Ten Year Site Plan: 2016-2025

City of Tallahassee Utilities

Photo: Purdom Unit 8

Report prepared by: City of Tallahassee Electric System Integrated Planning

#1 Public Utility in America

City of Tallahassee
Your Own Utilities℠

CITY OF TALLAHASSEE
TEN YEAR SITE PLAN FOR ELECTRICAL GENERATING FACILITIES
AND ASSOCIATED TRANSMISSION LINES
2016-2025
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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 117,825 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 746 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 seven points of interconnection with Duke Energy Florida ("Duke", formerly Progress Energy Florida); three 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 20 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 128 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.

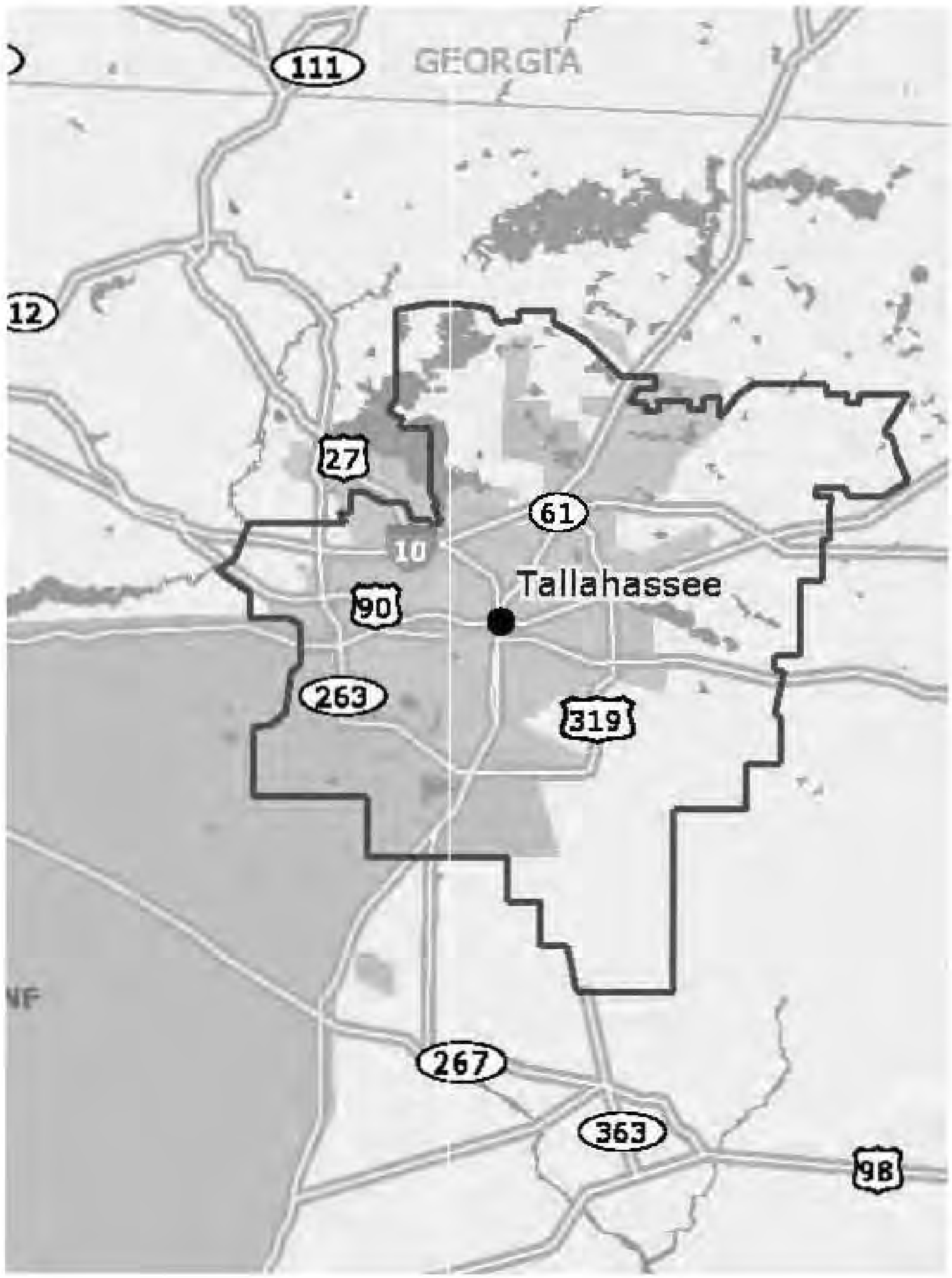
The City’s current total net summer installed generating capability is 746 MW. The corresponding winter net peak installed generating capability is 822 MW. Table 1.1 contains the details of the individual generating units.

1.2 PURCHASED POWER AGREEMENTS

The City has no long-term firm capacity and energy purchase agreements. 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 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 be completed by 2019 at which time all City customers will be served via City facilities. Reciprocal service is provided to Talquin customers served by the City electric system. Payments for electric service provided to and received from Talquin and the transfer of customers and electric facilities is governed by a 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, 2015

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Plant	Unit No.	Location	Unit Type	Fuel Primary	Fuel Alternate	Fuel Transport Primary	Fuel Transport Alternate	Alt. Fuel Days Use	Commercial In-Service Month/Year	Expected Retirement Month/Year	Gen. Max. Nameplate (kW)	Net Capability Summer (MW)	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-1		GT	NG	FO2	PL	TK	[1, 2]	12/63	10/17	15,000	10	10
	GT-2		GT	NG	FO2	PL	TK	[1, 2]	5/64	10/17	15,000	10	10
											Plant Total	242	278
A. B. Hopkins	1	Leon	ST	NG	NA	PL	NA	[3]	5/71	1/21	75,000	76	78
	2		CC	NG	FO2	PL	TK	[2]	6/08 [4]	Unknown	358,200 [5]	300	330 [7]
	GT-1		GT	NG	FO2	PL	TK	[2]	2/70	4/17	16,320	12	14
	GT-2		GT	NG	FO2	PL	TK	[2]	9/72	4/18	27,000	24	26
	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	504	544
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, 2015			746	822

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 based on combustion turbine generator (CTG) nameplate and modeled steam turbine generator (STG) output in a 1x1 combined cycle (CC) configuration with supplemental duct firing.

[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 ^{o}F and 29 ^{o}F ambient temperature, respectively.

CHAPTER II

Forecast of Energy/Demand Requirements and Fuel Utilization

2.0 INTRODUCTION

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

2.1 SYSTEM DEMAND AND ENERGY REQUIREMENTS

Historical and forecast energy consumption and customer information are presented in Tables 2.1, 2.2 and 2.3 (Schedules 2.1, 2.2, and 2.3). Figure B1 shows the historical total energy sales and forecast energy sales by customer class. Figure B2 shows the percentage of energy sales by customer class (excluding the impacts of DSM) for the base year of 2016 and the horizon year of 2025. 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 2015-2017 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 a methodology that the City first employed in 1980, and has since been updated and revised every one or two years. The methodology consists of nine multi-variable linear regression models and four 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 linear 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.

Since 1992, the City has used two econometric models to separately predict summer and winter peak demand. Table 2.14 also shows the key explanatory variables used in the demand models. The seasonal peak demand forecasts are developed first by forecasting expected system load factor. 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 predictive variables for projected load factors versus summer peak demand include maximum summer temperature, maximum temperature on the day prior to the peak and real residential price of electricity. For projected load factors versus winter peak demand minimum winter temperature, degree-days heating the day prior to the winter peak day, deviation from a base minimum temperature of 22 degrees and annual degree-days cooling are used as input. The projected load factors are then applied to 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 2015 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 2016-2035 at an average annual growth rate (AAGR) of 0.83%. This growth rate is below that for the state of Florida (1.20%) but is higher than that for the United States (0.71%).

