A.11-11-002- SoCalGas and SDG&E 2013 Triennial Cost Allocation Proceeding

Corrected Supplemental Work Papers of Bruce M. Wetzel

February 2013

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SoCalGas Consolidated Gas Demand

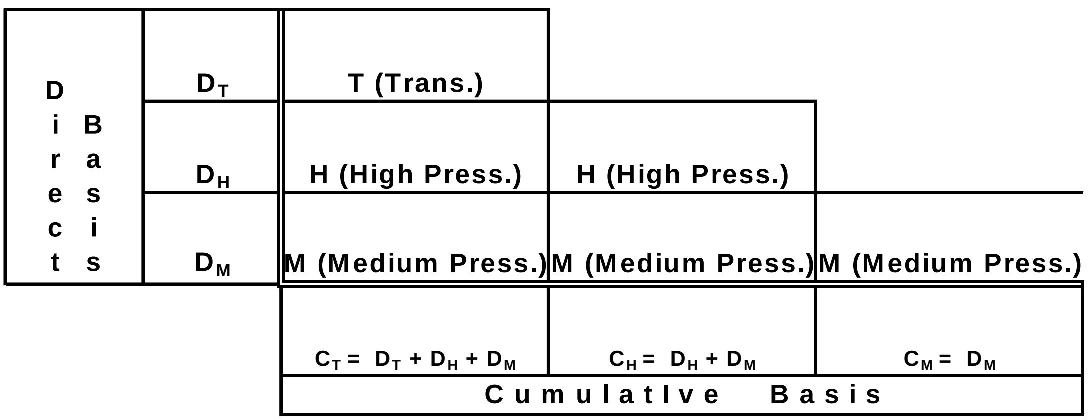
Marginal Demand Measures (MDM)

Marginal Demand Measures (MDMs) are used for rate design and cost allocation calculations. Figure 1, below, shows the relationships among the various MDMs that are provided in the accompanying tables.

<u>Figure 1</u>

LENART Diagram Depicting the Relationships

Among "Direct" and "Cumulative" MDMs



For example, the MDM data in the tables below for Noncore C&I (G-30), Avearge Year throughput gas demand have *direct* values for various segments of pressure service:

D_T = 639,338 MTh, D_H = 563,346 MTh, and D_M = 307,611 MTh.

The corresponding *cumulative* totals are:

C_T = 1,510,295 MTh, C_H = 870,957 MTh, and C_M = 307,611 MTh,

using the formulas indicated in the Figure 1, above.

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

Unaccounted Fcst (%*AYTP)	0.761%
MDM #Yrs Av (2- or 3-yr)	3
Btu Factor:	1.0235

Co-Use-Fuel	UAF
0.459%	0.752%
0.464%	0.761%

Forecast Summary	MDM	Residential	Nonresidential Core G-10	G-AC	G-GE	G-NGV	Total Core
<< TCAP Period >> January 2013 - December 2015							
DIRECT (%'s Load or Cust/Mtrs Sum to 100%)							
Transmission	%-Load:	0.004%	0.86%	0.00%	4.01%	23.42%	
	Average Year Throughput (MTh)	107	8,666	0	721	30,892	**40,386**
	Cold Year Throughput (1-in-35) (MTh)	117	9,086	0	721	30,892	**40,816**
	Cold Year Peak Month (December) (MTh)	18	1,030	0	29	3,134	**4,211**
	Peak Day (see note a/ below) (MTh)	1	52	-	1	101	**155**
	%-Cust/Mtrs:	0.0004%	0.0417%	0.00%	2.45%	2.03%	
	Number of Customers	23	88	-	17	6	**134**
High Pressure	%-Load:	0.39%	4.46%	39.05%	17.56%	40.91%	
	Average Year Throughput (MTh)	9,807	45,186	225	3,158	53,966	**112,341**
	Cold Year Throughput (1-in-35) (MTh)	10,737	47,374	225	3,158	53,966	**115,459**
	Cold Year Peak Month (December) (MTh)	1,627	5,371	14	126	5,475	**12,613**
	Peak Day (see note a/ below) (MTh)	98	270	0	4	177	**549**
	%-Cust/Mtrs:	0.1289%	1.2755%	25.00%	30.07%	29.95%	
	Number of Customers	7,151	2,684	2	210	89	**10,137**
Medium Pressure	%-Load:	99.60%	94.68%	60.95%	78.43%	35.67%	
	Average Year Throughput (MTh)	2,473,139	959,325	351	14,105	47,054	**3,493,974**
	Cold Year Throughput (1-in-35) (MTh)	2,707,617	1,005,784	351	14,105	47,054	**3,774,910**
	Cold Year Peak Month (December) (MTh)	410,330	114,032	22	562	4,774	**529,719**
	Peak Day (see note a/ below) (MTh)	24,804	5,731	1	18	154	**30,708**
	%-Cust/Mtrs:	99.8707%	98.6828%	75.00%	67.48%	68.02%	
	Number of Customers	5,541,680	207,678	7	472	201	**5,750,038**

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

Unaccounted Fcst (%*AYTP)
0.761%
MDM #Yrs Av (2- or 3-yr)
3

Btu Factor:	1.0235

	Co-Use-Fuel	UAF
	0.459%	0.752%
	0.464%	0.761%

Row	Forecast Summary		MDM	Residential	G-10	G-AC	G-GE	G-NGV	Total Core
9					Nonresidential Core				
11	<< TCAP Period >> January 2013 - December 2015								
34	**CUMULATIVE (Calc'd from DIRECT %'s)**								
35	Transmission	%-Load:		100.00%	100.00%	100.00%	100.00%	100.00%	
36		Average Year Throughput (MTh)		2,483,053	1,013,177	575	17,984	131,912	**3,646,701**
37		Cold Year Throughput (1-in-35) (MTh)		2,718,471	1,062,244	575	17,984	131,912	**3,931,186**
38		Cold Year Peak Month (December) (MTh)		411,974	120,434	36	716	13,382	**546,543**
39		Peak Day (see note a/ below) (MTh)		24,904	6,052	1	23	432	**31,412**
40		%-Cust/Mtrs:		100.00%	100.00%	100.00%	100.00%	100.00%	
41		Number of Customers		5,548,854	210,450	9	700	296	**5,760,309**
42	High Pressure	%-Load:		100.00%	99.14%	100.00%	95.99%	76.58%	
43		Average Year Throughput (MTh)		2,482,946	1,004,511	575	17,263	101,020	**3,606,315**
44		Cold Year Throughput (1-in-35) (MTh)		2,718,354	1,053,158	575	17,263	101,020	**3,890,370**
45		Cold Year Peak Month (December) (MTh)		411,957	119,404	36	687	10,248	**542,332**
46		Peak Day (see note a/ below) (MTh)		24,903	6,001	1	22	331	**31,257**
47		%-Cust/Mtrs:		100.00%	1.32%	25.00%	32.52%	31.98%	
48		Number of Customers		5,548,831	210,362	9	683	290	**5,760,174**
49	Medium Pressure	%-Load:		0.00%	0.86%	0.00%	4.01%	23.42%	
50		Average Year Throughput (MTh)		2,473,139	959,325	351	14,105	47,054	**3,493,974**
51		Cold Year Throughput (1-in-35) (MTh)		2,707,617	1,005,784	351	14,105	47,054	**3,774,910**
52		Cold Year Peak Month (December) (MTh)		410,330	114,032	22	562	4,774	**529,719**
53		Peak Day (see note a/ below) (MTh)		24,804	5,731	1	18	154	**30,708**
54		%-Cust/Mtrs:		0.00%	0.04%	0.00%	2.45%	2.03%	
55		Number of Customers		5,541,680	207,678	7	472	201	**5,750,038**

