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August 1, 2023

**VIA: ELECTRONIC TRANSMISSION**

Mr. Adam Teitzman
Commission Clerk
Florida Public Service Commission
2540 Shumard Oak Boulevard
Tallahassee, Florida 32399-0850

Re: TECO 2023 Load Research Sampling Plan

Dear Mr. Teitzman:

In compliance with Rule 25-6.0437, attached is TECO's Load Research Sampling Plan report.

Thank you for your assistance in connection with this matter.

Sincerely,

Malcolm N. Means

Malcolm N. Means

MNM/bml
Attachment

cc: Paula K. Brown (w/o attachment)

TAMPA ELECTRIC

# LOAD RESEARCH

# SAMPLING PLAN

**FILED: August 1, 2023**

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## APPLICABLE RATE CLASSES

Tampa Electric Company's retail rate classes and the respective annual MWH sales for each rate class are shown in the table below. Additionally, the third column provides the percent of total annual sales for each rate class and demonstrates the company's compliance with Rule 25-6.0437, Florida Administrative Code, which requires sampling of all rate classes that account for more than one percent of a utility's annual sales. The annual sales reported are for the 12-month period ending December 31, 2022.

**PERCENTAGE OF ANNUAL MWH SALES BY RATE**

| Rate | Annual Sales (MWH) | Percent of Total Sales |
|---|---|---|
| Residential (RS,RSVP) | 10,202,854 | 49.71% |
| General Service Non-Demand (GS, GST, CS) | 949,261 | 4.63% |
| General Service Demand (GSD, GSDT, SBDT) | 6,988,122 | 34.05% |
| General Service Large Demand (GSLD, SBLDT) | 2,265,361 | 11.04% |
| Lighting Service (LS) | 117,294 | 0.57% |
| **Total** | **20,522,892** | **100.0%** |

## EXISTING SAMPLE METHODOLOGY

During 2022, each of the rate classes listed in the table above were monitored as part of Tampa Electric Company's load research program. Samples for the Residential and General Service Demand classes were randomly selected and installed in late 2021 and data was collected during 2022. Samples for the General Service Non-Demand rate class were randomly selected and installed in late 2020 and data was collected during 2021 and 2022. The sample for the General Service Large Demand class is not necessary because recorders are installed on all these meters for billing purposes. Therefore, the data collected by the recorders are used for load research purposes as well. The lighting services rate class sampled circuits were chosen based on their ability to be metered and will remain in place on an ongoing basis.

On an ongoing basis, random samples for one or two rate classes will be selected and installed every year and data will be collected from the samples for 24 months. Once the new sample is fully installed and data collection has begun, the previously selected sample for the class(es) will be retired and removed.

## EXISTING SAMPLE DESIGN

The Residential Service (RS) class sample was pre-stratified by three categories of housing type: single family detached, multi-family and mobile home. The stratification is needed because the load patterns for the three housing types are dissimilar and the percentage of mobile homes in the population changes with the seasons. Because the sample is stratified by housing type and the inter-strata migration is insignificant, the stratum weights are varied on a month-by-month basis when estimating class demands. Thus, the estimated demands reflect the seasonal changes in the housing type mix.

The sample points were allocated to the strata using Neyman allocation with stratum means and variances estimated from previous sample results. A minimum sample size of 50 was used in the multi-family and mobile home categories to ensure greater accuracy of data for those sub-populations. The resulting allocation is shown below.

The RS class sample did not require any changes. Proposed sample allocations for this class remain the same and are shown in the table below.

**RS SAMPLE**

| Stratum | Sample Size |
|---|---|
| Single Family Detached | 175 |
| Multi-family | 50 |
| Mobile Home | 50 |
| **Total** | **275** |

The stratification variable used for the General Service Non-Demand (GS) sample was the annual kilowatt-hour (kWh) consumption at the time of sample selection. The stratum boundary was set at 15,000 kWh of annual usage. The sample points were allocated to the strata using Neyman allocation with stratum variances estimated from previous sample results. The sample also includes additional stratums for customers metered or served at primary voltage levels to perform cost of service analysis. The 100 percent sampled strata sizes are as of December 2022. The allocation is shown below.