Total and per customer demand and energy requirements have also decreased in recent years. There are several reasons for this decrease including but not limited to the issuance of new or updated federal appliance and equipment efficiency standards since 2009 and the 2010 modifications to the State of Florida Energy Efficiency Code for Building Construction. The City's energy efficiency and demand-side management (DSM) programs (discussed in Section 2.1.3) and the economic conditions during and following the 2008-2009 recession 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 2016 base forecasts for summer peak demand and annual sales/net energy for load that are generally comparable to the corresponding 2015 base forecasts. The winter peak demand forecast has been increased so that the projection is more consistent with the historical trend of actual winter peak demands.

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 capture approximately 80% of occurrences (i.e., +/- 1.3 standard deviations). The high and low forecasts shown in this year's report use statistics provided by Woods & Poole Economics, Inc. (Woods & Poole) to develop a range of potential outcomes. Woods & Poole publishes several statistics that define the average amount by which various projections they have provided in the past are different from actual results. The City's load forecasting consultant, Leidos Engineering, interpreted these statistics to develop ranges of the trends of economic activity and population representing 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
Neighborhood REACH Weatherization Assistance	Demand Response (PeakSmart)
Energy Star Appliance Rebates	
High Efficiency HVAC Rebates	
Energy Star New Home Rebates	
Solar Water Heater Rebates	
Solar PV Net Metering	
Duct Leak Repair Grants	
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.

An energy services provider (ESP) had been under contract since 2010 to assist staff in deploying a portion of the City's DSM program. Staff had worked with the ESP and consultants to develop operational and pricing parameters, craft rate tariffs and solicit participants for a commercial demand response/direct load control (DR/DLC) program. This measure is currently at about 30% of targeted enrollment and the system is online. Although the ESP contract expired in 2015, the City is exploring options to expand its DR/DLC offerings to include deployment of a residential DR/DLC measure which had been delayed while the technology matured. Otherwise, work continues with the City's Neighborhood REACH measure, and participation in the City's other existing DSM measures continues to be steady.

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. And it is questionable 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 2007-2015 attributable to the City’s DSM efforts are below those projected in the last IRP study. Due to reduced load and energy forecasts and based on the City’s experience to date DSM program participation and thus associated demand and energy savings are not expected to increase as rapidly as originally projected. The latest projections reflect a notable reduction in DSM savings when compared to prior years based in part on historical experience and a true-up of DR/DLC potential in both the City’s commercial and residential sectors. Future activities include deployment of residential DR/DLC, expansion of commercial DR/DLC to small and medium-sized businesses and implementation of new commercial demand reduction measures such as thermal energy storage that seek to shift load to the off-peak periods.

Staff will continue to periodically review and, where appropriate, update technical and economic assumptions, expected demand and energy savings and re-evaluate the cost-effectiveness of current and prospective DSM measures. The City will provide further updates regarding its 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 2016-2025. Figure B4 displays the percentage of energy by fuel type in 2016 and 2025.

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 opportunities for firm and economy purchases from neighboring systems provides allows the City to satisfy its total energy requirements consistent with our energy policies that seek to balance 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 PROSYM production simulation model (provided by Ventyx) 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 [3]		
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
2006	272,648	-	1,097	92,017	11,922	1,602	18,533	86,440
2007	273,684	-	1,099	93,569	11,745	1,657	18,583	89,168
2008	274,926	-	1,054	94,640	11,137	1,625	18,597	87,380
2009	275,059	-	1,050	94,827	11,073	1,611	18,478	87,185
2010	275,783	-	1,136	95,268	11,924	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	10,583	1,572	18,445	85,226
2013	279,468	-	1,014	97,145	10,438	1,544	18,558	83,199
2014	282,471	-	1,089	97,985	11,119	1,548	18,723	82,690
2015	285,383	-	1,088	99,007	10,989	1,567	18,820	83,263
2016	287,922	-	1,108	99,918	11,093	1,591	18,983	83,813
2017	290,743	-	1,114	100,968	11,031	1,611	19,150	84,133
2018	293,590	-	1,119	102,028	10,971	1,639	19,318	84,869
2019	296,461	-	1,125	103,096	10,912	1,656	19,488	84,978
2020	299,224	-	1,130	104,124	10,855	1,669	19,651	84,937
2021	301,782	-	1,135	105,076	10,799	1,683	19,802	84,983
2022	304,360	-	1,139	106,036	10,745	1,693	19,955	84,846
2023	306,961	-	1,144	107,004	10,691	1,703	20,108	84,710
2024	309,588	-	1,149	107,981	10,639	1,714	20,264	84,576
2025	312,164	-	1,153	108,940	10,588	1,724	20,416	84,447

[1] Population data represents Leon County population.
[2] Values include DSM Impacts.
[3] As of 2007 "Commercial" includes General Service Non-Demand, General Service Demand, General Service Large Demand, Interruptible (FSU and Goose Pond), Curtailable (TMH), Traffic Control, Security Lights and Street & Highway Lights.

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	Other Sales to Public	Total Sales to Ultimate Consumers
Year	(GWh)	Average No. of Customers [1]	Average kWh Consumption Per Customer	Railroads and Railways (GWh)	(GWh) [2]	Authorities (GWh)	(GWh) [3]
2006	-	-	-		15		2,714
2007	-	-	-		0		2,756
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		2,699
2017	-	-	-		0		2,725
2018	-	-	-		0		2,759
2019	-	-	-		0		2,781
2020	-	-	-		0		2,799
2021	-	-	-		0		2,818
2022	-	-	-		0		2,832
2023	-	-	-		0		2,847
2024	-	-	-		0		2,863
2025	-	-	-		0		2,878

[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] Values include DSM Impacts.

