



Tara Bachkosky
Manager, Cost and Load Research
Rates and Tariffs
Florida Power & Light Company
700 Universe Boulevard
Juno Beach, FL 33408-0420
(561) 691-2391
(561) 691-7091 (Facsimile)
Tara.Bachkosky@fpl.com

May 4, 2020

Via Electronic Filing Clerk
Florida Public Service Commission
2540 Shumard Oak Blvd.
Tallahassee, FL 32399-0850

RE: FPL 2020 Load Research Sampling Plan Filing

Dear Mr. Teitzman:

In compliance with FPSC Rule 25-6.0437, enclosed is FPL's 2020 Load Research Sampling Plan for approval of sample deployments for the years 2020 to 2022.

If you have any questions or require additional information about this filing, please call me at (561) 691-2391.

Sincerely,

/s/ Tara Bachkosky
Tara Bachkosky
Manager, Cost and Load Research

CC: Elisabeth Draper, Chief, Division of Economics (via electronic mail)

FLORIDA POWER & LIGHT COMPANY

Load Research Sampling Plan
FPSC Rule 25-6.0437

May 4, 2020

Rates and Tariff Administration Department
Load Research Section

FLORIDA POWER & LIGHT COMPANY

2020 Load Research Sampling Plan

Table of Contents

I.	INTRODUCTION.....	1
II.	PROPOSED SAMPLING PLAN DESIGN METHODOLOGY.....	2
III.	PROPOSED SAMPLING PLAN SUMMARY.....	4
TABLE 1:	FPL Retail Sales.....	5
TABLE 2:	Proposed RS(T)-1 Sample Design.....	6
TABLE 3:	Proposed GSD(T)-1 Sample Design	7
TABLE 4:	Proposed GS(T)-1 Sample Design	8
TABLE 5:	Proposed GSLD(T)-1 Sample Design	9
TABLE 6:	Definition of Variables and Indices	10
TABLE 7:	Formulas Used in Sample Designs	11

I. INTRODUCTION

Florida Power & Light Company (FPL) filed its last Load Research Sampling Plan on May 2, 2017. The Commission Staff approved the 2017 Plan on June 21st, 2017. This 2020 Load Research Sampling Plan is being submitted by FPL in compliance with Rule 25-6.0437, Florida Administrative Code (Rule). The Rule applicable to electric utilities that provide electric service to more than 50,000 retail customers at the end of any calendar year requires those utilities to sample all rate classes that account for more than 1 percent of a utility's annual retail sales. The Rule further provides that the sampling plan shall be designed to provide estimates of the averages of the 12 monthly coincident peaks for each class within plus or minus 10 percent at the 90 percent confidence level. The sampling plan shall also be designed to provide estimates of the summer and winter peak demands for each rate class within plus or minus 10 percent at the 90 percent confidence level, except for the General Service Non-Demand rate class. The sampling plan shall be designed to provide estimates of the summer and winter peak demands for the General Service Non-Demand rate class within plus or minus 15 percent at the 90 percent confidence level. The Rule also requires the filing of a revised sampling plan to the Commission no less often than every three years after the most recent sampling plan was required to be submitted.

This report summarizes FPLs' proposed 2020 sample plan designs for the following rate classes:

- RS(T)-1:** Residential Service (RS-1 & RTR-1)
- GSD(T)-1:** General Service Demand (GSD-1, GSDT-1, HLFT-1, SDTR-1A & SDTR-1B)
- GS(T)-1:** General Service Non-Demand (GS-1 & GST-1)
- GSLD(T)-1:** General Service Large Demand (GSLD-1, GSLDT-1, CS-1, CST-1, HLFT-2, SDTR-2A & SDTR-2B)

As shown on Table 1, all other rate classes meeting the "more than 1%" of annual retail sales criterion are 100% metered with recording meters for billing purposes and therefore do not require statistical sampling.

Consistent with FPL's 2017 approved sampling plan, for purposes of this plan the related time-of-use (TOU), non-time-of-use rate classes and other related rate schedules were combined. For example, GSD-1 (General Service Demand), GSDT-1 (General Service Demand TOU), HLFT-1 (High Load Factor TOU) and SDTR-1 (Seasonal Demand TOU A & B) rate schedules are treated as one class [GSD(T)-1].

II. PROPOSED SAMPLING PLAN DESIGN METHODOLOGY

The sampling plan methodology proposed in this plan utilizes a three-year replacement cycle for the load research sampling points in the RS(T)-1, GSD(T)-1, GS(T)-1 and GSLD(T)-1 rate class samples.