**GS SAMPLE**

| **Stratum** | **Sample Size** |
|---|---|
| Secondary: 0 – 14,999 kWh | 257 |
| Secondary: 15,000 – infinity kWh | 243 |
| Secondary Metered/Primary Served | 0 (1) |
| Primary Metered/Secondary Served | 5 (1) |
| Primary Metered/Primary Served | 16 (1) |
| Primary Metered/Subtransmission Served | 0 (1) |
| **Total** | **521** |

(1) 100 percent sampled stratum; therefore, size will vary depending upon the number of customers meeting the criteria.

The stratification variable used for the General Service Demand sample was the highest billed demand in the twelve months prior to sample selection. For cost-of-service analysis, class demands are separated by voltage level. For secondary voltage customers, the stratum boundaries were 200 kW and 500 kW. All secondary metered/secondary served customers over 500 kW were included in a 100 percent sampled stratum. If any primary served, or sub transmission served customers exceed 1,000 kW, they will move to the GSLD class. For any customers subsequently exceeding the 500-kW threshold, recorders were installed on the meters, and they were included in the sample as well. The sample points in the two sampled strata were allocated using Neyman allocation. The allocation is shown below and reflects totals in the 100 percent sampled strata as of December 2022.

**GSD SAMPLE**

| Stratum | Sample Size |
|---|---|
| Secondary 0 – 199 kW | 70 |
| Secondary 200 – 499 kW | 70 |
| Secondary over 499 kW (100%) | 581 (1) |
| Secondary Metered/Primary Served (100%) | 0 (1) |
| Primary Metered/Secondary Served (100%) | 43 (1) |
| Primary Metered/Primary Served (100%) | 65 (1) |
| Primary Metered/Sub transmission Served (100%) | 1 (1) |
| Sub transmission Metered/Primary Served (100%) | 1 (1) |
| Sub transmission Metered/Subtrans.Served (100%) | 2 (1) |
| **Total** | **833** |

(1) 100 percent sampled stratum; therefore, size will vary depending upon the number of customers meeting the criteria.

The General Service Large Demand (GSLD) class replaces the former Interruptible Service Class that was removed in the last rate case. GSD class customers that are either primary or sub transmission served and over 1,000 kW were moved to the GSLD class. The GSLD class has recorders installed on each customer. For cost-of-service analysis, the customers are stratified by voltage level as served, either primary or sub transmission. In the event customers migrate out of the GSLD rate, the analysis population is changed accordingly. The population size was 73 as of December 2022.

The lighting sample consists of four circuits of 84 total lights with varying types of fixtures and wattage.

## EXISTING SAMPLE ACCURACY

The 2022 accuracy achieved for the three classes randomly sampled were calculated for each month's coincident peak, the aggregate of the 12 monthly coincident peaks and the summer and winter non-coincident (rate class) peaks. The accuracy for each class was calculated in the conventional manner for combined ratio analysis.

The 2022 accuracy achieved for each rate class's aggregated 12 coincident peaks was better than the required ±10 percent accuracy at the 90 percent confidence limit. The results are shown below.

**2022 COINCIDENT PEAK PERCENTAGE ACCURACIES AT 90 PERCENT CONFIDENCE LEVEL USING COMBINED RATIO ESTIMATION**

| Month | RS | GS | GSD |
|---|---|---|---|
| January | 8.54 | 9.67 | 10.47 |
| February | 6.20 | 6.26 | 7.22 |
| March | 5.52 | 5.32 | 3.88 |
| April | 5.12 | 5.84 | 3.00 |
| May | 4.89 | 5.01 | 3.54 |
| June | 4.30 | 4.67 | 4.33 |
| July | 3.66 | 4.56 | 3.66 |
| August | 3.61 | 4.32 | 3.34 |
| September | 3.55 | 4.55 | 4.04 |
| October | 4.02 | 5.55 | 4.02 |
| November | 4.61 | 5.52 | 3.72 |
| December | 8.88 | 15.01 | 5.42 |
| **12 Coincident Peaks Accuracy** | **5.22** | **5.89** | **4.63** |

The 2022 winter and summer non-coincident (rate class) peak accuracy achieved for the RS and GSD samples was better than the target of ±10 percent accuracy at the 90 percent confidence limit. The accuracy achieved for the GS sample was also better than the target of ±15 percent accuracy at the 90 percent confidence limit for the winter and summer peaks. The results are shown below.