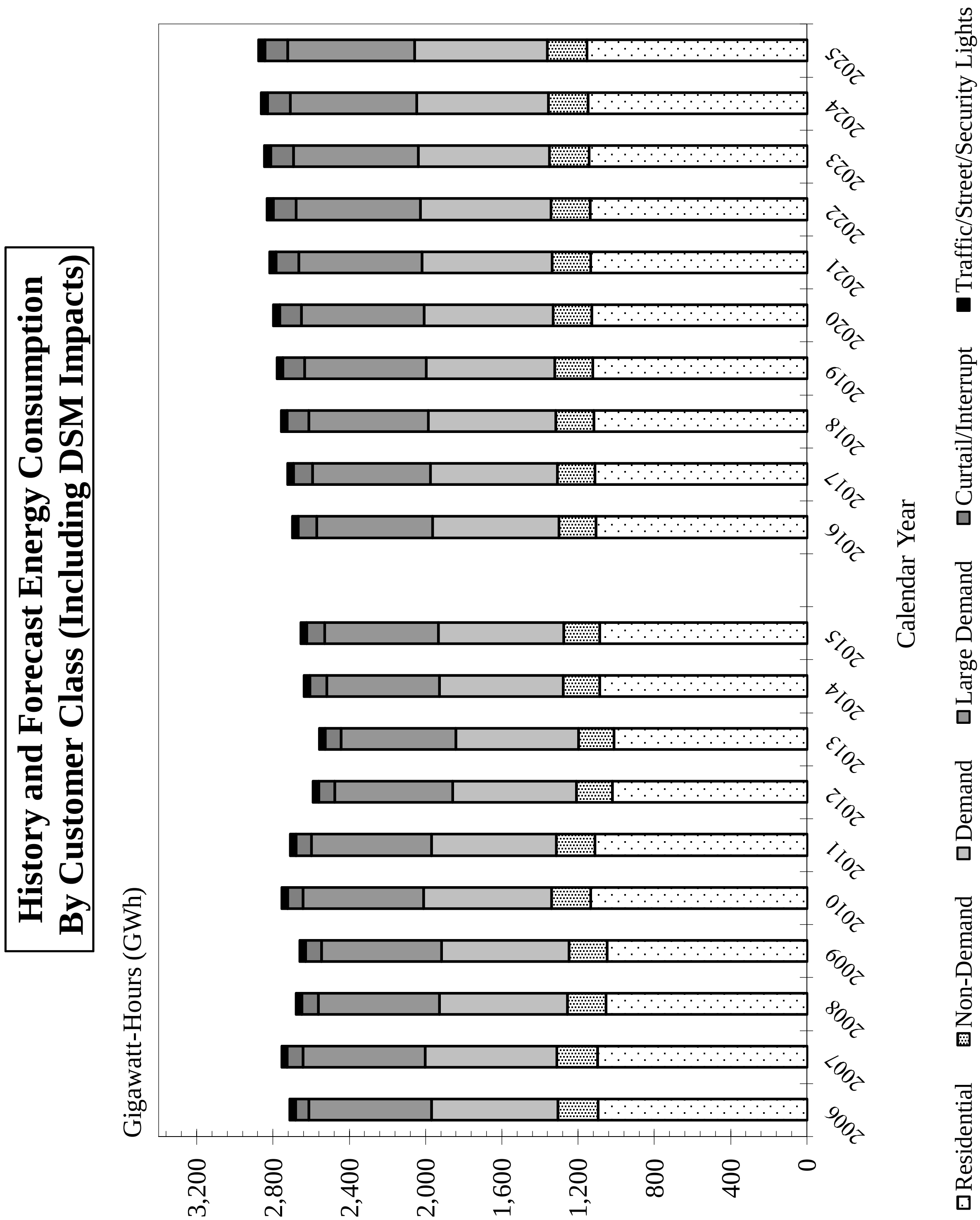
City Of Tallahassee

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

Base Load Forecast

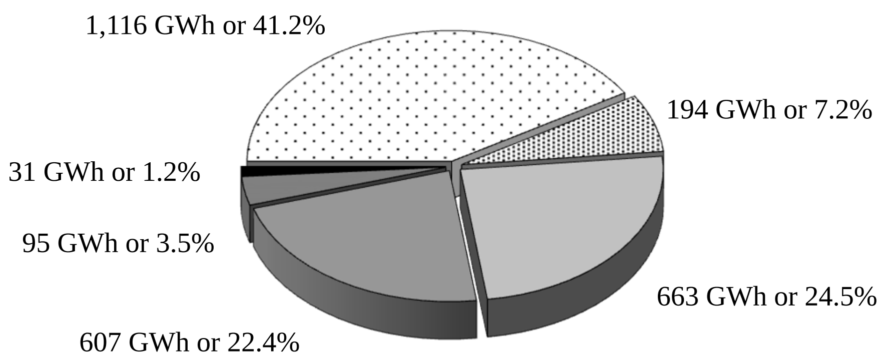
(1)	(2)	(3)	(4)	(5)	(6)
Year	Sales for Resale (GWh)	Utility Use & Losses (GWh)	Net Energy for Load (GWh) [1]	Other Customers (Average No.)	Total No. of Customers [2]
2006	0	154	2,868	0	110,550
2007	0	158	2,914	0	112,152
2008	0	155	2,834	0	113,237
2009	0	140	2,801	0	113,305
2010	0	177	2,931	0	113,694
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	148	2,847	0	118,901
2017	0	149	2,874	0	120,118
2018	0	152	2,910	0	121,346
2019	0	153	2,934	0	122,584
2020	0	154	2,953	0	123,775
2021	0	154	2,972	0	124,878
2022	0	156	2,988	0	125,990
2023	0	157	3,004	0	127,112
2024	0	157	3,020	0	128,245
2025	0	158	3,035	0	129,356

[1] 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
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
Calendar Year
Residential
Non-Demand
Demand
Large Demand
Curtail/Interrupt
Traffic/Street/Security Lights

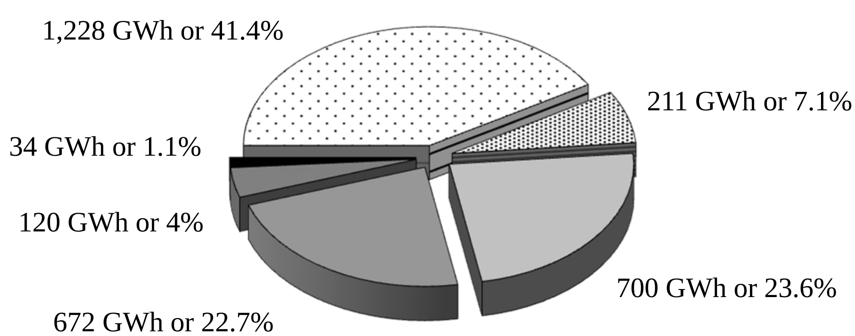
Energy Consumption By Customer Class
(Excluding DSM Impacts)

Calendar Year 2016



Total 2016 Sales = 2,707 GWh

Calendar Year 2025



Total 2025 Sales = 2,965 GWh

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

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]
2006	577		577						577
2007	621		621						621
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	601		601		0	1	0	0	600
2016	601		601		0	2	0	1	598
2017	609		609		1	3	4	2	599
2018	618		618		3	5	6	3	601
2019	625		625		5	6	8	5	601
2020	631		631		10	8	10	6	597
2021	637		637		15	9	10	8	595
2022	642		642		20	10	10	9	593
2023	647		647		20	12	10	10	595
2024	652		652		20	13	10	11	598
2025	658		658		20	14	10	13	601

[1] Values include DSM Impacts.
[2] Reduction estimated at busbar. 2015 DSM is actual at peak.
[3] 2015 values reflect incremental increase from 2014.

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]
2006	577		577						577
2007	621		621						621
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	601		601		0	1	0	0	600
2016	614		614		0	2	0	1	612
2017	625		625		1	3	4	2	616
2018	638		638		3	5	6	3	623
2019	649		649		5	6	8	5	626
2020	659		659		10	8	10	6	625
2021	668		668		15	9	10	8	627
2022	677		677		20	10	10	9	629
2023	686		686		20	12	10	10	635
2024	695		695		20	13	10	11	642
2025	705		705		20	14	10	13	648

[1] Values include DSM Impacts.
[2] Reduction estimated at busbar. 2015 DSM is actual at peak.
[3] 2015 values reflect incremental increase from 2014.

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]
2006	577		577						577
2007	621		621						621
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	601		601		0	1	0	0	600
2016	586		586		0	2	0	1	584
2017	590		590		1	3	4	2	581
2018	596		596		3	5	6	3	580
2019	600		600		5	6	8	5	576
2020	602		602		10	8	10	6	569
2021	605		605		15	9	10	8	563
2022	606		606		20	10	10	9	557
2023	608		608		20	12	10	10	557
2024	610		610		20	13	10	11	556
2025	611		611		20	14	10	13	555

[1] Values include DSM Impacts.
[2] Reduction estimated at busbar. 2015 DSM is actual at peak.
[3] 2015 values reflect incremental increase from 2014.

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]
2006 -2007	528		528						528
2007 -2008	526		526						526
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	512		512		0	1	0	0	511
2016 -2017	554		554		0	4	0	1	549
2017 -2018	562		562		0	5	0	2	555
2018 -2019	568		568		0	7	0	2	559
2019 -2020	574		574		0	9	0	3	562
2020 -2021	580		580		0	11	0	4	565
2021 -2022	583		583		0	12	0	4	567
2022 -2023	589		589		0	14	0	5	570
2023 -2024	593		593		0	15	0	5	573
2024 -2025	599		599		0	17	0	6	576
2025 -2026	603		603		0	18	0	6	579

[1] Values include DSM Impacts.
[2] Reduction estimated at busbar. 2015-2016 DSM is actual at peak.
[3] Reflects no expected utilization of demand response (DR) resources in winter.
[4] 2015-2016 values reflect incremental increase from 2014-2015.