Note: a/ Core HDD-sensitive markets (Res & G10) at 1-in-35 exceedance peak-day design temp.;

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

Unaccounted Fcst (%*AYTP)
0.761%
MDM #Yrs Av (2- or 3-yr)
3

Row	A–D	N	O	P	Q	R	S	T	U	V	W
9	**Forecast Summary** **MDM**			**Noncore - C&I**	**EG-Dist**	**EG-Trans**	**EG-Dist**	**EG-Trans**	**Noncore - Electric Generatiion**		
10		**G-30 Dist**	**G-30 Trans**	**G-30**	**EG (<3MMThms)**	**EG (<3MMThms)**	**EG (>=3MMThms)**	**EG (>=3MMThms)**	**EG (<3MMThms)**	**EG (>=3MMThms)**	**EG (Total)**
11	<< TCAP Period >> January 2013 - December 2015										
12	**DIRECT (%'s Load or Cust/Mtrs Sum to 100%)**										
13	Transmission %-Load:										
14	Average Year Throughput (MTh)	0	639,338	639,338	0	19,334	0	2,537,535	19,334	2,537,535	2,556,869
15	Cold Year Throughput (1-in-35) (MTh)	0	639,705	639,705	0	19,334	0	2,537,535	19,334	2,537,535	2,556,869
16	Cold Year Peak Month (December) (MTh)	0	55,034	55,034	0	1,082	0	191,602	1,082	191,602	192,684
17	Peak Day (see note a/ below) (MTh)	0	1,791	1,791	0	37	0	7,640	37	7,640	7,677
18	%-Cust/Mtrs:										
19	Number of Customers	0	35	35	0	17	0	35	17	35	53
20	High Pressure %-Load:										
21	Average Year Throughput (MTh)	563,346	0	563,346	18,718	0	448,474	0	18,718	448,474	467,192
22	Cold Year Throughput (1-in-35) (MTh)	564,698	0	564,698	18,718	0	448,474	0	18,718	448,474	467,192
23	Cold Year Peak Month (December) (MTh)	43,790	0	43,790	1,151	0	34,166	0	1,151	34,166	35,317
24	Peak Day (see note a/ below) (MTh)	1,470	0	1,470	58	0	1,216	0	58	1,216	1,274
25	%-Cust/Mtrs:										
26	Number of Customers	247	0	247	35	0	27	0	35	27	62
27	Medium Pressure %-Load:										
28	Average Year Throughput (MTh)	307,611	0	307,611	23,485	0	25,377	0	23,485	25,377	48,862
29	Cold Year Throughput (1-in-35) (MTh)	310,043	0	310,043	23,485	0	25,377	0	23,485	25,377	48,862
30	Cold Year Peak Month (December) (MTh)	24,786	0	24,786	1,941	0	2,110	0	1,941	2,110	4,050
31	Peak Day (see note a/ below) (MTh)	903	0	903	63	0	72	0	63	72	134
32	%-Cust/Mtrs:										
33	Number of Customers	399	0	399	90	0	4	0	90	4	94

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

Unaccounted Fcst (%*AYTP)
0.761%
MDM #Yrs Av (2- or 3-yr)
3

Row	Forecast Summary	MDM		Noncore - C&I	EG-Dist	EG-Trans	EG-Dist	EG-Trans	Noncore - Electric Generatiion		
10		G-30 Dist	G-30 Trans	G-30	EG (<3MMThms)	EG (<3MMThms)	EG (>=3MMThms)	EG (>=3MMThms)	EG (<3MMThms)	EG (>=3MMThms)	EG (Total)
11	<< TCAP Period >> January 2013 - December 2015										
34	**CUMULATIVE (Calc'd from DIRECT %'s)**										
35	Transmission %-Load:										
36	Average Year Throughput (MTh)	870,957	639,338	1,510,295	42,203	19,334	473,851	2,537,535	61,537	3,011,386	3,072,923
37	Cold Year Throughput (1-in-35) (MTh)	874,741	639,705	1,514,446	42,203	19,334	473,851	2,537,535	61,537	3,011,386	3,072,923
38	Cold Year Peak Month (December) (MTh)	68,576	55,034	123,610	3,092	1,082	36,275	191,602	4,174	227,877	232,051
39	Peak Day (see note a/ below) (MTh)	2,372	1,791	4,163	120	37	1,288	7,640	158	8,928	9,086
40	%-Cust/Mtrs:										
41	Number of Customers	647	35	682	125	17	31	35	142	66	209
42	High Pressure %-Load:										
43	Average Year Throughput (MTh)	870,957	0	870,957	42,203	0	473,851	0	42,203	473,851	516,054
44	Cold Year Throughput (1-in-35) (MTh)	874,741	0	874,741	42,203	0	473,851	0	42,203	473,851	516,054
45	Cold Year Peak Month (December) (MTh)	68,576	0	68,576	3,092	0	36,275	0	3,092	36,275	39,367
46	Peak Day (see note a/ below) (MTh)	2,372	0	2,372	120	0	1,288	0	120	1,288	1,408
47	%-Cust/Mtrs:										
48	Number of Customers	647	0	647	125	0	31	0	125	31	156
49	Medium Pressure %-Load:										
50	Average Year Throughput (MTh)	307,611	0	307,611	23,485	0	25,377	0	23,485	25,377	48,862
51	Cold Year Throughput (1-in-35) (MTh)	310,043	0	310,043	23,485	0	25,377	0	23,485	25,377	48,862
52	Cold Year Peak Month (December) (MTh)	24,786	0	24,786	1,941	0	2,110	0	1,941	2,110	4,050
53	Peak Day (see note a/ below) (MTh)	903	0	903	63	0	72	0	63	72	134
54	%-Cust/Mtrs:										
55	Number of Customers	399	0	399	90	0	4	0	90	4	94

Note: a/ **Noncore HDD-sensitive markets (G30-Com) at 1-in-10 exceedance design temp.; UEG/EWG & Large CoGen peak daily load in month of DECEMBER for BASE HYDRO water year; all other market segments at average daily load in DECEMBER month.**

