0	0	776	565	211	37	0	211	37
2024/25	776	0	0	0	776	569	207	36	0	207	36
2025/26	795	0	0	0	795	573	222	39	0	222	39
2026/27	795	0	0	0	795	576	219	38	0	219	38
2027/28	795	0	0	0	795	578	216	37	0	216	37

[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		
	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
Purdom	CT-2	Wakulla	GT	NG	DFO	PL	TK	NA	5/64	10/18	15,000	-10	-10	RT
Hopkins	1	Leon	ST	NG	NA	PL	NA	NA	5/71	10/18	75,000	-76	-78	RT
Sub 12 DG	IC 1-2 [1]	Leon	IC	NG	NA	PL	NA	5/17	10/18	NA	9,341 [2]	18	18	U
Hopkins	IC 1-4 [1]	Leon	IC	NG	NA	PL	NA	7/17	12/18	NA	18,759 [2]	74	74	U
Hopkins	IC 5 [1]	Leon	IC	NG	NA	PL	NA	3/24	6/25	NA	18,759	18	18	P

Acronyms

GT Gas Turbine
ST Steam Turbine
IC Internal Combustion

Pri Primary Fuel
Alt Alternate Fuel
NG Natural Gas
DFO Diesel Fuel Oil
RFO Residual Fuel Oil
PL Pipeline
TK Truck

kW Kilowatts
MW Megawatts
RT Existing generator scheduled for retirement.
P Planned for installation but not utility authorized. Not under construction.
U Under construction, less than or equal to 50 percent complete.

[1] For the purposes of this report, the City has identified the addition of two (2) 9.2 MW reciprocating internal combustion engine (RICE) generating units to be located at its existing Substation 12, and five (5) 18.4 MW RICE units at its existing Hopkins Plant site. TAL has commenced construction of the 2018 resource additions. The number, timing, site, type and size of the 2025 resource addition 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 locations or a peak season purchase.

[2] 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) [3]	Total Capacity (MW)	Res %
2018	598	5	593	700 [2]	0	0		700	18
2019	611	13	598	614	0	0	92	706	18
2020	617	22	596	614	0	0	92	706	19
2021	623	29	593	614	0	0	92	706	19
2022	627	32	595	614	0	0	92	706	19
2023	634	35	598	614	0	0	92	706	18
2024	639	37	601	614	0	0	92	706	18
2025	644	40	604	614	0	0	111	725	20
2026	649	42	607	614	0	0	111	725	19
2027	654	44	610	614	0	0	111	725	19

Notes

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

[2] Hophins ST 1, Purdom CT 2 official retirement currently scheduled for October 2018.

[3] For the purposes of this report, the City has identified the addition of two (2) 9.2 MW reciprocating internal combustion engine (RICE) generating units to be located at its existing Substation 12, and five (5) 18.4 MW RICE units at its existing Hopkins Plant site. TAL has commenced construction of the 2018 resource additions. The number, timing, site, type and size of the 2025 resource addition 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 locations or a peak season purchase.

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Chapter IV

Proposed Plant Sites and Transmission Lines

4.1 PROPOSED PLANT SITE

As discussed in Chapter 3 the City currently expects that additional power supply resources will be required in the reporting period to meet future system needs (see Table 4.1). The City Commission has approved the addition of two (2) 9.2 MW natural gas fueled reciprocating internal combustion engines (RICE or IC) at its Substation 12 and four (4) 18.5 MW RICE units its existing Hopkins Plant. It is anticipated that all of these units will be placed into service during 2018.

To augment these approved additions more generating capacity will be needed by the summer of 2025 to satisfy load and reserve requirements through the 2027 horizon year of this reporting cycle. For the purposes of this report it is assumed that another 18.5 MW RICE generator would be installed at the Hopkins 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 purchase.

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. The majority of 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.

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 are needed to address (i) improvements in capability to deliver power from the Hopkins Plant (on the west side of the City's service territory) to the load center, and (ii) the strengthening of the system on the east side of the City's service territory to improve the voltage profile in that area and enhance response to contingencies.