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]
2006 -2007	528		528						528
2007 -2008	526		526						526
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	512		512		0	1	0	0	511
2016 -2017	569		569		0	4	0	1	565
2017 -2018	581		581		0	5	0	2	574
2018 -2019	590		590		0	7	0	2	581
2019 -2020	599		599		0	9	0	3	588
2020 -2021	608		608		0	11	0	4	594
2021 -2022	616		616		0	12	0	4	600
2022 -2023	625		625		0	14	0	5	606
2023 -2024	633		633		0	15	0	5	613
2024 -2025	641		641		0	17	0	6	619
2025 -2026	650		650		0	18	0	6	625

[1] Values include DSM Impacts.
[2] Reduction estimated at busbar. 2015-2016 DSM is actual at peak.
[3] Reflects no expected utilization of demand response (DR) resources in winter.
[4] 2015-2016 values reflect incremental increase from 2014-2015.

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]
2006 -2007	528		528						528
2007 -2008	526		526						526
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	512		512		0	1	0	0	511
2016 -2017	537		537		0	4	0	1	533
2017 -2018	542		542		0	5	0	2	536
2018 -2019	546		546		0	7	0	2	536
2019 -2020	548		548		0	9	0	3	536
2020 -2021	550		550		0	11	0	4	536
2021 -2022	552		552		0	12	0	4	535
2022 -2023	553		553		0	14	0	5	535
2023 -2024	555		555		0	15	0	5	535
2024 -2025	556		556		0	17	0	6	534
2025 -2026	557		557		0	18	0	6	533

[1] Values include DSM Impacts.
[2] Reduction estimated at busbar. 2015-2016 DSM is actual at peak.
[3] Reflects no expected utilization of demand response (DR) resources in winter.
[4] 2015-2016 values reflect incremental increase from 2014-2015.

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 [2], [3]	Comm./Ind Conservation [2], [3]	Retail Sales [1]	Wholesale	Utility Use & Losses	Net Energy for Load [1]	Load Factor % [1]
2006	2,714			2,714		154	2,868	57
2007	2,756			2,756		158	2,914	54
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	2,661	6	0	2,655		121	2,776	53
2016	2,707	8	0	2,699		148	2,847	54
2017	2,741	15	1	2,725		149	2,874	55
2018	2,784	23	2	2,759		152	2,910	55
2019	2,815	30	4	2,781		153	2,934	56
2020	2,842	38	5	2,799		154	2,953	56
2021	2,869	45	7	2,818		154	2,972	57
2022	2,893	53	8	2,832		156	2,988	58
2023	2,917	60	10	2,847		157	3,004	58
2024	2,941	68	11	2,863		157	3,020	58
2025	2,965	75	13	2,878		158	3,035	58

[1] Values include DSM Impacts.
[2] Reduction estimated at customer meter. 2015 DSM is actual.
[3] 2015 values reflect incremental increase from 2014.

City Of Tallahassee

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

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Year	Total Sales	Residential Conservation [2], [3]	Comm./Ind Conservation [2], [3]	Retail Sales [1]	Wholesale	Utility Use & Loss's	Net Energy for Load [1]	Load Factor % [1]
2006	2,714			2,714		154	2,868	57
2007	2,756			2,756		158	2,914	54
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	2,661	6	0	2,655		121	2,776	53
2016	2,770	8	0	2,762		152	2,914	54
2017	2,821	15	1	2,805		154	2,959	55
2018	2,879	23	2	2,855		157	3,011	55
2019	2,926	30	4	2,893		159	3,051	56
2020	2,971	38	5	2,928		161	3,089	56
2021	3,014	45	7	2,962		162	3,125	57
2022	3,055	53	8	2,994		164	3,159	57
2023	3,095	60	10	3,025		166	3,191	57
2024	3,137	68	11	3,058		168	3,226	57
2025	3,179	75	13	3,091		170	3,261	57

[1] Values include DSM Impacts.
[2] Reduction estimated at customer meter. 2015 DSM is actual.
[3] 2015 values reflect incremental increase from 2014.

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 [2], [3]	(4) Comm./Ind Conservation [2], [3]	(5) Retail Sales [1]	(6) Wholesale	(7) Utility Use & Losses	(8) Net Energy for Load [1]	(9) Load Factor % [1]
2006	2,714			2,714		154	2,868	57
2007	2,756			2,756		158	2,914	54
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	2,661	6	0	2,655		121	2,776	53
2016	2,645	8	0	2,637		145	2,781	54
2017	2,661	15	1	2,645		145	2,790	55
2018	2,689	23	2	2,664		146	2,810	55
2019	2,704	30	4	2,671		146	2,817	56
2020	2,715	38	5	2,673		147	2,819	57
2021	2,727	45	7	2,675		147	2,822	57
2022	2,734	53	8	2,673		147	2,820	58
2023	2,742	60	10	2,672		147	2,819	58
2024	2,750	68	11	2,671		147	2,817	58
2025	2,756	75	13	2,668		146	2,814	58

[1] Values include DSM Impacts.
[2] Reduction estimated at customer meter. 2015 DSM is actual.
[3] 2015 values reflect incremental increase from 2014.

City Of Tallahassee

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

(1)	(2)	(3)	(4)	(5)	(6)	(7)
	2015 Actual		**2016 Forecast [1][2]**		**2017 Forecast [1]**	
Month	Peak Demand (MW)	NEL (GWh)	Peak Demand (MW)	NEL (GWh)	Peak Demand (MW)	NEL (GWh)
January	556	225	544	235	549	237
February	548	212	524	208	529	210
March	367	201	432	208	436	210
April	447	211	457	210	461	212
May	503	240	524	241	529	244
June	569	262	590	271	595	274
July	600	287	598	284	599	286
August	569	282	592	290	597	293
September	527	244	558	260	564	262
October	452	215	493	224	498	226
November	441	198	418	201	422	203
December	362	198	458	215	462	217
TOTAL		2,776		2,847		2,874

[1] Peak Demand and NEL include DSM Impacts.
[2] Represents forecast values for 2016.

City of Tallahassee, Florida

2016 Electric System Load Forecast

Key Explanatory Variables

Ln. No.	Model Name	Leon County Population	Residential Customers	Cooling Degree Days	Heating Degree Days	Tallahassee Per Capita Taxable Sales	Price of Electricity	Minimum Winter Peak day Temp.	Prior Winter Peak day HDD	Maximum Summer Peak day Temp.	Prior Summer Peak day Temp.	Appliance Saturation	R Squared[1]
1	Residential Customers	X											0.998
2	Residential Consumption		X	X	X	X	X					X	0.936
3	General Service Non-Demand Customers		X										0.965
4	General Service Demand Customers		X										0.959
5	General Service Non-Demand Consumption	X		X	X	X							0.926
6	General Service Demand Consumption	X		X	X								0.956
7	General Service Large Demand Consumption	X		X	X								0.862
8	Summer Peak Demand						X			X	X		0.901
9	Winter Peak Demand			X				X	X				0.918