The proposed sampling plan was developed using FPL's most currently available load research data and seasonal peak information. To ensure that a sufficient number of sample points would be selected, sample sizes were calculated for every month starting January 2017 through December 2019. The month with the largest number of required sample points over this period

was selected for each rate class.

Based on the results obtained from this data FPL proposes to continue the use of the following types of sample designs:

A one-dimensional stratified random design based on the annual average monthly energy for the RS(T)-1, GSD(T)-1, GS(T)-1, and GSLD(T)-1 rate classes.

The sample sizes reported herein are designed to meet FPSC accuracy requirements based on the requisite confidence level and expected data loss factors, while simultaneously minimizing costs.

RS(T)-1 Residential Service (RS-1 & RTR-1)

A one dimensional stratified random sample design process was used for the RS(T)-1 rate class. The customer population was stratified on the basis of average monthly energy consumption (kWh) for 2019.

Stratum breakpoints were defined using the Dalenius-Hodges method. This process generated four strata based on energy consumption:

1. 0 to 546 kWh
2. 547 to 1,207 kWh
3. 1,208 to 1,898 kWh
4. 1,899 kWh and Above

GSD(T)-1 General Service Demand (GSD-1, GSDT-1, HLFT-1, SDTR-1A & SDTR-1B)

A one dimensional stratified random sample design process was used for the GSD(T)-1 rate class. The customer population was stratified on the basis of average monthly energy consumption (kWh) for 2019.

Stratum breakpoints were defined using the Dalenius-Hodges method. The process generated three strata based on energy consumption, which are as follows:

1. 0 to 14,400 kWh
2. 14,401 to 58,880 kWh
3. 58,881 kWh and Above

The GSD(T)-1 class stratum breakpoints and sample size will be recalculated using the most current available load research data prior to its 2022 load research sample deployment.

GS(T)-1 General Service Non-Demand (GS-1 & GST-1)

A one dimensional stratified random sample design process was used for the GS(T)-1 rate class. The customer population was stratified on the basis of average monthly energy consumption (kWh) for 2019.

Stratum breakpoints were defined using the Dalenius-Hodges method. This process generated four strata based on energy consumption:

1. 0 to 580 kWh
2. 581 to 1,600 kWh
3. 1,601 to 3,500 kWh
4. 3,501 kWh and Above

The GS(T)-1 class stratum breakpoints and sample size will be recalculated using the most current available load research data prior to its 2021 load research sample deployment.

GSLD(T)-1 General Service Large Demand (GSLD-1, GSLDT-1, CS-1, CST-1, HLFT-2, SDTR-2A & SDTR-2B)

A one dimensional stratified random sample design process was used for the GSLD(T)-1 rate class. The customer population was stratified on the basis of average monthly energy consumption (kWh) for 2019.

Stratum breakpoints were defined using the Dalenius-Hodges method. This process generated two strata based on energy consumption:

1. 0 to 262,600 kWh
2. 262,601 kWh and Above

The GSLD(T)-1 class stratum breakpoints and sample size will be recalculated using the most current available load research data prior to its 2022 load research sample deployment.

III. PROPOSED SAMPLING PLAN SUMMARY

The following table lists the expected number of sample points and deployment year for each rate class:

Rate Class	Sample Points	Deployment Year	Detailed Design Statistics
RS(T)-1	714	2020	See Table 2
GSD(T)-1	318	2022	See Table 3
GS(T)-1	559	2021	See Table 4
GSLD(T)-1	118	2022	See Table 5

Please refer to Table 6 for definitions of variables and indices and Table 7 for formulas used in the design and estimation of these samples.

Except for the RS(T)-1 sample deployment in 2020, the sample sizes shown above will be recalculated using the most current available load research data prior to their deployment.