**2022 NON-COINCIDENT (RATE CLASS) PEAK PERCENTAGE ACCURACIES AT 90 PERCENT CONFIDENCE LEVEL USING COMBINED RATIO ESTIMATION**

| Month | RS | GS | GSD |
|---|---|---|---|
| Winter Peak | 8.63 | 10.07 | 6.39 |
| Summer Peak | 4.58 | 4.79 | 3.9 |

## PROPOSED SAMPLING PLAN FOR 2025 LOAD RESEARCH STUDY

The Residential Service (RS) class sample met the required levels of accuracy for 2022; therefore, no changes are required in this sample design. Proposed sample allocations for this class remain the same and are shown in the table below.

**PROPOSED RS SAMPLE**

| Stratum | Sample Size |
|---|---|
| Single Family Detached | 175 |
| Multi-family | 50 |
| Mobile Home | 50 |
| **Total** | **275** |

The General Service Non-Demand (GS) class sample also met the required levels of accuracy for the 2022 winter non-coincident peak, summer non-coincident peak and 12 coincident peaks; therefore, no changes are required in the sample design. Proposed sample allocations for this class are shown in the table below.

**PROPOSED GS SAMPLE**

| Stratum | Sample Size |
|---|---|
| Secondary: 0 – 14,999 kWh | 257 |
| Secondary: 15,000 – infinity kWh | 243 |
| Secondary Metered/Primary Served | 0 (1) |
| Primary Metered/Secondary Served | 5 (1) |
| Primary Metered/Primary Served | 16 (1) |
| Primary Metered/Sub transmission Served | 0 (1) |
| **Total** | **521** |

(1) 100 percent sampled stratum; therefore, size will vary depending upon the number of customers meeting the criteria.

The General Service Demand (GSD) class sample also met the required winter non-coincident peak, summer non-coincident peak and 12 coincident peaks levels of accuracy for 2022; therefore, no changes are required in the sample design. The proposed GSD sample allocation is shown below and the totals for the 100 percent sampled strata are as of December 2022.

**PROPOSED GSD SAMPLE**

| Stratum | Sample Size |
|---|---|
| Secondary 0 – 199 kW | 70 |
| Secondary 200 – 499 kW | 70 |
| Secondary over 499 kW (100%) | 581 (1) |
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| **Total** | **833** |

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The General Service Large Demand (GSLD) class replaces the former Interruptible Service Class that was removed in the last rate case. GSD class customers that are either primary or sub transmission served and over 1,000 kW were moved to the GSLD class. The GSLD class has recorders installed on each customer. For cost-of-service analysis, the customers are stratified by voltage level as served, either primary or sub transmission. In the event customers migrate out of the GSLD rate, the analysis population is changed accordingly. The population size was 73 as of December 2022.

The lighting services rate class sample will remain the same. Data collection on the four circuits with 84 lights will continue through 2025.

## SAMPLE SELECTION

Once sample sizes, stratum definitions, and sample allocations are determined, sample selection begins. Random numbers are assigned to each customer in the class; then, the list of customers is sorted in ascending order by the assigned random number. The first group of customers on the list is the prime sample, while the following group is used, if necessary, as a source of replacement customers. The replacement list is maintained in random order and used in order, as needed.

For customers that have an AMI meter (smart meter) at their location, the AMI's 15-minute watt hour energy is transferred to the Load Research System. If the customer does not have an AMI meter, the standard billing watt-hour meter is replaced with a pulse-initiating meter. In addition, a recording device is installed to collect and retain pulse information in 15-minute intervals. The recorded information is collected and processed monthly. Both meter types are being used until full deployment of the AMI meters throughout Tampa Electric's service territory.

## SAMPLE REMOVALS AND REPLACEMENTS

Tampa Electric proposes to allow a specific number of removals per class that will not require replacements. Therefore, the RS class will be allowed five removals per stratum, before installation of replacements begins. The GS class and the GSD class will be allowed fifteen and five removals per stratum, respectively. There is no expectation that accuracy levels will be impacted by this change. Sample sizes are well above the computed sample size levels for meeting accuracy requirements.