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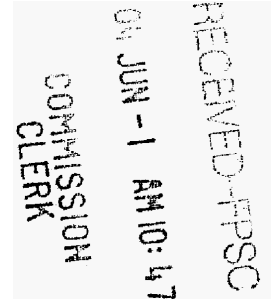
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ORIGINAL



May 28, 2004

Ms. Blanca S. Bayo, Director
Division of the Commission Clerk and Administrative Services
Florida Public Service Commission
2540 Shumard Oak Boulevard
Tallahassee FL 32399-0870



Dear Ms. Bayo:

Enclosed are an original and fifteen copies of Gulf Power Company's 2003 Cost of Service Load Research Study which is filed pursuant to Rule 25.6.0437(7).

Sincerely,

lw

Enclosure

- CMP _____
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2003 Cost of Service
Load Research Rule
DOCKET NO. 820491-EU
GULF POWER COMPANY
May 28, 2004
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Results of the
2003 Cost of Service
Load Research Study

DOCUMENT NUMBER-DATE

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INTRODUCTION

The purpose of this document is to meet the filing requirements of the Cost of Service Load Research Rule, Docket No. 820491-EU, Order No. 13026, issued February 23, 1984, by the Florida Public Service Commission (FPSC). This rule was amended by the FPSC on January 6, 2004.

This rule requires the reporting of results of each load research study conducted in accordance with the specifications of this rule within 120 days following completion of the study. The results reported within this report are for load research studies conducted between January 1, 2003, and December 31, 2003.

A rate data summary is provided on Tables 1A and 1B and provides a comparison of various significant variables between rate classes. The number of sample points for each rate class is provided in these tables, as well as the coincident system peak (CP) demand, summer and winter CP demands, and relative accuracies.

TABLE 1A
 Rate Data Summary
 2003

<u>Rate</u>	<u>Year End</u> <u>Customers</u>	<u>Annual</u> <u>MWh</u>	<u>% of</u> <u>Total</u>	<u>System</u> <u>CP</u> <u>kW (2003)</u>	<u>% of</u> <u>Total</u>
RS	340,122	5,058,291	45.2%	1,465,727	58.6%
GS	28,895	277,337	2.5%	54,901	2.2%
GSD/GSDT/ GS-TOU	15,095	2,413,180	21.5%	328,170	13.1%
LP	174	578,099	5.2%	66,376	2.7%
LPT	112	1,434,589	12.8%	152,142	6.1%
RTP	14	435,038	3.9%	38,856	1.6%
SBS	2	143,435	1.3%	0	0.0%
CISR/CSA	2	284,650	2.5%	28,954	1.2%
Others (1)	<u>9,442</u>	<u>577,959</u>	<u>5.2%</u>	<u>364,874</u>	<u>14.6%</u>
TOTAL	393,858	11,202,578	100.0%	2,500,000	100.0%

(1) Sales for Resale, Rates OS and PX, unbilled, Interdepartmental, company use, losses and SEPA allocation.

TABLE 1B

Rate Data Summary
 2003

<u>Rate</u>	<u>Sample Points</u>	<u>% of Total</u>	<u>Summer CPKW</u>	<u>Relative Accuracy (%)</u>	<u>Winter CPKW</u>	<u>Relative Accuracy (%)</u>
RS	225	25.6%	1,037,645	5.29	1,465,727	7.31
GS	380	43.2%	65,023	7.30	54,901	8.89
GSD/GSDT/ GS-TOU	160	18.2%	470,592	3.99	328,170	7.31
LP	54	6.1%	108,386	4.21	66,376	6.11
LPT	49	5.6%	219,442	0.6	152,142	1.53
RTP	7	0.8%	34,966	0	38,856	0
SBS	2	0.2%	25,257	0	0	0
CISR/CSA	2	0.2%	39,495	0	28,954	0
Others (1)	<u>1</u>	0.1%	<u>274,194</u>	N/A	<u>364,874</u>	N/A
TOTAL	880	100.0%	2,275,000	N/A	2,500,000	N/A

(1) Sales for Resale, Rates OS and PX, unbilled, Interdepartmental, company use, losses and SEPA allocation.