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

Unaccounted Fcst (%*AYTP)
0.761%

MDM #Yrs Av (2- or 3-yr)
3

Forecast Summary	MDM	EOR Dist	EOR Trans	Noncore- EOR EOR	Total Retail Noncore
<< TCAP Period >> January 2013 - December 2015					
DIRECT (%'s Load or Cust/Mtrs Sum to 100%)					
Transmission	%-Load:				
Average Year Throughput (MTh)		0	69,256	69,256	**3,265,463**
Cold Year Throughput (1-in-35) (MTh)		0	69,256	69,256	**3,265,831**
Cold Year Peak Month (December) (MTh)		0	5,884	5,884	**253,602**
Peak Day (see note a/ below) (MTh)		0	190	190	**9,658**
	%-Cust/Mtrs:				
Number of Customers		0	15	15	**103**
High Pressure	%-Load:				
Average Year Throughput (MTh)		80,408	0	80,408	**1,110,946**
Cold Year Throughput (1-in-35) (MTh)		80,408	0	80,408	**1,112,299**
Cold Year Peak Month (December) (MTh)		6,827	0	6,827	**85,934**
Peak Day (see note a/ below) (MTh)		220	0	220	**2,964**
	%-Cust/Mtrs:				
Number of Customers		15	0	15	**324**
Medium Pressure	%-Load:				
Average Year Throughput (MTh)		106	0	106	**356,578**
Cold Year Throughput (1-in-35) (MTh)		106	0	106	**359,010**
Cold Year Peak Month (December) (MTh)		9	0	9	**28,845**
Peak Day (see note a/ below) (MTh)		0.3	0	0	**1,037**
	%-Cust/Mtrs:				
Number of Customers		2	0	2	**495**

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

Unaccounted Fcst (%*AYTP)
0.761%
MDM #Yrs Av (2- or 3-yr)
3

Forecast Summary	MDM	EOR Dist	EOR Trans	Noncore- EOR EOR	Total Retail Noncore
<< TCAP Period >> January 2013 - December 2015					
CUMULATIVE (Calc'd from DIRECT %'s)					
Transmission	%-Load:				
	Average Year Throughput (MTh)	80,514	69,256	149,770	**4,732,988**
	Cold Year Throughput (1-in-35) (MTh)	80,514	69,256	149,770	**4,737,139**
	Cold Year Peak Month (December) (MTh)	6,836	5,884	12,720	**368,381**
	Peak Day (see note a/ below) (MTh)	221	190	410	**13,659**
	%-Cust/Mtrs:				
	Number of Customers	17	15	32	**922**
High Pressure	%-Load:				
	Average Year Throughput (MTh)	80,514	0	80,514	**1,467,524**
	Cold Year Throughput (1-in-35) (MTh)	80,514	0	80,514	**1,471,308**
	Cold Year Peak Month (December) (MTh)	6,836	0	6,836	**114,779**
	Peak Day (see note a/ below) (MTh)	221	0	221	**4,001**
	%-Cust/Mtrs:				
	Number of Customers	17	0	17	**820**
Medium Pressure	%-Load:				
	Average Year Throughput (MTh)	106	0	106	**356,578**
	Cold Year Throughput (1-in-35) (MTh)	106	0	106	**359,010**
	Cold Year Peak Month (December) (MTh)	9	0	9	**28,845**
	Peak Day (see note a/ below) (MTh)	0	0	0	**1,037**
	%-Cust/Mtrs:				
	Number of Customers	2	0	2	**495**

Note: a/

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

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0.761%
MDM #Yrs Av (2- or 3-yr)
3

Forecast Summary **MDM**

	A–D	AE	AF	AG	AH	AI	AK	AM	AO
10		Wholesale Noncore				**Total**	International NC	**Total**	**Total**
11	<< TCAP Period >> January 2013 - December 2015	Long Beach	SDG&E	Southwest Gas	Vernon	**Wholesale**	Ecogas	**Noncore**	**System**
12	**DIRECT (%'s Load or Cust/Mtrs Sum to 100%)**								
13	Transmission %-Load:	100.00%	100.00%	100.00%	100.00%		100.00%		
14	Average Year Throughput (MTh)	84,077	1,233,373	67,171	80,602	**1,465,224**	66,380	**4,797,067**	**4,837,453**
15	Cold Year Throughput (1-in-35) (MTh)	88,619	1,274,770	71,940	80,602	**1,515,931**	66,380	**4,848,141**	**4,888,957**
16	Cold Year Peak Month (December) (MTh)	10,286	139,459	11,186	9,105	**170,035**	5,313	**428,950**	**433,161**
17	Peak Day (see note a/ below) (MTh)	623	5,925	594	294	**7,435**	171	**17,265**	**17,420**
18	%-Cust/Mtrs:	100.00%	100.00%	100.00%	100.00%		100.00%		
19	Number of Customers	1	1	1	1	**4**	1	**108**	**242**
20	High Pressure %-Load:	0.00%	0.00%	0.00%	0.00%		0.00%		
21	Average Year Throughput (MTh)	0	0	0	0	**0**	0	**1,110,946**	**1,223,288**
22	Cold Year Throughput (1-in-35) (MTh)	0	0	0	0	**0**	0	**1,112,299**	**1,227,758**
23	Cold Year Peak Month (December) (MTh)	0	0	0	0	**0**	0	**85,934**	**98,547**
24	Peak Day (see note a/ below) (MTh)	-	-	-	-	**0**	-	**2,964**	**3,513**
25	%-Cust/Mtrs:	0.00%	0.00%	0.00%	0.00%		0.00%		
26	Number of Customers	-	-	-	-	**0**	-	**324**	**10,461**
27	Medium Pressure %-Load:	0.00%	0.00%	0.00%	0.00%		0.00%		
28	Average Year Throughput (MTh)	0	0	0	0	**0**	0	**356,578**	**3,850,551**
29	Cold Year Throughput (1-in-35) (MTh)	0	0	0	0	**0**	0	**359,010**	**4,133,920**
30	Cold Year Peak Month (December) (MTh)	0	0	0	0	**0**	0	**28,845**	**558,564**
31	Peak Day (see note a/ below) (MTh)	-	-	-	-	**0**	-	**1,037**	**31,745**
32	%-Cust/Mtrs:	0.00%	0.00%	0.00%	0.00%		0.00%		
33	Number of Customers	-	-	-	-	**0**	-	**495**	**5,750,533**