The City's transmission expansion plan includes a 230 kV loop around the City to address these needs and ensure continued reliable service consistent with current and anticipated FERC and NERC requirements. As the first phase of this transmission project, the City tapped its existing Hopkins-Duke Crawfordville 230 kV transmission line and extended a 230 kV transmission line to the east terminating at the existing Substation BP-5. The City next upgraded its existing 115 kV line from Substation BP-5 to Substation BP-4 to 230 kV and additional 230/115 kV transformation was placed in service at BP-4. The final phase of the project is an upgrade of the existing 115 kV line from Substation BP-4 to Substation BP-7 to 230 kV thereby completing the loop. This work was completed in February 2018. This new 230 kV loop addresses a number of potential line overloads for the single contingency loss of other key transmission lines in the City's system. Table 4.2 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 2019 is currently ongoing, and any revisions to project budgets in the electric utility will not be finalized until the summer of 2018. 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:	Substation 12 IC 1-2	[1]
(2)	Capacity		
	a.) Summer:	9.2	
	b.) Winter:	9.2	
(3)	Technology Type:	IC	
(4)	Anticipated Construction Timing		
	a.) Field Construction start - date:	May-17	
	b.) Commercial in-service date:	Oct-18	
(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):	1.38	
	Forced Outage Factor (FOF):	2.18	
	Equivalent Availability Factor (EAF):	93.4	
	Resulting Capacity Factor (%):	4.5	[2]
	Average Net Operating Heat Rate (ANOHR):	8,296	[3]
(13)	Projected Unit Financial Data		
	Book Life (Years)	30	
	Total Installed Cost (In-Service Year $/kW)	1,669	[4]
	Direct Construction Cost ($/kW):	1,669	
	AFUDC Amount ($/kW):	NA	
	Escalation ($/kW):	0	
	Fixed O & M ($kW-Yr):	33.10	[5]
	Variable O & M ($/MWH):	10.37	[5]
	K Factor:	NA	

Notes

[1] The generator "Capacity", "Projected Unit Performance Data" and "Projected Unit Financial Data" reflect those for a single unit. For the purposes of this report, the City has identified the addition of two (2) 9.2 MW reciprocating internal combustion engine (RICE) generating units to be located at its existing Substation 12, and five (5) 18.4 MW RICE units at its existing Hopkins Plant site. TAL has commenced construction of the 2018 resource additions. The number, timing, site, type and size of the 2025 resource addition 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 locations or a peak season purchase.

[2] Expected 2019 capacity factor for prospective Substation 12 additions.

[3] Expected 2019 net average heat rate for prospective Substation 12 additions.

[4] Estimated 2018 dollars for prospective Substation 12 additions.

[5] Estimated 2018 dollars.

City Of Tallahassee

Schedule 9
Status Report and Specifications of Proposed Generating Facilities

(1)	Plant Name and Unit Number:	Hopkins IC 1-4	[1]
(2)	Capacity		
	a.) Summer:	18.492	
	b.) Winter:	18.492	
(3)	Technology Type:	IC	
(4)	Anticipated Construction Timing		
	a.) Field Construction start - date:	Sep-17	
	b.) Commercial in-service date:	Dec-18	
(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):	1.38	
	Forced Outage Factor (FOF):	2.18	
	Equivalent Availability Factor (EAF):	93.4	
	Resulting Capacity Factor (%):	11.0	[2]
	Average Net Operating Heat Rate (ANOHR):	8,138	[3]
(13)	Projected Unit Financial Data		
	Book Life (Years)	30	
	Total Installed Cost (In-Service Year $/kW)	1,669	[4]
	Direct Construction Cost ($/kW):	1,669	
	AFUDC Amount ($/kW):	NA	
	Escalation ($/kW):	0	
	Fixed O & M ($kW-Yr):	33.10	[5]
	Variable O & M ($/MWH):	10.37	[5]
	K Factor:	NA	

Notes

[1] The generator "Capacity", "Projected Unit Performance Data" and "Projected Unit Financial Data" reflect those for a single unit. For the purposes of this report, the City has identified the addition of two (2) 9.2 MW reciprocating internal combustion engine (RICE) generating units to be located at its existing Substation 12, and five (5) 18.4 MW RICE units at its existing Hopkins Plant site. TAL has commenced construction of the 2018 resource additions. The number, timing, site, type and size of the 2025 resource addition 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 locations or a peak season purchase.