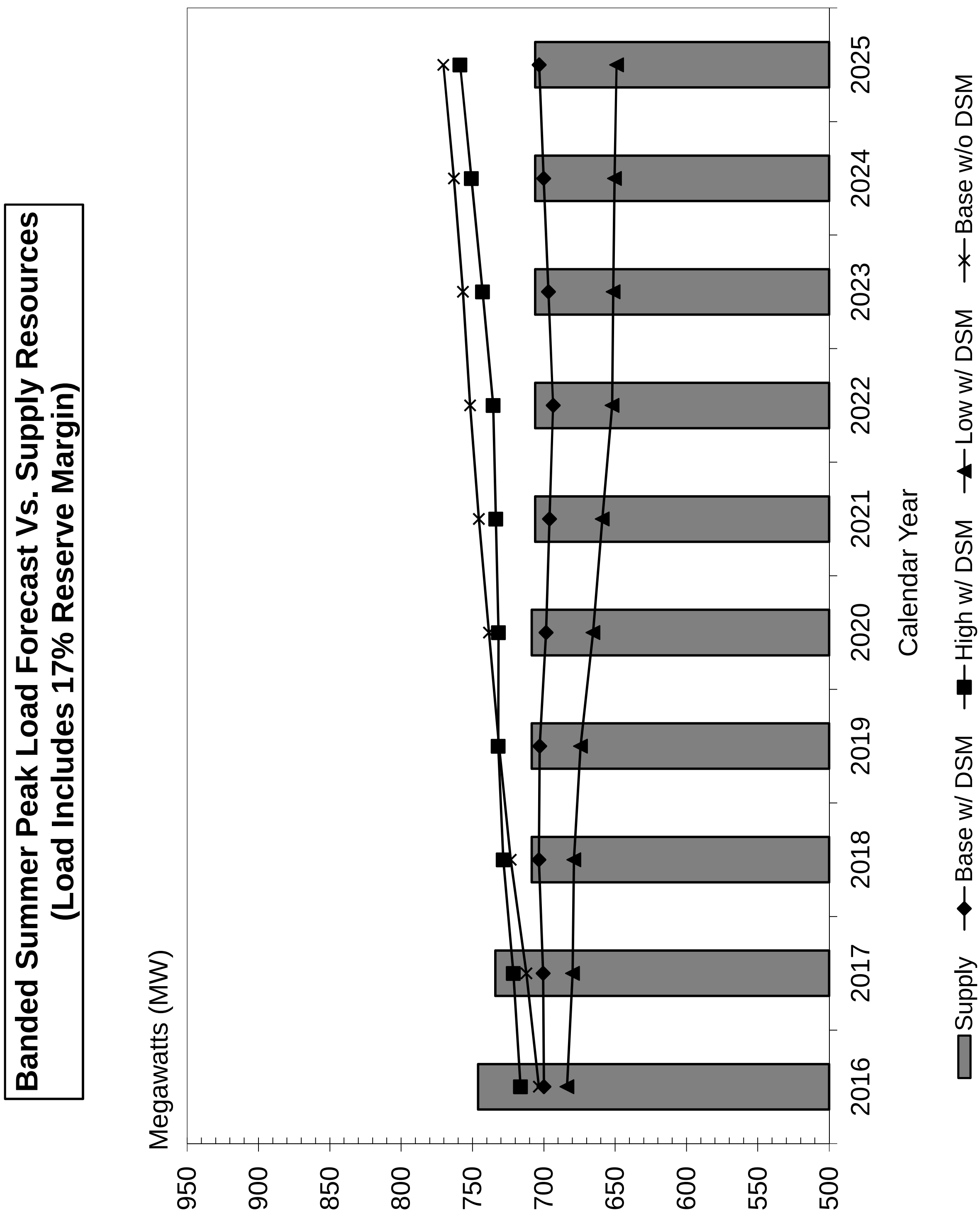
[1] R Squared, sometimes called the coefficient of determination, is a commonly used measure of goodness of fit of a linear model. If the observations fall on the model regression line, R Squared is 1. If there is no linear relationship between the dependent and independent variable, R Squared is 0. A reasonably good R Squared value could be anywhere from 0.6 to 1.

City of Tallahassee

2016 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
2.	Cooling Degree Days	NOAA reports
3.	Heating Degree Days	NOAA reports
4.	AC Saturation Rate	Appliance Saturation Study
5.	Heating Saturation Rate	Appliance Saturation Study
6.	Real Tallahassee Taxable Sales	Florida Department of Revenue, CPI
7.	Florida Population	Bureau of Economic and Business Research
8.	State Capitol Incremental	Department of Management Services
9.	FSU Incremental Additions	FSU Planning Department
10.	FAMU Incremental Additions	FAMU Planning Department
11.	GSLD Incremental Additions	City Utility Services
12.	Other Commercial Customers	City Utility Services
13.	Tall. Memorial Curtailable	System Planning/ Utilities Accounting.
14.	System Peak Historical Data	City System Planning
15.	Historical Customer Projections by Class	System Planning & Customer Accounting
16.	Historical Customer Class Energy	System Planning & Customer Accounting
17.	GDP Forecast	Blue Chip Economic Indicators
18.	CPI Forecast	Blue Chip Economic Indicators
19.	Interruptible, Traffic Light Sales, & Security Light Additions	System Planning & Customer Accounting
20.	Historical Residential Real Price of Electricity	Calculated from Revenues, kWh sold, CPI
21.	Historical Commercial Real Price Of Electricity	Calculated from Revenues, kWh sold, CPI


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
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
Calendar Year
Supply
Base w/ DSM
High w/ DSM
Low w/ DSM
Base w/o DSM

City Of Tallahassee

2016 Electric System Load Forecast

Projected Demand Side Management
Energy Reductions [1]

Calendar Year Basis

Year	Residential Impact (MWh)	Commercial Impact (MWh)	Total Impact (MWh)
2016	7,911	264	8,175
2017	15,823	791	16,614
2018	23,734	2,373	26,108
2019	31,646	3,956	35,601
2020	39,557	5,538	45,095
2021	47,468	7,120	54,589
2022	55,380	8,703	64,082
2023	63,291	10,285	73,576
2024	71,203	11,867	83,070
2025	79,114	13,449	92,563

[1] Reductions estimated at generator busbar.

City Of Tallahassee

2016 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)
2016	2016-2017	2	4	1	1	0	0	0	0	2	4
2017	2017-2018	3	5	2	2	1	0	4	0	9	7
2018	2018-2019	5	7	3	2	3	0	6	0	16	9
2019	2019-2020	6	9	5	3	5	0	8	0	23	12
2020	2020-2021	8	11	6	4	10	0	10	0	33	14
2021	2021-2022	9	12	8	4	15	0	10	0	41	16
2022	2022-2023	10	14	9	5	20	0	10	0	49	18
2023	2023-2024	12	15	10	5	20	0	10	0	51	20
2024	2024-2025	13	17	11	6	20	0	10	0	54	22
2025	2025-2026	14	18	13	6	20	0	10	0	56	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 2014	Actual 2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
(1)	Nuclear		Billion Btu	0	0	0	0	0	0	0	0	0	0	0	0
(2)	Coal		1000 Ton	0	0	0	0	0	0	0	0	0	0	0	0
(3)	Residual	Total	1000 BBL	0	0	0	0	0	0	0	0	0	0	0	0
(4)		Steam	1000 BBL	0	0	0	0	0	0	0	0	0	0	0	0
(5)		CC	1000 BBL	0	0	0	0	0	0	0	0	0	0	0	0
(6)		CT	1000 BBL	0	0	0	0	0	0	0	0	0	0	0	0
(7)		Diesel	1000 BBL	0	0	0	0	0	0	0	0	0	0	0	0
(8)	Distillate	Total	1000 BBL	0	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	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	22,250	21,649	21,802	21,817	22,205	22,359	22,519	22,315	22,246	22,352	22,556	22,594
(14)		Steam	1000 MCF	1,829	1,921	1,055	1,142	1,577	1,377	1,596	0	0	0	0	0
(15)		CC	1000 MCF	19,669	18,386	19,888	20,022	19,595	20,290	19,903	19,265	20,673	20,732	19,910	20,823
(16)		CT	1000 MCF	752	1,342	859	654	1,033	692	1,020	3,051	1,573	1,621	2,646	1,771
(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 2014	Actual 2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
(1)	Annual Firm Interchange		GWh	0	0	18	13	9	4	0	0	0	0	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	2,788	2,704	2,851	2,854	2,877	2,909	2,925	2,936	2,956	2,971	2,983	3,001
(15)		Steam	GWh	150	155	89	97	138	120	140	0	0	0	0	0
(16)		CC	GWh	2,566	2,414	2,678	2,690	2,631	2,717	2,678	2,607	2,789	2,799	2,698	2,813
(17)		CT	GWh	72	135	84	67	108	72	107	329	167	172	284	188
(18)		Diesel	GWh	0	0	0	0	0	0	0	0	0	0	0	0
(19)	Hydro		GWh	20	16	14	14	14	14	14	14	14	14	14	14
(20)	Economy Interchange[1]		GWh	-56	55	-35	-38	-31	-35	-27	-19	-22	-21	-18	-20
(21)	Renewables		GWh	0	0	0	32	41	41	40	40	40	40	40	39
(22)	Net Energy for Load		GWh	2,753	2,776	2,847	2,874	2,910	2,934	2,953	2,972	2,988	3,004	3,020	3,035