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

Unaccounted Fcst (%*AYTP)
0.761%
MDM #Yrs Av (2- or 3-yr)
3

Forecast Summary **MDM**

Row			Long Beach	SDG&E	Southwest Gas	Vernon	Total Wholesale	International NC Ecogas	Total Noncore	Total System
10			Wholesale Noncore							
11	<< TCAP Period >> January 2013 - December 2015									
34	**CUMULATIVE (Calc'd from DIRECT %'s)**									
35	Transmission	%-Load:	100.00%	100.00%	100.00%	100.00%		100.00%		
36		Average Year Throughput (MTh)	84,077	1,233,373	67,171	80,602	**1,465,224**	66,380	**6,264,591**	**9,911,292**
37		Cold Year Throughput (1-in-35) (MTh)	88,619	1,274,770	71,940	80,602	**1,515,931**	66,380	**6,319,449**	**10,250,635**
38		Cold Year Peak Month (December) (MTh)	10,286	139,459	11,186	9,105	**170,035**	5,313	**543,729**	**1,090,272**
39		Peak Day (see note a/ below) (MTh)	623	5,925	594	294	**7,435**	171	**21,266**	**52,678**
40		%-Cust/Mtrs:	100.00%	100.00%	100.00%	100.00%		100.00%		
41		Number of Customers	1	1	1	1	**4**	1	**927**	**5,761,236**
42	High Pressure	%-Load:	0.00%	0.00%	0.00%	0.00%		0.00%		
43		Average Year Throughput (MTh)	0	0	0	0	**0**	0	**1,467,524**	**5,073,839**
44		Cold Year Throughput (1-in-35) (MTh)	0	0	0	0	**0**	0	**1,471,308**	**5,361,678**
45		Cold Year Peak Month (December) (MTh)	0	0	0	0	**0**	0	**114,779**	**657,111**
46		Peak Day (see note a/ below) (MTh)	0	0	0	0	**0**	0	**4,001**	**35,258**
47		%-Cust/Mtrs:	0.00%	0.00%	0.00%	0.00%		0.00%		
48		Number of Customers	0	0	0	0	**0**	0	**820**	**5,760,994**
49	Medium Pressure	%-Load:	0.00%	0.00%	0.00%	0.00%		0.00%		
50		Average Year Throughput (MTh)	0	0	0	0	**0**	0	**356,578**	**3,850,551**
51		Cold Year Throughput (1-in-35) (MTh)	0	0	0	0	**0**	0	**359,010**	**4,133,920**
52		Cold Year Peak Month (December) (MTh)	0	0	0	0	**0**	0	**28,845**	**558,564**
53		Peak Day (see note a/ below) (MTh)	0	0	0	0	**0**	0	**1,037**	**31,745**
54		%-Cust/Mtrs:	0.00%	0.00%	0.00%	0.00%		0.00%		
55		Number of Customers	0	0	0	0	**0**	0	**495**	**5,750,533**
56		**Note: a/**								

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

ANNUAL FORECAST DATA

Row					Nonresidential Core				Total
60				Residential	G-10	G-AC	G-GE	G-NGV	Core
61	**Average Year Throughput (Mth)**								
62	2,010	Jan		2,449,400	1,023,852	817	15,451	99,013	**3,588,533**
63	2,011	Jan		2,550,051	1,030,966	730	17,909	118,589	**3,718,245**
64	2,012	Jan		2,530,912	1,025,779	664	17,834	123,007	**3,698,195**
65	2,013	Jan		2,491,183	1,020,247	597	18,738	127,452	**3,658,217**
66	2,014	Jan		2,482,630	1,016,108	597	17,657	131,920	**3,648,912**
67	2,015	Jan		2,475,346	1,003,176	531	17,556	136,363	**3,632,973**
68	2,016	Jan		2,472,406	1,002,560	465	17,481	140,818	**3,633,729**

Row					Nonresidential Core				Total
72				Residential	G-10	G-AC	G-GE	G-NGV	Core
73	**Average Year Sales (Mth)**								
74	2,010	Jan	365	2,440,787	938,681	817	15,374	98,644	**3,494,304**
75	2,011	Jan	365	2,541,084	945,203	730	17,821	118,147	**3,622,985**
76	2,012	Jan	366	2,522,012	940,448	664	17,746	122,549	**3,603,418**
77	2,013	Jan	365	2,482,423	935,376	597	18,645	126,977	**3,564,019**
78	2,014	Jan	365	2,473,899	931,582	597	17,570	131,428	**3,555,077**
79	2,015	Jan	365	2,466,642	919,726	531	17,470	135,855	**3,540,223**
80	2,016	Jan	366	2,463,712	919,161	465	17,394	140,293	**3,541,025**

Row					Nonresidential Core				Total
84				Residential	G-10	G-AC	G-GE	G-NGV	Core
85	**Cold Year Throughput (Mth)**								
86	2,010	Jan		2,681,628	1,071,851	817	15,451	99,013	**3,868,759**
87	2,011	Jan		2,791,821	1,079,670	730	17,909	118,589	**4,008,720**
88	2,012	Jan		2,770,868	1,074,628	664	17,834	123,007	**3,987,000**
89	2,013	Jan		2,727,372	1,069,211	597	18,738	127,452	**3,943,370**
90	2,014	Jan		2,718,008	1,065,292	597	17,657	131,920	**3,933,474**
91	2,015	Jan		2,710,034	1,052,229	531	17,556	136,363	**3,916,713**
92	2,016	Jan		2,706,815	1,051,712	465	17,481	140,818	**3,917,290**

Row					Nonresidential Core				Total
96	**Peak Day Thrughput (Mth/Day)**			Residential	G-10	G-AC	G-GE	G-NGV	Core
97	2,010			24,566	6,002	2	20	272	**30,863**
98	2,011			25,576	6,071	1	21	388	**32,056**
99	2,012			25,384	6,068	1	21	403	**31,876**
100	2,013			24,985	6,062	1	29	417	**31,494**
101	2,014			24,899	6,068	1	20	432	**31,421**
102	2,015			24,826	6,027	1	20	446	**31,321**
103	2,016			24,797	6,035	1	20	461	**31,314**

Row					Nonresidential Core				Total
107				Residential	G-10	G-AC	G-GE	G-NGV	Core
108	**Forecast Number of Customers**								
109	2,010	Jan		5,309,182	205,946	12	714	252	**5,516,105**
110	2,011	Jan		5,356,431	209,164	11	710	263	**5,566,579**
111	2,012	Jan		5,411,852	209,186	10	707	274	**5,622,029**
112	2,013	Jan		5,475,270	209,729	9	703	285	**5,685,996**
113	2,014	Jan		5,546,406	210,398	9	700	296	**5,757,810**
114	2,015	Jan		5,624,886	211,223	8	696	307	**5,837,120**
115	2,016	Jan		5,708,769	212,218	7	693	319	**5,922,006**