TABLE 1C

Load Factors
 2003

<u>Rate</u>	<u>12</u> <u>CPKW</u>	<u>Rate NCPKW</u>	<u>Annual</u> <u>MWh</u>	<u>12 CPKW</u> <u>Load</u> <u>Factor</u>	<u>Rate NCPKW</u> <u>Load Factor</u>
RS	935,610	1,465,727	5,058,291	0.617	0.394
GS	49,541	71,152	277,337	0.639	0.445
GSD/GSDT/GS-TOU	378,462	521,897	2,413,180	0.728	0.528
LP	83,705	110,537	578,099	0.788	0.597
LPT	189,640	240,037	1,434,589	0.864	0.682
RTP	46,653	86,564	435,038	1.064	0.574
SBS	13,528	61,005	143,435	1.210	0.268
CISR/CSA	35,956	41,516	284,650	0.904	0.783

SAMPLE DESIGN METHODOLOGY

The Load Research Sampling Plan that was used in this study was approved by the Commission in 2002. The results of the 2001 load research study were utilized to determine estimates of variance for each rate class. These results provided a relatively accurate estimate of the variance, which was used in the sample design of the 2003 plan.

The combined ratio estimator methodology was used for the sample size estimates. The formulas for this plan are provided in Table 2. The definitions for the variables used in these formulas are provided in Table 3.

Stratified random sampling was used within each rate class design to achieve better accuracy with fewer sample points. The actual calculations for each rate class, which provide sample size determinations for both summer and winter peaks, are provided within the Cost of Service Load Research Plan submitted to the Commission for approval. Provided in Table 4 are the strata allocation and sample design for each rate class.

TABLE 2

Formula for Sample Plan

I. Sample Size Estimates Using Combined Ratio Estimator:

$$n = \frac{\left[\sum_{h=1}^L W_h \sqrt{F_h} \right]^2}{\left[\frac{D \left(\frac{\hat{T}_y}{N} \right)}{1.65} \right]^2 + \frac{1}{N} \sum_{h=1}^L W_h F_h}$$

$$F_h = S_{yh}^2 + \left(\hat{R}^2 * S_{xh}^2 \right) - 2\hat{R}r_h * S_{yh} * S_{xh}$$

$$\hat{T}_y = \hat{R} * T_x$$

$$\hat{R} = \frac{\sum_{h=1}^L W_h \bar{y}_h}{\sum_{h=1}^L W_h \bar{x}_h}$$

II. Neyman Allocation of Sample Points to Strata

$$n_h = \frac{W_h S_{yh}}{\sum_{h=1}^L W_h S_{yh}} * n$$

TABLE 3

Definitions for Formulas

- n = Sample Size Estimate
- n_h = Stratum Sample Size
- W_h = Stratum Weight
- D = Percent Relative Accuracy (0.1)
- T_y = Estimated Population CPKW
- N = Population Number of Customers
- R = Ratio Estimator
- T_x = Population kWh
- \bar{Y}_h = Stratum Average CPKW
- S_{yh} = Stratum Standard Deviation of CPKW
- \bar{X}_h = Stratum average monthly kWh
- S_{xh} = Stratum standard deviation of monthly kWh
- r_h = Stratum correlation coefficient between CPKW & Monthly kWh
- μ_y = Population mean for CPKW

Subscripts

- h = Stratum number
- y = CPKW variable
- x = Monthly kWh variable

TABLE 4

GULF POWER COMPANY
2003 Cost of Service Load Research Rule Sample Size

<u>Rate</u>	<u>Strata Allocation</u>	<u>Sample Size</u>	
RS	1) MF GT 900 kWh	21	
	2) MF 0-900 kWh	20	
	3) MH	30	
	4) SFD 1251-2000 kWh	52	
	5) SFD GE 2001 kWh	53	
	6) SFD 0-1250 kWh	50	
	TOTAL	226	
GS	1) 0-500 kWh	107	
	2) 501-1000 kWh	95	
	3) 1001-1700 kWh	89	
	4) over 1700 kWh	89	
	TOTAL	380	
GSD	1) 0-20.0 kW	31	
	2) 20.1-50.0 kW	35	
	3) 50.1-130.0 kW	52	
	4) over 130.0 kW	42	
	TOTAL	160	
LP	1) Less than 800 kW	31	
	2) 800 kW and greater	31	(census)
	TOTAL	62	
LPT	1) Less than 1000 kW	20	
	2) 1000 kW and greater	37	(census)
		57	
CISR/CSA	1) All customers	2	(census)
RTP	1) All customers	7	(census)
SBS	1) All customers	2	(census)
	TOTAL	896	

DATA ANALYSIS METHODOLOGY

Load profiles for each rate schedule were estimated using the combined ratio technique. The equation used to calculate the demand estimate for each hour of the year is provided below. The definitions for the variables for these formulas are provided in Table 5.