TABLE 1

FPL Retail Sales Rate Class	2019 Annual Retail Billed Sales		Data Collection Process
	MWH	Percent	
RS(T)-1 Residential Service: RS-1 and RTR-1	60,294,568	53.87%	Sampling Plan
GSD(T)-1 General Service Demand: GSD-1, GSDT-1, HLFT-1, SDTR-1A and SDTR-1B	27,177,601	24.28%	Sampling Plan
GSLD(T)-1 General Service Large Demand 1 (500 to 1,999 kW): GSLD-1, GSLDT-1, CS-1, CST-1, HLFT-2, SDTR-2A and SDTR-2B	10,043,166	8.97%	Sampling Plan
GS(T)-1 General Service Non-Demand: GS-1 and GST-1	6,500,972	5.81%	Sampling Plan
GSLD(T)-2 General Service Large Demand 1 (2,000 + kW): GSLD-2, GSLDT-2, CS-2, CST-2, HLFT-3, SDTR-3A and SDTR-3B	2,681,114	2.40%	100% Sampled
CILC-1D Commercial/Industrial Load Control, Distribution	2,597,502	2.32%	100% Sampled
CILC-1T Commercial/Industrial Load Control, Transmission	1,456,036	1.30%	100% Sampled
All Other Rate Classes ¹	1,178,469	1.05%	Not Applicable
Total	111,929,427	100%	

1. Each rate class in this category falls below the 1% of annual retail sales criterion. Thus, load research sampling plans are not required.

TABLE 2

PROPOSED RS(T)-1 SAMPLE DESIGN

Rate Classes : RS-1 and RTR-1 (Rate Codes 44 and 145)
Deployment Year : 2020
Sample Design : One Dimensional Stratified Random Sample - Combined Ratio Estimation, Dalenius-Hodges Procedure, Neyman Allocation, With Finite Population Correction
Design Precision(P) : 10%
Design Confidence : 90% (1.645)
Stratification Variable : Annual Monthly Mean Energy (kWh)

[1]	[2]	[3]	[4]	[4]x[5]	[3]x[4]	[4]x([3]^2)	[6]	[7]
Strata	Sample Size	SDRh	Wh	Nh	Wh(SDRh)	Wh(SDRh)^2	Neyman Alloc. of n with losses (nh)	Proposed Sample
1	99	1.798	0.34391	1,499,562	0.618	1.112	184.859	185
2	204	2.362	0.37961	1,655,214	0.897	2.118	268.053	269
3	213	2.957	0.22652	987,697	0.670	1.981	200.245	201
4	74	3.945	0.04996	217,831	0.197	0.777	58.919	59
Sum(Σ)	590		1.00000	4,360,304	2.382	5.988	712.076	714
Combined		2.745		[5]				

CALCULATIONS	
YBAR =	2.6807
$n = (\sum Wh \cdot SDRh)^2 / ((P \cdot YBAR / Z)^2 + (\sum Wh (SDRh)^2 / \sum Nh))$	
=	213.623
$n(\text{with losses}) = n / 0.3 =$	712.076

DEFINITIONS:

[1] Strata Break Points (kWh)

Strata 1 = 0 - 546

Strata 2 = 547 - 1,207

Strata 3 = 1,208 - 1,898

Strata 4 = 1,899 & Above

[2] Number of valid sample points in LodeStar for the month of January 2018 (Refer to Note B)

[3] Standard deviation for the month of January 2018 coincident peak, per LodeStar. (Refer to Note B)

[4] Percent of customers per strata for the summer and winter peak months from FPL's Customer Information System (Refer to Note C)

[5] Total number of customers for the month of January 2018 from FPL's Customer Information System (Refer to Note B)

[6] $nh = Wh(SDRh) / \sum Wh(SDRh)$

[7] Based on Neyman Allocation of n with losses. Minimum strata size = 30, via central limit theorem

NOTES:

A) The most current load research data available was obtained from LodeStar (FPL's Load Research System) for the period January 2017 to December 2019.

B) The above calculations were performed for every month of 2017, 2018 and 2019. January 2018 load research data produced the largest sample size requirement and was therefore selected.

C) The strata break points and weights were defined on the basis of average monthly energy consumption (kWh) for 2019.

TABLE 3

PROPOSED GSD(T)-1 SAMPLE DESIGN

Rate Classes : GSD-1, GSDT-1, HLFT-1 and SDTR-1 (Rate Codes 70, 72, 170, 270 and 370)
Installation Year : 2022
Sample Design : One Dimensional Stratified Random Sample - Combined Ratio Estimation, Dalenius-Hodges Procedure, Neyman Allocation, With Finite Population Correction
Design Precision(P) : 10%
Design Confidence : 90% (1.645)
Stratification Variable : Annual Monthly Mean Energy (kWh)

[1]	[2]	[3]	[4]	[4]x[5]	[3]x[4]	[4]x[3]^2	[6]	[7]
Strata	Sample Size	SDRh	Wh	Nh	Wh(SDRh)	Wh(SDRh)^2	Neyman Alloc. of n with losses (nh)	Proposed Sample
1	239	8.818	0.68973	73,106	6.082	53.632	124.188	125
2	228	26.418	0.24331	25,789	6.428	169.806	131.245	132
3	80	44.195	0.06696	7,097	2.959	130.788	60.426	61
Sum(Σ)	547		1.00000	105,992	15.469	354.226	315.860	318
Combined		24.630		[5]				