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

Row	A	B	C	N	O	P	Q	R	S	T
59	***ANNUAL FORECAST DATA***				Noncore - G-30					Noncore - Electric Gene
60				G-30 (Dist.)	G-30 (Trans.)	**G-30 (Total)**	EG-Dist. (<3MMThms)	EG-Trans. (<3MMThms)	EG-Dist. (>=3MMThms)	EG-Trans. (>=3MMThms)
61	**Average Year Throughput (Mth)**									
62	2,010	Jan		926,668	641,071	**1,567,739**	48,733	10,386	528,982	2,226,111
63	2,011	Jan		900,377	666,136	**1,566,513**	47,570	38,722	481,823	2,206,899
64	2,012	Jan		885,751	657,324	**1,543,075**	47,977	40,310	475,722	2,305,730
65	2,013	Jan		879,360	646,478	**1,525,838**	42,346	22,782	478,655	2,528,403
66	2,014	Jan		873,345	639,719	**1,513,064**	42,695	16,832	478,853	2,552,345
67	2,015	Jan		860,165	631,817	**1,491,982**	41,567	18,390	464,045	2,531,855
68	2,016	Jan		845,701	621,069	**1,466,770**	41,682	18,015	466,153	2,570,584
69										
70										
71					Noncore - G-30					Noncore - Electric Gene
72				G-30 (Dist.)	G-30 (Trans.)	**G-30 (Total)**	EG-Dist. (<3MMThms)	EG-Trans. (<3MMThms)	EG-Dist. (>=3MMThms)	EG-Trans. (>=3MMThms)
73	**Average Year Sales (Mth)**									
74	2,010	Jan	365	0	0	**0**	0	0	0	0
75	2,011	Jan	365	0	0	**0**	0	0	0	0
76	2,012	Jan	366	0	0	**0**	0	0	0	0
77	2,013	Jan	365	0	0	**0**	0	0	0	0
78	2,014	Jan	365	0	0	**0**	0	0	0	0
79	2,015	Jan	365	0	0	**0**	0	0	0	0
80	2,016	Jan	366	0	0	**0**	0	0	0	0
81										
82										
83					Noncore - G-30					Noncore - Electric Gene
84				G-30 (Dist.)	G-30 (Trans.)	**G-30 (Total)**	EG-Dist. (<3MMThms)	EG-Trans. (<3MMThms)	EG-Dist. (>=3MMThms)	EG-Trans. (>=3MMThms)
85	**Cold Year Throughput (Mth)**									
86	2,010	Jan		897,870	674,020	**1,571,890**	48,733	10,386	528,982	2,226,111
87	2,011	Jan		898,774	671,890	**1,570,664**	47,570	38,722	481,823	2,206,899
88	2,012	Jan		889,535	657,691	**1,547,227**	47,977	40,310	475,722	2,305,730
89	2,013	Jan		883,144	646,846	**1,529,989**	42,346	22,782	478,655	2,528,403
90	2,014	Jan		877,129	640,086	**1,517,215**	42,695	16,832	478,853	2,552,345
91	2,015	Jan		863,949	632,184	**1,496,133**	41,567	18,390	464,045	2,531,855
92	2,016	Jan		849,485	621,436	**1,470,921**	41,682	18,015	466,153	2,570,584
93										
94										
95					Noncore - G-30					Noncore - Electric Gene
96	**Peak Day Thrughput (Mth/Day)**			G-30 (Dist.)	G-30 (Trans.)	**G-30 (Total)**	EG-Dist. (<3MMThms)	EG-Trans. (<3MMThms)	EG-Dist. (>=3MMThms)	EG-Trans. (>=3MMThms)
97	2,010			2,432	1,844	**4,276**	114	18	1,478	7,357
98	2,011			2,448	1,882	**4,330**	110	154	1,274	6,437
99	2,012			2,416	1,835	**4,251**	169	94	1,354	6,748
100	2,013			2,397	1,811	**4,208**	121	41	1,357	7,216
101	2,014			2,378	1,792	**4,170**	140	30	1,155	7,762
102	2,015			2,342	1,769	**4,111**	100	40	1,351	7,943
103	2,016			2,300	1,734	**4,034**	107	45	1,224	8,251
104										
105										
106					Noncore - G-30					Noncore - Electric Gene
107				G-30 (Dist.)	G-30 (Trans.)	**G-30 (Total)**	EG-Dist. (<3MMThms)	EG-Trans. (<3MMThms)	EG-Dist. (>=3MMThms)	EG-Trans. (>=3MMThms)
108	**Forecast Number of Customers**									
109	2,010	Jan		605	32	**637**	119	16	31	31
110	2,011	Jan		645	35	**680**	125	17	31	33
111	2,012	Jan		645	35	**680**	125	17	31	34
112	2,013	Jan		646	35	**681**	125	17	31	35
113	2,014	Jan		647	35	**682**	125	17	31	35
114	2,015	Jan		647	35	**682**	125	17	31	35
115	2,016	Jan		648	35	**683**	125	17	31	35