Load profiles were balanced to territorial input as follows:

$$\begin{aligned}
 &(\text{Input kW}) - (\text{Losses}) - (\text{Rate 1 kW}) - (\text{Rate 2 kW}) - \dots \\
 &\quad - (\text{Rate } n\text{ kW}) = \text{Residual kW}
 \end{aligned}$$

This residual profile was distributed to the rate schedule profiles by allocating on the standard deviation(s) of the demand estimate, i.e.:

$$\text{Rate}_i \text{ kW} = \text{Rate}_i \text{ kW} + \text{Residual kW} \frac{S_i}{S_1 + S_2 + \dots + S_i + \dots + S_n}$$

The coincident and non-coincident demands and residential load profile shown in this report have been adjusted per this balancing process. Confidence intervals and relative accuracies are based on unadjusted estimates of demand. The average of the estimated peak demand, confidence intervals, and relative accuracies are also based on unadjusted estimates of demand.

TABLE 5

Definitions for Formulas

\hat{T}_y

\hat{T}_y = Estimated Population Hourly kW

\hat{T}_x

\hat{T}_x = Population Monthly kWh

R

R = Ratio Estimator

W_h = Stratum Weight

\bar{Y}_h = Stratum Sample Average Hourly kWh

\bar{X}_h = Stratum Sample Average Monthly kWh

$\hat{V}(T_y)$

$\hat{V}(T_y)$ = Estimated Variance of T_y

n_h = Stratum Number of Good Sample Points

$N_h = W_h N$; N = Population Number of Customers

S_{yh} = Stratum Sample Standard Deviation of kW

S_{xh} = Stratum Sample Standard Deviation of kWh

r_h = Stratum Correlation Coefficient Between kW & kWh

$S = \sqrt{\hat{V}(T_y)}$ = Estimated Standard Deviation of T_y

Subscripts

h = Stratum number

v = kW variable

L = Total Number of Strata

x = kWh variable

STUDY RESULTS

Provided on the following tables are the rate class estimated non-coincident and coincident peak kW demands for each month of the year 2003. The relative accuracy and the confidence interval at the 90% confidence level are also provided. Results for rate classes RS, GS, GSD/GSDT/GS-TOU, LP, LPT, SBS, RTP, and CISR/CSA are included. Provided also on Table 6 are the monthly coincident and non-coincident peak demands, dates and times.

TABLE 6
2003
Coincident and Non-Coincident Peak Demand
Days and Hours

MONTH	Coincident Peak		RS	GS	Non-Coincident Peaks								CISA/CSR					
	Day	Hour			GSD	LP	LPT	RTP	SBS	Day	Hour							
JAN	24	0700	24	0800	24	1000	24	1000	24	0900	24	1000	6	1400	8	1200	3	1100
FEB	7	1900	8	0900	5	1100	18	1000	27	1100	7	1000	4	1200	27	1500	22	2200
MAR	3	1900	31	0700	19	1600	19	1500	13	1400	19	1400	12	1500	21	1200	29	2000
APR	30	1600	30	1800	30	1400	30	1400	30	1300	30	1400	8	1700	7	1500	10	0900
MAY	16	1700	11	1600	16	1500	16	1400	6	1400	8	1400	23	2100	16	1700	16	0300
JUN	16	1700	10	1800	10	1500	16	1500	10	1400	11	1300	4	1800	28	0100	23	1300
JUL	10	1600	8	1800	31	1500	31	1500	10	1500	17	1400	28	1100	19	1500	1	0100
AUG	27	1700	31	1800	27	1500	15	1400	19	1300	25	1500	27	1100	29	1500	28	1000
SEP	4	1600	1	1700	4	1500	4	1400	4	1400	4	1400	10	1200	1	2300	3	0100
OCT	14	1600	5	1700	6	1500	7	1400	8	1500	7	1500	3	1400	13	1300	4	2000
NOV	5,6	1800	30	0800	5	1400	5	1400	6	1400	5	1200	18	1300	18	0400	9	2000
DEC	15	0800	15	0800	15	1000	15	1000	4	1400	4	1400	12	1100	22	1700	1	0600