CALCULATIONS	
YBAR =	26.1237
$n = (\Sigma Wh \cdot SDRh)^2 / ((P \cdot YBAR / Z)^2 + (\Sigma Wh (SDRh)^2 / \Sigma Nh))$	
=	94.758
$n(\text{with losses}) = n / 0.3 =$	315.860

DEFINITIONS:

- [1] Strata Break Points (kWh)
Strata 1 = 0 - 14,400
Strata 2 = 14,401 - 58,880
Strata 3 = 58,881 & Above

[2] Number of valid sample points in LodeStar for the month of January 2018 (Refer to Note B)

[3] Standard deviation for the month of January 2018 coincident peak, per LodeStar. (Refer to Note B)

[4] Percent of customers per strata for the summer and winter peak months from FPL's Customer Information System (Refer to Note C)

[5] Total number of customers for the month of January 2018 from FPL's Customer Information System (Refer to Note B)

[6] $nh = Wh(SDRh) / \Sigma Wh(SDRh)$

[7] Based on Neyman Allocation of n with losses. Minimum strata size = 30, via central limit theorem.

NOTES:

A) The most current load research data available was obtained from LodeStar (FPL's Load Research System) for the period January 2017 to December 2019.

B) The above calculations were performed for every month of 2017, 2018 and 2019. January 2018 load research data produced the largest sample size requirement and was therefore selected.

C) The strata break points and weights were defined on the basis of average monthly energy consumption (kWh) for 2019.

TABLE 4

PROPOSED GS(T)-1 SAMPLE DESIGN

Rate Classes : GS-1 and GST-1 (Rate Codes 68 and 69)
Installation Year : 2021
Sample Design : One Dimensional Stratified Random Sample - Combined Ratio Estimation, Dalenius-Hodges Procedure, Neyman Allocation, With Finite Population Correction
Design Precision(P) : 15%
Design Confidence : 90% (1.645)
Stratification Variable : Annual Monthly Mean Energy (kWh)

[1]	[2]	[3]	[4]	[4]x[5]	[3]x[4]	[4]x[3]^2	[6]	[7]
Strata	Sample Size	SDRh	Wh	Nh	Wh(SDRh)	Wh(SDRh)^2	Neyman Alloc. of n with losses (nh)	Proposed Sample
1	213	1.110	0.51612	221,657	0.573	0.636	191.672	192
2	120	2.009	0.28808	123,720	0.579	1.163	193.630	194
3	176	2.642	0.14293	61,385	0.378	0.998	126.342	127
4	44	2.586	0.05288	22,709	0.137	0.354	45.749	46
Sum(Σ)	553		1.00000	429,471	1.666	3.150	557.392	559
Combined		2.019		[5]				

CALCULATIONS	
YBAR =	1.4126
$n = (\sum Wh \cdot SDRh)^2 / ((P \cdot YBAR / Z)^2 + (\sum Wh (SDRh)^2 / \sum Nh))$	
=	167.218
$n(\text{with losses}) = n / 0.3 =$	557.392

DEFINITIONS:

- [1] Strata Break Points (kWh)
Strata 1 = 0 - 580
Strata 2 = 581 - 1,600
Strata 3 = 1,601 - 3,500
Strata 4 = 3,501 & Above

[2] Number of valid sample points in LodeStar for the month of January 2018 (Refer to Note B)

[3] Standard deviation for the month of January 2018 coincident peak, per LodeStar (Refer to Note B)

[4] Percent of customers per strata for the summer and winter peak months from FPL's Customer Information System (Refer to Note C)

[5] Total number of customers for the month of January 2018 from FPL's Customer Information System (Refer to Note B)

[6] $nh = Wh(SDRh) / \sum Wh(SDRh)$

[7] Based on Neyman Allocation of n with losses. Minimum strata size = 30, via central limit theorem

NOTES:

A) The most current load research data available was obtained from LodeStar (FPL's Load Research System) for the period January 2017 to December 2019.

B) The above calculations were performed for every month of 2017, 2018 and 2019. January 2018 load research data produced the largest sample size requirement and was therefore selected.

C) The strata break points and weights were defined on the basis of average monthly energy consumption (kWh) for 2019.