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

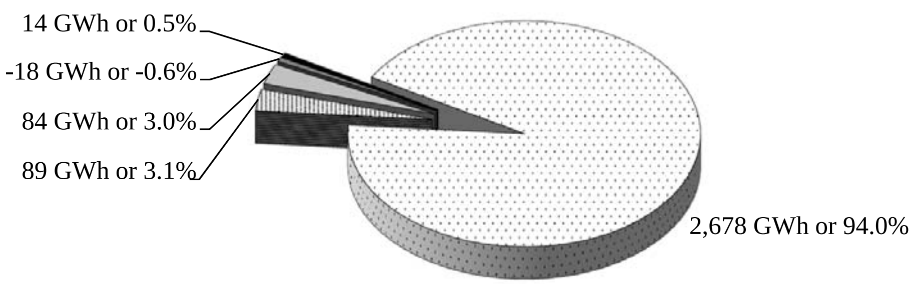
City Of Tallahassee

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 2014	Actual 2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
(1)	Annual Firm Interchange		%	0.0	0.0	0.6	0.5	0.3	0.1	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	%	101.3	97.4	100.1	99.3	98.9	99.2	99.0	98.8	98.9	98.9	98.8	98.9
(15)		Steam	%	5.4	5.6	3.1	3.4	4.8	4.1	4.7	0.0	0.0	0.0	0.0	0.0
(16)		CC	%	93.2	87.0	94.0	93.6	90.4	92.6	90.7	87.7	93.3	93.2	89.4	92.7
(17)		CT	%	2.6	4.9	3.0	2.3	3.7	2.5	3.6	11.1	5.6	5.7	9.4	6.2
(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	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
(20)	Economy Interchange		%	-2.0	2.0	-1.2	-1.3	-1.1	-1.2	-0.9	-0.6	-0.7	-0.7	-0.6	-0.7
(21)	Renewables		%	0.0	0.0	0.0	1.1	1.4	1.4	1.4	1.4	1.3	1.3	1.3	1.3
(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

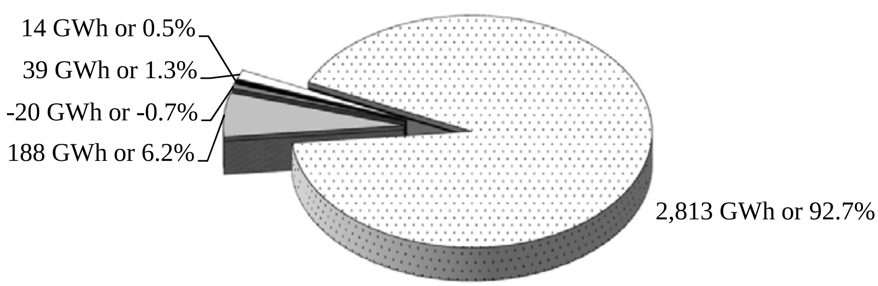
Generation By Resource/Fuel Type

Calendar Year 2016



Total 2016 NEL = 2,847 GWh

Calendar Year 2025



Total 2025 NEL = 3,035 GWh

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

Chapter III

Projected Facility Requirements

3.1 PLANNING PROCESS

In December 2006 the City completed its last comprehensive IRP Study. The purpose of this study was to review future DSM and power supply options that are consistent with the City's policy objectives. Included in the IRP Study was a detailed analysis of how the DSM and power supply alternatives perform under base and alternative assumptions.

The preferred resource plan identified in the IRP Study included the repowering of Hopkins Unit 2 to combined cycle operation, renewable energy purchases, a commitment to an aggressive DSM portfolio and the latter year addition of peaking resources to meet future energy demand. Based on more recent information including but not limited to the updated forecast of the City's demand and energy requirements (discussed in Chapter II) the City has made revisions to its resource plan. These revisions will be discussed in this chapter.

3.2 PROJECTED RESOURCE REQUIREMENTS

3.2.1 TRANSMISSION LIMITATIONS

The City's projected transmission import capability continues to be a major determinant of the need for 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 in part to the lack of investment in the regional transmission system around Tallahassee as well as the impact of unscheduled power flow-through on the City's 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.

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). Unfortunately, none of these efforts is expected to produce substantive improvements to the City's transmission import/export capability in the short-term. In consideration of the City's limited transmission import capability the results of the IRP Study and other 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 advance the in-service date of new power supply resources to complement available transmission import capability.

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 LOLP analyses to determine if conditions warrant a change to its resource adequacy criteria. The results of recent LOLP 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

At their October 17, 2005 meeting the City Commission gave the Electric Utility approval to proceed with the repowering of Hopkins Unit 2 to combined cycle operation. The repowering was completed and the unit began commercial operation in June 2008. The former Hopkins Unit 2 boiler was retired and replaced with a combustion turbine generator (CTG) and a heat recovery steam generator (HRSG). The Hopkins 2 steam turbine and generator is now powered by the steam generated in the HRSG. Duct burners have been installed in the HRSG to provide additional peak generating capability. The repowering project provides additional capacity as well as increased efficiency versus the unit's capabilities prior to the repowering project. The repowered unit has achieved official seasonal net capacities of 300 MW in the summer and 330 MW in the winter.

There are several generating unit retirements scheduled in the near term (2016-2020). A total of 56 MW (summer net rating) of generating capacity provided by four (4) small combustion turbines (Hopkins CTs 1 & 2 and Purdom CTs 1 & 2) are planned for retirement by the spring of 2018. Though the retirement dates of these units have been postponed several times in the past the City believes it would not be prudent to consider them as dependable capacity beyond their currently planned retirement dates. In addition, the City's Hopkins Unit 1, which first went into service in 1971, is planned for retirement at the end of 2020. All of these generating units are in excess of 40 years old. Expected future resource additions are discussed in Section 3.2.6, "Future Power Supply Resources".

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 projected retirement of older generating units will reduce the number 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, such as loss of load expectation (LOLE), 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's last IRP Study evaluated both short and long-term purchased power options based on conventional sources as well as power offers based on renewable resources. A consultant-assisted study completed in 2008 evaluated the potential reliability and economic benefits of prospectively increasing the City's transmission import (and export) capabilities. The results of this study 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 panels) 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 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. 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.

The City continues to seek out suitable projects that utilize the renewable fuels available within the big bend and panhandle of Florida. In February 2015, the City issued a request for proposals (RFP) for a purchase power agreement (PPA) for a 10 MW_{ac} utility scale solar PV project. During the negotiations of the Purchase Power Agreement, the project developer offered expand the project from 10 MW_{ac} to 20 MW_{ac}. On February 24, 2016, the City Commission voted to authorize negogiations for a PPA for 20 MW_{ac}. It is expected that the project will be located within the City's service territory or adjacent to a City-owned facility. Due to the intermittent nature of solar PV the PPA will be for energy only and will not be considered firm capacity. It is anticipated that this facility will be operational by the summer of 2017.

Although there are ongoing concerns regarding the potential impact 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.

As of the end of calendar year 2015 the City has a portfolio of 232 kW of solar PV operated and maintained by the Electric Utility and a cumulative total of 1,502 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.