GULF POWER COMPANY
 LOAD RESEARCH DATA
 RATE SCHEDULE RS/RST
 January 2003 to December 2003

2003	Estimated NonCoincident Peak (KW)	90% Confidence Interval (KW)	Relative Accuracy %	Estimated Coincident Peak (KW)	90% Confidence Interval (KW)	Relative Accuracy %
JAN	1465727	114658	7.31	1465727	114658	7.31
FEB	900358	69342	7.26	872663	62478	6.96
MAR	818994	82243	10.26	739132	62316	7.81
APR	760232	62422	8.74	680068	51807	7.67
MAY	994039	49465	4.98	947987	54964	5.62
JUN	1063801	56358	5.27	1038232	52680	5.06
JUL	1103439	54476	4.95	1037645	53660	5.29
AUG	1084047	53641	4.92	1032933	52489	5.09
SEP	1067730	55973	5.19	945072	51088	5.44
OCT	802396	52957	6.64	699682	54030	7.48
NOV	878718	72935	8.00	737976	52975	6.88
DEC	1051552	104135	9.25	1030207	89246	7.92
AVG				935610	24696	2.56

GULF POWER COMPANY
 LOAD RESEARCH DATA
 RATE SCHEDULE GS/GST
 January 2003 to December 2003

2003	Estimated NonCoincident Peak (KW)	90% Confidence Interval (KW)	Relative Accuracy %	Estimated Coincident Peak (KW)	90% Confidence Interval (KW)	Relative Accuracy %
JAN	68503	5973	7.94	54901	5298	8.89
FEB	49337	4128	8.24	33209	2309	6.77
MAR	48320	3899	8.12	27202	2641	8.89
APR	53636	3996	7.78	50201	3586	7.19
MAY	62923	4299	7.27	49054	4419	8.58
JUN	69173	5086	7.62	59366	4341	7.29
JUL	67647	4799	7.42	65023	4594	7.30
AUG	71152	4321	6.29	60654	4003	6.62
SEP	68213	4459	6.51	66547	4513	6.84
OCT	55354	3933	7.10	53699	4076	7.36
NOV	53413	4849	8.94	35328	2654	7.19
DEC	48943	4761	9.68	39309	4717	10.63
AVG				49541	2069	4.07

GULF POWER COMPANY
 LOAD RESEARCH DATA
 RATE SCHEDULE GSD/GSDT
 January 2003 to December 2003

2003	Estimated NonCoincident Peak (KW)	90% Confidence Interval (KW)	Relative Accuracy %	Estimated Coincident Peak (KW)	90% Confidence Interval (KW)	Relative Accuracy %
JAN	375880	26942	6.49	328170	25646	7.31
FEB	297273	19019	6.33	272588	16120	5.78
MAR	361834	18178	5.33	258283	15983	5.84
APR	412874	17627	4.38	385262	18272	4.76
MAY	445182	20418	4.63	408300	18220	4.36
JUN	462965	18510	4.02	446858	18058	4.03
JUL	495320	18440	3.70	470592	18427	3.99
AUG	521897	20249	3.78	464136	17125	3.69
SEP	485235	21494	4.45	468062	18448	3.96
OCT	406826	20927	5.03	384167	17730	4.53
NOV	415005	26237	6.24	361014	19009	5.10
DEC	324279	18542	6.01	294110	20916	6.61
AVG				378462	11069	2.87

GULF POWER COMPANY
 LOAD RESEARCH DATA
 RATE SCHEDULE LP
 January 2003 to December 2003

2003	Estimated NonCoincident Peak (KW)	90% Confidence Interval (KW)	Relative Accuracy %	Estimated Coincident Peak (KW)	90% Confidence Interval (KW)	Relative Accuracy %
JAN	83246	4409	5.59	66376	4293	6.11
FEB	83265	3929	4.84	64185	4555	6.91
MAR	94955	4315	4.95	64389	2574	3.85
APR	92978	5112	5.63	87438	4318	4.96
MAY	99756	4631	4.80	87150	4261	4.76
JUN	102721	4728	4.78	94625	4627	4.88
JUL	108386	4481	4.21	108386	4481	4.21
AUG	110537	5479	5.23	97558	4406	4.52
SEP	105788	4207	4.00	103146	4313	4.20
OCT	96129	4329	4.86	86820	4434	5.00
NOV	93858	4505	4.76	83662	4006	4.65
DEC	83370	3803	4.89	60726	4510	6.88
AVG				83705	2520	2.96