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

Row	A	B	C	U	V	W	Y	Z	AA	AC
59	***ANNUAL FORECAST DATA***			'atiion				Noncore - EOR		**Total**
60				**EG (<3MMThms)**	**EG (>=3MMThms)**	**EG (Total)**	EOR (Dist.)	EOR (Trans.)	**EOR (Total)**	**Retail Noncore**
61	**Average Year Throughput (Mth)**									
62	2,010	Jan		**59,119**	**2,755,092**	**2,814,212**	86,385	65,765	**152,150**	**4,534,100**
63	2,011	Jan		**86,292**	**2,688,722**	**2,775,014**	80,135	67,695	**147,830**	**4,489,357**
64	2,012	Jan		**88,287**	**2,781,452**	**2,869,739**	80,735	69,445	**150,180**	**4,562,994**
65	2,013	Jan		**65,128**	**3,007,057**	**3,072,186**	80,514	69,256	**149,770**	**4,747,794**
66	2,014	Jan		**59,527**	**3,031,199**	**3,090,726**	80,514	69,256	**149,770**	**4,753,560**
67	2,015	Jan		**59,956**	**2,995,901**	**3,055,857**	80,514	69,256	**149,770**	**4,697,609**
68	2,016	Jan		**59,697**	**3,036,738**	**3,096,434**	80,735	69,445	**150,180**	**4,713,384**
69										
70										
71				'atiion				Noncore - EOR		**Total**
72				**EG (<3MMThms)**	**EG (>=3MMThms)**	**EG (Total)**	EOR (Dist.)	EOR (Trans.)	**EOR (Total)**	**Retail Noncore**
73	**Average Year Sales (Mth)**									
74	2,010	Jan	365	**0**	**0**	**0**	0	0	**0**	**0**
75	2,011	Jan	365	**0**	**0**	**0**	0	0	**0**	**0**
76	2,012	Jan	366	**0**	**0**	**0**	0	0	**0**	**0**
77	2,013	Jan	365	**0**	**0**	**0**	0	0	**0**	**0**
78	2,014	Jan	365	**0**	**0**	**0**	0	0	**0**	**0**
79	2,015	Jan	365	**0**	**0**	**0**	0	0	**0**	**0**
80	2,016	Jan	366	**0**	**0**	**0**	0	0	**0**	**0**
81										
82										
83				'atiion				Noncore - EOR		**Total**
84				**EG (<3MMThms)**	**EG (>=3MMThms)**	**EG (Total)**	EOR (Dist.)	EOR (Trans.)	**EOR (Total)**	**Retail Noncore**
85	**Cold Year Throughput (Mth)**									
86	2,010	Jan		**59,119**	**2,755,092**	**2,814,212**	81,237	70,913	**152,150**	**4,538,252**
87	2,011	Jan		**86,292**	**2,688,722**	**2,775,014**	79,099	68,731	**147,830**	**4,493,508**
88	2,012	Jan		**88,287**	**2,781,452**	**2,869,739**	80,735	69,445	**150,180**	**4,567,146**
89	2,013	Jan		**65,128**	**3,007,057**	**3,072,186**	80,514	69,256	**149,770**	**4,751,945**
90	2,014	Jan		**59,527**	**3,031,199**	**3,090,726**	80,514	69,256	**149,770**	**4,757,711**
91	2,015	Jan		**59,956**	**2,995,901**	**3,055,857**	80,514	69,256	**149,770**	**4,701,760**
92	2,016	Jan		**59,697**	**3,036,738**	**3,096,434**	80,735	69,445	**150,180**	**4,717,536**
93										
94										
95				'atiion				Noncore - EOR		**Total**
96	**Peak Day Thrughput (Mth/Day)**			**EG (<3MMThms)**	**EG (>=3MMThms)**	**EG (Total)**	EOR (Dist.)	EOR (Trans.)	**EOR (Total)**	**Retail Noncore**
97	2,010			**132**	**8,836**	**8,968**	239	178	**417**	**13,661**
98	2,011			**263**	**7,712**	**7,975**	219	185	**405**	**12,710**
99	2,012			**263**	**8,102**	**8,365**	221	190	**410**	**13,027**
100	2,013			**162**	**8,572**	**8,734**	221	190	**410**	**13,353**
101	2,014			**170**	**8,918**	**9,087**	221	190	**410**	**13,668**
102	2,015			**141**	**9,294**	**9,435**	221	190	**410**	**13,957**
103	2,016			**152**	**9,476**	**9,627**	221	190	**410**	**14,071**
104										
105										
106				'atiion				Noncore - EOR		**Total**
107				**EG (<3MMThms)**	**EG (>=3MMThms)**	**EG (Total)**	EOR (Dist.)	EOR (Trans.)	**EOR (Total)**	**Retail Noncore**
108	**Forecast Number of Customers**									
109	2,010	Jan		**135**	**62**	**197**	15	16	**31**	**865**
110	2,011	Jan		**142**	**64**	**206**	17	15	**32**	**917**
111	2,012	Jan		**142**	**65**	**208**	17	15	**32**	**920**
112	2,013	Jan		**143**	**66**	**209**	17	15	**32**	**922**
113	2,014	Jan		**142**	**66**	**209**	17	15	**32**	**923**
114	2,015	Jan		**142**	**66**	**209**	17	15	**32**	**923**
115	2,016	Jan		**142**	**66**	**209**	17	15	**32**	**923**

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

ANNUAL FORECAST DATA

Row				Wholesale Noncore				Total	International NC	Total
				Long Beach	SDG&E	Southwest Gas	Vernon	**Wholesale**	Ecogas	**Noncore**
61	**Average Year Throughput (Mth)**									
62	2,010	Jan		82,486	**1,219,091**	67,047	84,412	**1,453,036**	64,691	**6,051,827**
63	2,011	Jan		82,815	**1,197,172**	64,941	84,412	**1,429,339**	65,393	**5,984,089**
64	2,012	Jan		82,880	**1,225,307**	65,674	75,542	**1,449,403**	65,720	**6,078,118**
65	2,013	Jan		84,075	**1,230,882**	66,278	78,072	**1,459,307**	66,049	**6,273,149**
66	2,014	Jan		83,557	**1,233,295**	67,140	80,602	**1,464,594**	66,379	**6,284,533**
67	2,015	Jan		84,600	**1,235,942**	68,096	83,132	**1,471,770**	66,711	**6,236,090**
68	2,016	Jan		84,970	**1,241,293**	69,213	83,132	**1,478,607**	67,044	**6,259,036**

Row				Wholesale Noncore				Total	International NC	Total
				Long Beach	SDG&E	Southwest Gas	Vernon	**Wholesale**	Ecogas	**Noncore**
73	**Average Year Sales (Mth)**									
74	2,010	Jan	365	0	**0**	0	0	**0**	0	**0**
75	2,011	Jan	365	0	**0**	0	0	**0**	0	**0**
76	2,012	Jan	366	0	**0**	0	0	**0**	0	**0**
77	2,013	Jan	365	0	**0**	0	0	**0**	0	**0**
78	2,014	Jan	365	0	**0**	0	0	**0**	0	**0**
79	2,015	Jan	365	0	**0**	0	0	**0**	0	**0**
80	2,016	Jan	366	0	**0**	0	0	**0**	0	**0**

Row				Wholesale Noncore				Total	International NC	Total
				Long Beach	SDG&E	Southwest Gas	Vernon	**Wholesale**	Ecogas	**Noncore**
85	**Cold Year Throughput (Mth)**									
86	2,010	Jan		87,006	**1,260,521**	67,047	84,412	**1,498,986**	64,691	**6,101,928**
87	2,011	Jan		87,335	**1,239,420**	71,428	84,412	**1,482,594**	65,393	**6,041,495**
88	2,012	Jan		87,400	**1,267,403**	70,316	75,542	**1,500,662**	65,720	**6,133,527**
89	2,013	Jan		88,606	**1,272,359**	70,977	78,072	**1,510,014**	66,049	**6,328,007**
90	2,014	Jan		88,098	**1,274,697**	71,906	80,602	**1,515,304**	66,379	**6,339,394**
91	2,015	Jan		89,151	**1,277,253**	72,938	83,132	**1,522,474**	66,711	**6,290,945**
92	2,016	Jan		89,532	**1,282,574**	74,132	83,132	**1,529,371**	67,044	**6,313,951**

Row				Wholesale Noncore				Total	International NC	Total
96	**Peak Day Thrughput (Mth/Day)**			Long Beach	SDG&E	Southwest Gas	Vernon	**Wholesale**	Ecogas	**Noncore**
97	2,010			627	**5,732**	522	254	**7,135**	161	**20,957**
98	2,011			617	**6,005**	573	254	**7,449**	169	**20,327**
99	2,012			622	**6,158**	579	280	**7,639**	170	**20,836**
100	2,013			622	**6,055**	586	287	**7,550**	171	**21,073**
101	2,014			621	**6,067**	594	294	**7,576**	171	**21,416**
102	2,015			624	**5,652**	603	300	**7,180**	172	**21,309**
103	2,016			625	**5,953**	613	300	**7,491**	173	**21,735**