TABLE 5

PROPOSED GSLD(T)-1 SAMPLE DESIGN

Rate Classes : GSLD-1, GSLDT-1, CS-1, CST-1, HLFT-2 and SDTR-2 (Rate Codes 62, 64, 73, 74, 164, 264 and 364)	
Deployment Year : 2022	
Sample Design : One Dimensional Stratified Random Sample - Combined Ratio Estimation, Dalenius-Hodges Procedure, Neyman Allocation, With Finite Population Correction	
Design Precision(P) :	10%
Design Confidence :	90% (1.645)
Stratification Variable : Annual Monthly Mean Energy (kWh)	

[1]	[2]	[3]	[4]	[4]x[5]	[3]x[4]	[4]x[3]^2	[6]	[7]
Strata	Sample Size	SDRh	Wh	Nh	Wh(SDRh)	Wh(SDRh)^2	Neyman Alloc. of n with losses (nh)	Proposed Sample
1	71	183.662	0.61451	1,741	112.863	20728.596	63.839	64
2	52	243.317	0.38549	1,092	93.795	22822.033	53.054	54
Sum(Σ)	123		1.00000	2,833	206.658	43550.629	116.893	118
Combined		210.007		[5]				

CALCULATIONS			
YBAR =	570.4328		
n = (ΣWh*SDRh)^2/((P*YBAR/Z)^2+(ΣWh(SDRh)^2/ΣNh))			
=	35.068		
n(with losses) = n /	0.3	=	116.893

DEFINITIONS:

[1] Strata Break Points (kWh)
 Strata 1 = 0 - 262,600
 Strata 2 = 262,601 & Above

[2] Number of valid sample points in LodeStar for the month of December 2019 (Refer to Note B)

[3] Standard deviation for the month of December 2019 coincident peak, per LodeStar. (Refer to Note B)

[4] Percent of customers per strata for the summer and winter peak months from FPL's Customer Information System (Refer to Note C)

[5] Total number of customers for the month of December 2019 from FPL's Customer Information System (Refer to Note B)

[6] $nh = Wh(SDRh)/\Sigma Wh(SDRh)$

[7] Based on Neyman Allocation of n with losses. Minimum strata size = 30, via central limit theorem

NOTES:

A) The most current load research data available was obtained from LodeStar (FPL's Load Research System) for the period January 2017 to December 2019.

B) The above calculations were performed for every month of 2017, 2018 and 2019. December 2019 load research data produced the largest sample size requirement and was therefore selected.

C) The strata break points and weights were defined on the basis of average monthly energy consumption (kWh) for 2019.

TABLE 6

DEFINITIONS OF VARIABLES AND INDICES

$YBAR$	= Existing sample mean coincident demand (kW)
$XBAR$	= Existing sample mean energy (kWh)
R	= Ratio of mean coincident demand to mean energy for the existing sample
h	= Index for each strata within the sample
i	= Index for each customer
Y_{hi}	= Coincident demand for each customer “i” in stratum “h”
X_{hi}	= Energy for each customer “i” in stratum “h”
n_{Ch}	= Number of customers in the existing sample in stratum “h”
SDR_h	= Standard deviation of the residuals in stratum “h”
W_h	= Stratum “h” weight
P	= Precision (0.10 for RS, GSD & GSLD and 0.15 for GS)
$Z_{\alpha/2}$	= Two tailed normal variate (1.645 for 90% confidence)
n	= Required new sample size
N_h	= Stratum “h” population (customers)
n_h	= Required new sample size for stratum “h”

TABLE 7
FORMULAS USED IN SAMPLE DESIGNS

I. Calculations using rate load research data (Refer to Table 6 for definitions):

$$YBAR = \sum_h W_h x \left[\frac{\sum_i Y_{hi}}{nc_h} \right] \quad XBAR = \sum_h W_h x \left[\frac{\sum_i X_{hi}}{nc_h} \right] \quad R = \frac{YBAR}{XBAR}$$

$$SDR_h = \sqrt{\frac{\sum_i (Y_{hi} - R x X_{hi})^2}{nc_h - 1}}$$

II. Sample size calculation (Refer to Table 6 for definitions):

$$n = \frac{\left[\sum_h (W_h x SDR_h) \right]^2}{\left[\frac{PxYBAR}{Z_{\alpha/2}} \right]^2 + \frac{\sum_h (W_h x SDR_h^2)}{\sum_h N_h}}$$

$$n_h = \left[\frac{W_h x SDR_h}{\sum_h W_h x SDR_h} \right] xn$$