GULF POWER COMPANY
 LOAD RESEARCH DATA
 RATE SCHEDULE LPT
 January 2003 to December 2003

2003	Estimated	90%	Relative	Estimated	90%	Relative
	NonCoincident Peak (KW)	Confidence Interval (KW)	Accuracy %	Coincident Peak (KW)	Confidence Interval (KW)	Accuracy %
JAN	163017	2747	1.68	152142	2356	1.53
FEB	177555	2102	1.18	164291	1598	0.97
MAR	179028	1308	0.73	142016	978	0.68
APR	192115	1591	0.83	185079	1247	0.67
MAY	200342	2162	1.08	188727	1591	0.84
JUN	227738	1894	0.83	217727	1303	0.60
JUL	225019	1369	0.61	219442	1316	0.60
AUG	226349	2162	0.96	215487	1490	0.69
SEP	240037	1417	0.59	234604	1170	0.50
OCT	206983	1318	0.64	201690	1156	0.57
NOV	209460	2356	1.12	194382	3430	1.75
DEC	172934	1218	0.71	160093	1133	0.70
AVG				189640	843	0.44

GULF POWER COMPANY
 LOAD RESEARCH DATA
 RATE SCHEDULE RTP
 January 2003 to December 2003

2003	Estimated NonCoincident Peak (KW)	90% Confidence Interval (KW)	Relative Accuracy %	Estimated Coincident Peak (KW)	90% Confidence Interval (KW)	Relative Accuracy %
JAN	56909	0	0.00	38856	0	0.00
FEB	62274	0	0.00	44707	0	0.00
MAR	74034	0	0.00	52510	0	0.00
APR	74261	0	0.00	59352	0	0.00
MAY	78063	0	0.00	51344	0	0.00
JUN	79312	0	0.00	41492	0	0.00
JUL	66934	0	0.00	34966	0	0.00
AUG	64369	0	0.00	32823	0	0.00
SEP	77234	0	0.00	36629	0	0.00
OCT	75724	0	0.00	68021	0	0.00
NOV	86564	0	0.00	44092	0	0.00
DEC	69186	0	0.00	55039	0	0.00
AVG				46653	0	0.00

GULF POWER COMPANY
 LOAD RESEARCH DATA
 RATE SCHEDULE SBS
 January 2003 to December 2003

2003	Estimated NonCoincident Peak (KW)	90% Confidence Interval (KW)	Relative Accuracy %	Estimated Coincident Peak (KW)	90% Confidence Interval (KW)	Relative Accuracy %
JAN	21403	0	0.00	0	0	0.00
FEB	24663	0	0.00	0	0	0.00
MAR	41960	0	0.00	25069	0	0.00
APR	61005	0	0.00	55374	0	0.00
MAY	56641	0	0.00	56641	0	0.00
JUN	36491	0	0.00	0	0	0.00
JUL	60703	0	0.00	0	0	0.00
AUG	29404	0	0.00	25257	0	0.00
SEP	28819	0	0.00	0	0	0.00
OCT	24634	0	0.00	0	0	0.00
NOV	3400	0	0.00	0	0	0.00
DEC	19679	0	0.00	0	0	0.00
AVG				13528	0	0.00

Gulf Power Company
 Load Research Data
 Rate Schedule CSA
 January 2003 to December 2003

2003	Estimated NonCoincident Peak (KW)	90% Confidence Interval (KW)	Relative Accuracy %	Estimated Coincident Peak (KW)	90% Confidence Interval (KW)	Relative Accuracy %
JAN	30502	0	0.00	28954	0	0.00
FEB	39653	0	0.00	32125	0	0.00
MAR	40225	0	0.00	37630	0	0.00
APR	40697	0	0.00	36541	0	0.00
MAY	40651	0	0.00	40046	0	0.00
JUN	41516	0	0.00	39053	0	0.00
JUL	40772	0	0.00	39495	0	0.00
AUG	40355	0	0.00	39555	0	0.00
SEP	40547	0	0.00	39717	0	0.00
OCT	35667	0	0.00	34270	0	0.00
NOV	36064	0	0.00	30662	0	0.00
DEC	34818	0	0.00	33420	0	0.00
AVG				35956	0	0.00