Row				Wholesale Noncore				Total	International NC	Total
				Long Beach	SDG&E	Southwest Gas	Vernon	**Wholesale**	Ecogas	**Noncore**
108	**Forecast Number of Customers**									
109	2,010	Jan		1	**1**	1	1	**4**	1	**870**
110	2,011	Jan		1	**1**	1	1	**4**	1	**922**
111	2,012	Jan		1	**1**	1	1	**4**	1	**925**
112	2,013	Jan		1	**1**	1	1	**4**	1	**927**
113	2,014	Jan		1	**1**	1	1	**4**	1	**928**
114	2,015	Jan		1	**1**	1	1	**4**	1	**928**
115	2,016	Jan		1	**1**	1	1	**4**	1	**928**

	A	B	C	D	E	AO	AP	AQ	AR	AS	AT	AU
1	**2013 TCAP: SoCalGas Consolidated Gas Demand**											
2	**Forecast Summary (Mtherms)**											
59	***ANNUAL FORECAST DATA***					**Total**		**System Total**				**Total**
60						**System End-Use Dmd**		**(Mdth/d)**		**Co-Use-Fuel**	**"Un-Acnt'd-For" (UAF)**	**System Throughput**
61	**Average Year Throughput (Mth)**											
62	2,010	Jan				9,640,360		2,641		44,754	73,382	9,758,496
63	2,011	Jan				9,702,334		2,658		45,042	73,853	9,821,229
64	2,012	Jan				9,776,313		2,671		45,385	74,416	9,896,114
65	2,013	Jan				9,931,367		2,721		46,105	75,597	10,053,068
66	2,014	Jan				9,933,445		2,721		46,115	75,613	10,055,172
67	2,015	Jan				9,869,063		2,704		45,816	75,122	9,990,001
68	2,016	Jan				9,892,765		2,703		45,926	75,303	10,013,994
69												
70								**Check of**				
71						**Total**		**System Total**				
72						**System End-Use Dmd**		**(Mdth/d)**				
73	**Average Year Sales (Mth)**											
74	2,010	Jan	365			3,494,304		957				
75	2,011	Jan	365			3,622,985		993				
76	2,012	Jan	366			3,603,418		985				
77	2,013	Jan	365			3,564,019		976				
78	2,014	Jan	365			3,555,077		974				
79	2,015	Jan	365			3,540,223		970				
80	2,016	Jan	366			3,541,025		967				
81												
82								**Check of**				
83						**Total**		**System Total**				
84						**System End-Use Dmd**		**(Mdth/d)**		**Co-Use-Fuel**	**"Un-Acnt'd-For" (UAF)**	**System Throughput**
85	**Cold Year Throughput (Mth)**											
86	2,010	Jan				9,970,688		2,732		46,287	75,896	10,092,871
87	2,011	Jan				10,050,215		2,753		46,657	76,501	10,173,373
88	2,012	Jan				10,120,527		2,765		46,983	77,037	10,244,547
89	2,013	Jan				10,271,377		2,814		47,683	78,185	10,397,246
90	2,014	Jan				10,272,868		2,814		47,690	78,196	10,398,755
91	2,015	Jan				10,207,658		2,797		47,388	77,700	10,332,746
92	2,016	Jan				10,231,240		2,795		47,497	77,879	10,356,617
93												
94												
95						**Total**						
96	**Peak Day Thurghput (Mth/Day)**					**System End-Use Dmd**						
97	2,010					51,819						
98	2,011					52,384						
99	2,012					52,712						
100	2,013					52,568						
101	2,014					52,836						
102	2,015					52,630						
103	2,016					53,049						
104												
105												
106						**Total**						
107						**System**						
108	**Forecast Number of Customers**											
109	2,010	Jan				5,516,975						
110	2,011	Jan				5,567,502						
111	2,012	Jan				5,622,954						
112	2,013	Jan				5,686,923						
113	2,014	Jan				5,758,737						
114	2,015	Jan				5,838,048						
115	2,016	Jan				5,922,935						