[2] Expected 2019 capacity factor for prospective Hopkins IC 1-4 additions.

[3] Expected 2019 net average heat rate for prospective Hopkins IC 1-4 additions.

[4] Estimated 2018 dollars for prospective Hopkins IC 1-4 additions.

[5] Estimated 2018 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-24	
	b.) Commercial in-service date:	Jun-25	
(5)	Fuel		
	a.) Primary fuel:	NG	
	b.) Alternate fuel:		
(6)	Air Pollution Control Strategy:	BACT compliant	
(7)	Cooling Status:	Unknown	
(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):	1.38	
	Forced Outage Factor (FOF):	2.18	
	Equivalent Availability Factor (EAF):	93.4	
	Resulting Capacity Factor (%):	11.7	[2]
	Average Net Operating Heat Rate (ANOHR):	8,139	[3]
(13)	Projected Unit Financial Data		
	Book Life (Years)	30	
	Total Installed Cost (In-Service Year $/kW)	2,034	[4]
	Direct Construction Cost ($/kW):	1,669	[5]
	AFUDC Amount ($/kW):	NA	
	Escalation ($/kW):	365	
	Fixed O & M ($kW-Yr):	33.10	[5]
	Variable O & M ($/MWH):	10.37	[5]
	K Factor:	NA	

Notes

[1] The generator "Capacity", "Projected Unit Performance Data" and "Projected Unit Financial Data" reflect those for a single unit. For the purposes of this report, the City has identified the addition of two (2) 9.2 MW reciprocating internal combustion engine (RICE) generating units to be located at its existing Substation 12, and five (5) 18.4 MW RICE units at its existing Hopkins Plant site. TAL has commenced construction of the 2018 resource additions. The number, timing, site, type and size of the 2025 resource addition 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 locations or a peak season purchase.

[2] Expected 2026 capacity factor for prospective Hopkins IC 5 addition.

[3] Expected 2026 net average heat rate for prospective Hopkins IC 5 addition.

[4] Estimated 2024 dollars for prospective Hopkins IC 5 addition.

[5] Estimated 2018 dollars.

Figure D-1 – Hopkins Plant Site

Figure D-2 – Purdom Plant Site

City Of Tallahassee

Planned Transmission Projects, 2018-2027

		From Bus		To Bus		Expected In-Service	Voltage	Line Length
Project Type	Project Name	Name	Number	Name	Number	Date	(kV)	(miles)
Reconductor	Line 17 [1]	Sub 4	7604	Sub 7	7607	2/16/18	230	4.10
New Lines	Line 55	Sub 14	7514	Sub 7	7507	6/1/18	115	5.97
Substations	Sub 22 (Bus 7522)	NA	NA	NA	NA	7/31/20	115	NA

[1] The final phase of the 230 kV loop project. Former 115 kV line 17 to be operated at 230 kV after the in-service date.

City Of Tallahassee

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

(1)	Point of Origin and Termination:	Substation 4 - Substation 7 [1]
(2)	Number of Lines:	1
(3)	Right-of -Way:	TAL Owned
(4)	Line Length:	4.0 miles
(5)	Voltage:	230 kV
(6)	Anticipated Capital Timing:	See note [2]; in service date 2/16/2018
(7)	Anticipated Capital Investment:	See note [2]
(8)	Substations:	See note [3]
(9)	Participation with Other Utilities:	None

Notes

[1] Existing Line 17 rebuilt/reconductored and operating voltage increased from 115 kV to 230 kV.

[2] Anticipated capital investment associated with rebuilding/reconductoring associated existing transmission and substation facilities has not been segregated from that related to other improvements being made to these facilities for purposes other than that of establishing this 230 kV transmission line.

[3] North terminus is existing Substation 7; south terminus is existing Substation 4.

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