In 2011, the City of Tallahassee signed contracts with SunnyLand Solar and Solar Developers of America (SDA) for over 3 MWs of solar PV. These demonstration projects are to be built within the City's service area and will utilize new technology pioneered by Florida State University. As of December 31, 2015 both of these projects continue to face delays due to manufacturing and development issues associated with the technology. Such delays are to be expected with projects involving the demonstration of emerging technologies. While the project developers have not announced a revised commercial operations date (COD), the City remains optimistic that the technology will mature into a viable energy resource. Until a new COD is announced, this will be the last reporting of these projects.

3.2.6 FUTURE POWER SUPPLY RESOURCES

The City currently projects that additional power supply resources will be needed to maintain electric system adequacy and reliability through the 2025 horizon year. As a result of the lower demand and energy reductions expected from DSM (discussed in Section 2.1.3) the City has determined that additional capacity will be needed by the summer of 2018 in order to satisfy its 17% reserve margin criterion.

A generation project is being developed at the City's Substation 12. The project is primarily intended as a solution to a transmission constraint. Standard industry practice is to have 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 add another transmission line to this substation. As an alternative, a generation project located at the substation will provide about 18 MW (in the form of natural gas fueled reciprocating internal combustion engines (RICE or IC)) to back up the critical loads from this substation. This capacity addition would satisfy the load and reserve requirements from summer 2018 through the summer of 2020.

In addition to the generating capacity to be added at Substation 12 new generating capacity will be needed following the planned retirement of the City's Hopkins Unit 1 (76 MW) at the end of 2020. Based on the City's 17% reserve margin criterion an additional 64 MW of generating capacity would be needed by the summer of 2021. City staff has been exploring alternatives for addressing the need to replace Hopkins Unit 1 and has found that there may be opportunities to achieve additional benefits. The option that currently appears most attractive is the installation of 50-100 MW of small (10-20 MW each) RICE generators similar to those planned for Substation 12.

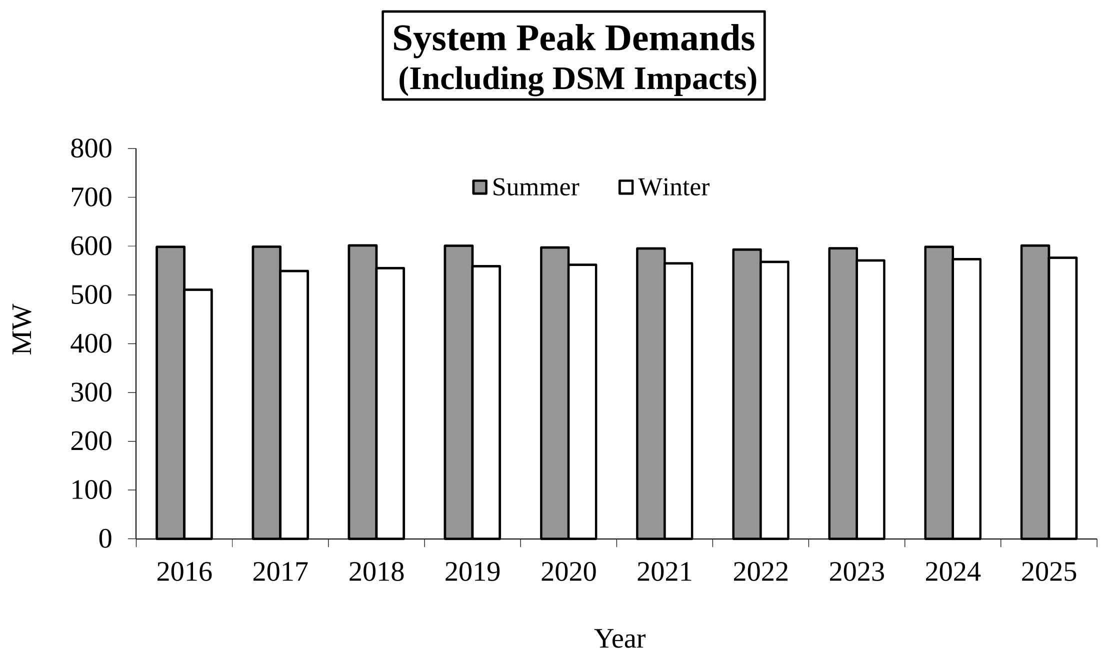
The RICE generators could provide additional benefits including but not necessarily limited to:

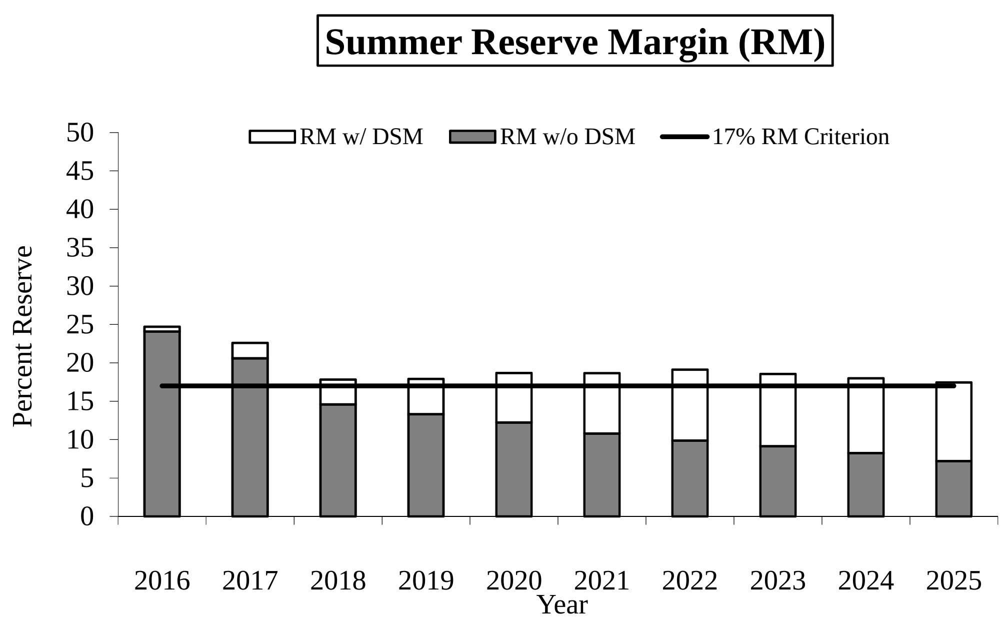
- The RICE generators could all be installed at the same time or phased over a period of years. This flexibility would allow the City to add the resources as needed.
- The RICE generators could be installed at either the City's Hopkins plant or split between the Hopkins plant and Purdom plant.
- The RICE generators are more efficient than the units that are being retired. As a result, preliminary analyses indicate 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 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.
- There may be merit to retiring Hopkins Unit 1 earlier and advancing the in-service dates of these RICE generators. Preliminary analyses indicate that some of the associated debt service could be offset by the fuel savings from the efficiency gains achieved by these

units. There is also a possibility that better pricing could be obtained if the City purchased more RICE generators than just those needed for the Substation 12 project.

The timing, site, type and size of any 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 33 MW of additional power supply resources to meet its load and planning reserve requirements through the horizon year of 2025. 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 2016 through 2025.


System Peak Demands
(Including DSM Impacts)
Summer
Winter
MW
800
700
600
500
400
300
200
100
0
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
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
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
Year

City Of Tallahassee

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

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Total Installed Capacity	Firm Capacity Import	Firm Capacity Export	QF	Total Capacity Available	System Firm Summer Peak Demand	Reserve Margin Before Maintenance		Scheduled Maintenance	Reserve Margin After Maintenance	
Year	(MW)	(MW)	(MW)	(MW)	(MW)	(MW)	(MW)	% of Peak	(MW)	(MW)	% of Peak
2016	746	0	0	0	746	598	148	25	0	148	25
2017	734	0	0	0	734	599	135	23	0	135	23
2018	708	0	0	0	708	601	107	18	0	107	18
2019	708	0	0	0	708	601	108	18	0	108	18
2020	708	0	0	0	708	597	111	19	0	111	19
2021	706	0	0	0	706	595	111	19	0	111	19
2022	706	0	0	0	706	593	113	19	0	113	19
2023	706	0	0	0	706	595	111	19	0	111	19
2024	706	0	0	0	706	598	108	18	0	108	18
2025	706	0	0	0	706	601	105	17	0	105	17

[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
2016/17	822	0	0	0	822	549	273	50	0	273	50
2017/18	788	0	0	0	788	555	233	42	0	233	42
2018/19	780	0	0	0	780	559	222	40	0	222	40
2019/20	780	0	0	0	780	562	219	39	0	219	39
2020/21	776	0	0	0	776	565	211	37	0	211	37
2021/22	776	0	0	0	776	567	209	37	0	209	37
2022/23	776	0	0	0	776	570	206	36	0	206	36
2023/24	776	0	0	0	776	573	203	35	0	203	35
2024/25	776	0	0	0	776	576	200	35	0	200	35
2025/26	776	0	0	0	776	579	197	34	0	197	34

[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
Hopkins	CT-1	Leon	GT	NG	DFO	PL	TK	NA	2/70	4/17	16,320	-12	-14	RT
Purdom	CT-1	Wakulla	GT	NG	DFO	PL	TK	NA	12/63	10/17	15,000	-10	-10	RT
Purdom	CT-2	Wakulla	GT	NG	DFO	PL	TK	NA	5/64	10/17	15,000	-10	-10	RT
Hopkins	CT-2	Leon	GT	NG	DFO	PL	TK	NA	9/72	4/18	27,000	-24	-26	RT
Hopkins	1	Leon	ST	NG	NA	PL	NA	NA	5/71	1/21	75,000	-76	-78	RT
Sub 12 DG	IC 1-2 [1]	Leon	IC	NG	NA	PL	NA	6/16	6/18	NA	9,341	18	18	P
Hopkins	IC 1-4 [1]	Leon	IC	NG	NA	PL	NA	1/19	1/21	NA	9,341	37	37	P
Purdom	IC 1-4 [1]	Leon	IC	NG	NA	PL	NA	1/19	1/21	NA	9,341	37	37	P

Acronyms

GT	Gas Turbine	Pri	Primary Fuel	kW	Kilowatts
ST	Steam Turbine	Alt	Alternate Fuel	MW	Megawatts
IC	Internal Combustion	NG	Natural Gas	RT	Existing generator scheduled for retirement.
		DFO	Diesel Fuel Oil	P	Planned for installation but not utility authorized. Not under construction.
		RFO	Residual Fuel Oil		
		PL	Pipeline		
		TK	Truck		

[1] For the purposes of this report, the City has identified the addition of up to ten (10) 9.2 MW reciprocating internal combustion engine (RICE) generating units to be located at its existing Substation 12, Hopkins Plant and/or Purdom Plant sites. The number, timing, site, type and size of new power supply resources 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.

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)		Total Capacity (MW)	Res %
2016	601	2	598	746		0				746	25
2017	609	9	599	734	[2,3]	0				734	23
2018	618	16	601	690	[4,6]	0		18	[6]	708	18
2019	625	23	601	690		0		18		708	18
2020	631	33	597	690		0		18		708	19
2021	637	41	595	614	[5]	0		92	[6]	706	19
2022	642	49	593	614		0		92		706	19
2023	647	51	595	614		0		92		706	19
2024	652	54	598	614		0		92		706	18
2025	658	56	601	614		0		92		706	17

Notes

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

[2] Hopkins CT 1 official retirement currently scheduled for April 2017.

[3] Purdom CTs 1 and 2 official retirement currently scheduled for October 2017.

[4] Hopkins CT 2 official retirement currently scheduled for April 2018.

[5] Hopkins ST 1 official retirement currently scheduled for January 2021.

[6] For the purposes of this report, the City has identified the addition of up to ten (10) 9.2 MW reciprocating internal combustion engine (RICE) generating units to be located at its existing Substation 12 (2018), Hopkins Plant and/or Purdom Plant (2021) sites. The number, timing, site, type and size of new power supply resources 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). For the purposes of this report, the City has identified the addition of up to ten (10) 9 MW natural gas fueled reciprocating internal combustion engines (RICE or IC) at its Substation 12, its existing Hopkins Plant and/or its existing Purdom 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 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 in part by the lack of investment in facilities in the panhandle region as well as the impact of unscheduled power flow-through on 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 indicate 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 be completed by Spring 2017 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 existing 115 kV line to 230 kV from Substation BP-5 to Substation BP-4 as the second phase of the project. As part of the second phase additional 230/115 kV transformation was placed in service at BP-4. The final phase of the project will be to upgrade the existing 115 kV line from Substation BP-4 to Substation BP-7 to 230 kV thereby completing the loop by Spring 2017. This new 230 kV loop would address 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 2017 is currently ongoing, and any revisions to project budgets in the electric utility will not be finalized until the summer of 2016. Some of the construction of the aforementioned 230 kV transmission projects is currently underway. If these improvements do not remain on schedule the City has prepared 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 Hopkins IC 1-4 Purdom IC 1-4	[1]
(2)	Capacity		
	a.) Summer:	9.2	
	b.) Winter:	9.2	
(3)	Technology Type:	IC	
(4)	Anticipated Construction Timing		
	a.) Field Construction start - date:	Jun-16	
	b.) Commercial in-service date:	Jun-18	
(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):	0.86	
	Forced Outage Factor (FOF):	3.79	
	Equivalent Availability Factor (EAF):	92.63	
	Resulting Capacity Factor (%):	1.6	[2]
	Average Net Operating Heat Rate (ANOHR):	8,580	[3]
(13)	Projected Unit Financial Data		
	Book Life (Years)	30	
	Total Installed Cost (In-Service Year $/kW)	1,669	[4]
	Direct Construction Cost ($/kW):	1,589	[5]
	AFUDC Amount ($/kW):	NA	
	Escalation ($/kW):	80	
	Fixed O & M ($kW-Yr):	31.50	[5]
	Variable O & M ($/MWH):	9.87	[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 up to ten (10) 9.2 MW reciprocating internal combustion engine (RICE) generating units to be located at its existing Substation 12, Hopkins Plant and/or Purdom Plant sites. The number, timing, site, type and size of new power supply resources 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 first year capacity factor for prospective Substation 12 additions.

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

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

[5] Estimated 2016 dollars.

Figure D-1 – Hopkins Plant Site

Figure D-2 – Purdom Plant Site

City Of Tallahassee

Planned Transmission Projects, 2016-2025

		From Bus		To Bus		Expected		Line
						In-Service	Voltage	Length
Project Type	Project Name	Name	Number	Name	Number	Date	(kV)	(miles)
New Lines	Line 55	Sub 14	7514	Sub 7	7507	1/31/17	115	6.0
Reconductor	Line 17 [1]	Sub 4	7604	Sub 7	7607	4/30/17	230	4.0
Substations	Sub 22 (Bus 7522)	NA	NA	NA	NA	7/31/18	115	NA
	Sub 23 (Bus 7523)	NA	NA	NA	NA	10/31/16	115	NA

[1] The final phase of the 230 kV loop project. Current 115 kV line 17 will be operated at 230 kV after the respective 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]; target in service 4/30/2017
(7)	Anticipated Capital Investment:	See note [2]
(8)	Substations:	See note [3]
(9)	Participation with Other Utilities:	None

Notes

[1] Rebuilding/reconductoring existing Line 17 and changing operating voltage 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 will be existing Substation 7; south terminus will be existing Substation 4.