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

MONTHLY FORECAST DATA

Row	Year	Month	Residential	Nonresidential Core G-10	Nonresidential Core G-AC	Nonresidential Core G-GE	Nonresidential Core G-NGV	**Total Core**	Noncore - G-30 G-30 (Dist.)	Noncore - G-30 G-30 (Trans.)	Noncore - G-30 **G-30 (Total)**	Noncore - Electric Gene EG-Dist. (<3MMThms)	Noncore - Electric Gene EG-Trans. (<3MMThms)	Noncore - Electric Gene EG-Dist. (>=3MMThms)	Noncore - Electric Gene EG-Trans. (>=3MMThms)
61	**Average Year Throughput (Mth)**														
62	2010	Jan	346,415	110,582	49	509	7,670	**465,225**	82,165	55,084	**137,249**	3,805	710	39,416	139,858
63		Feb	292,893	103,255	48	288	7,467	**403,951**	74,755	52,112	**126,867**	3,100	450	47,902	123,300
64		Mar	266,824	92,678	64	742	8,594	**368,902**	79,592	52,690	**132,282**	3,817	433	34,317	163,908
65		Apr	208,679	82,823	64	1,209	8,328	**301,102**	74,994	49,681	**124,676**	3,414	430	29,531	157,896
66		May	151,943	79,176	66	1,525	8,232	**240,940**	76,247	52,232	**128,479**	3,731	735	35,852	145,343
67		Jun	119,087	73,213	80	1,946	8,641	**202,966**	72,156	50,987	**123,142**	4,303	740	37,830	159,853
68		Jul	112,932	66,935	89	2,211	8,219	**190,387**	77,512	53,355	**130,868**	4,834	1,711	50,036	212,751
69		Aug	112,602	65,948	91	1,907	8,474	**189,021**	83,032	53,654	**136,685**	5,116	1,528	43,675	276,185
70		Sep	110,988	70,027	81	2,147	8,157	**191,399**	82,511	55,433	**137,945**	5,298	1,482	49,709	229,259
71		Oct	140,950	72,297	74	1,480	8,604	**223,406**	79,751	58,943	**138,694**	4,429	707	60,153	235,271
72		Nov	225,704	95,725	64	862	8,190	**330,546**	71,587	53,060	**124,647**	3,608	995	55,770	202,964
73		Dec	360,383	111,192	49	625	8,439	**480,688**	72,365	53,840	**126,205**	3,277	465	44,791	179,523
74															
75	2011	Jan	360,650	111,495	36	449	7,972	**480,602**	83,020	56,636	**139,656**	3,239	1,988	39,578	142,303
76		Feb	304,928	104,051	54	496	8,269	**417,799**	73,973	50,308	**124,281**	2,659	1,202	36,648	127,050
77		Mar	277,789	93,304	47	931	8,607	**380,678**	77,481	56,215	**133,697**	3,028	1,226	39,651	141,990
78		Apr	217,254	83,271	35	1,531	8,920	**311,011**	73,566	54,448	**128,014**	3,187	2,063	38,909	146,548
79		May	158,186	79,685	81	1,887	9,265	**249,104**	74,293	56,191	**130,484**	3,591	2,647	39,677	163,202
80		Jun	123,981	73,608	42	2,284	9,618	**209,532**	69,893	54,004	**123,897**	4,092	2,647	40,803	187,738
81		Jul	117,573	67,290	77	2,416	9,985	**197,341**	75,061	56,201	**131,261**	5,985	5,291	44,189	268,812
82		Aug	117,229	66,297	91	2,336	10,370	**196,323**	80,777	56,957	**137,734**	6,148	6,037	45,615	280,943
83		Sep	115,548	70,518	82	2,375	10,770	**199,293**	78,498	55,000	**133,498**	4,827	4,920	41,480	230,059
84		Oct	146,742	72,784	77	1,564	11,179	**232,345**	74,952	57,110	**132,061**	3,890	4,379	40,357	181,110
85		Nov	234,979	96,495	63	1,001	11,600	**344,138**	68,763	55,283	**124,046**	3,626	4,159	37,796	174,357
86		Dec	375,192	112,169	46	639	12,033	**500,079**	70,100	57,783	**127,883**	3,297	2,163	37,120	162,786
87															
88	2012	Jan	357,943	111,089	33	447	8,278	**477,791**	79,518	58,878	**138,395**	3,125	1,710	35,873	153,127
89		Feb	302,640	103,615	49	494	8,576	**415,375**	71,285	53,172	**124,457**	2,703	1,143	33,868	134,346
90		Mar	275,704	92,819	43	927	8,927	**378,420**	76,613	54,857	**131,469**	3,139	1,728	36,508	150,143
91		Apr	215,623	82,724	31	1,525	9,252	**309,155**	72,736	53,091	**125,827**	3,440	2,727	36,323	156,047
92		May	156,999	79,239	74	1,879	9,610	**247,800**	73,470	54,785	**128,255**	3,733	2,303	38,908	167,159
93		Jun	123,050	73,119	38	2,275	9,975	**208,457**	69,120	52,652	**121,772**	4,260	3,092	39,499	195,042
94		Jul	116,691	66,834	70	2,406	10,356	**196,356**	74,271	54,800	**129,071**	5,459	5,452	48,500	288,838
95		Aug	116,349	65,846	83	2,326	10,755	**195,359**	79,969	55,536	**135,506**	5,788	5,877	48,519	280,768
96		Sep	114,681	70,158	74	2,365	11,170	**198,449**	77,650	53,621	**131,271**	4,927	4,376	42,577	240,645
97		Oct	145,641	72,390	70	1,557	11,595	**231,252**	74,102	55,702	**129,804**	4,098	4,834	40,587	192,857
98		Nov	233,215	96,118	57	997	12,032	**342,418**	67,900	53,900	**121,799**	3,912	5,213	37,453	178,833
99		Dec	372,376	111,827	42	636	12,481	**497,362**	69,118	56,330	**125,448**	3,393	1,856	37,107	167,924
100															
101	2013	Jan	352,325	110,640	30	444	8,586	**472,025**	78,707	57,474	**136,182**	3,044	1,387	35,987	164,132
102		Feb	297,889	103,140	44	654	8,886	**410,614**	70,156	50,906	**121,063**	2,630	1,164	31,710	144,370
103		Mar	271,376	92,305	39	949	9,249	**373,917**	76,135	54,136	**130,272**	2,930	1,213	36,185	161,696
104		Apr	212,238	82,153	28	1,170	9,586	**305,175**	72,296	52,392	**124,688**	3,048	1,894	35,583	166,006
105		May	154,534	78,770	66	1,689	9,957	**245,016**	73,049	54,064	**127,114**	3,481	1,722	38,322	182,191
106		Jun	121,119	72,611	34	2,180	10,335	**206,278**	68,731	51,959	**120,689**	3,797	1,813	40,192	211,011
107		Jul	114,859	66,360	63	2,660	10,730	**194,672**	73,884	54,082	**127,966**	4,536	3,154	51,328	311,303
108		Aug	114,523	65,379	75	2,899	11,143	**194,019**	79,583	54,810	**134,392**	4,882	3,907	51,447	316,744
109		Sep	112,881	69,778	67	2,545	11,573	**196,844**	77,209	52,913	**130,121**	4,274	3,130	45,033	272,354
110		Oct	143,355	71,980	63	1,552	12,013	**228,963**	73,656	54,978	**128,633**	3,471	1,284	40,023	210,415
111		Nov	229,554	95,703	51	1,102	12,465	**338,876**	67,420	53,187	**120,607**	3,143	1,062	36,869	197,543
112		Dec	366,531	111,428	37	892	12,931	**491,819**	68,533	55,578	**124,111**	3,110	1,052	35,977	190,637

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

MONTHLY FORECAST DATA

Row	Year	Month	Residential	G-10	G-AC	G-GE	G-NGV	**Total Core**	G-30 (Dist.)	G-30 (Trans.)	**G-30 (Total)**	EG-Dist. (<3MMThms)	EG-Trans. (<3MMThms)	EG-Dist. (>=3MMThms)	EG-Trans. (>=3MMThms)
				Nonresidential Core					Noncore - G-30			Noncore - Electric Gene			
61	**Average Year Throughput (Mth)**														
113															
114	2014	Jan	351,115	110,363	30	442	8,895	**470,845**	78,085	56,796	**134,881**	2,963	1,061	35,952	179,589
115		Feb	296,866	102,821	44	489	9,197	**409,417**	69,642	50,386	**120,028**	2,571	870	32,028	159,251
116		Mar	270,444	91,919	39	918	9,572	**372,893**	75,610	53,577	**129,188**	2,981	929	35,857	176,594
117		Apr	211,510	81,690	28	1,510	9,921	**304,659**	71,813	51,849	**123,662**	3,174	1,462	36,235	188,555
118		May	154,004	78,401	66	1,860	10,305	**244,636**	72,584	53,505	**126,089**	3,487	1,375	37,878	195,680
119		Jun	120,703	72,191	34	2,252	10,697	**205,877**	68,300	51,421	**119,721**	3,740	1,224	39,582	202,668
120		Jul	114,464	65,962	63	2,382	11,105	**193,977**	73,447	53,526	**126,973**	4,620	2,123	50,969	302,746
121		Aug	114,129	64,984	75	2,303	11,533	**193,024**	79,133	54,247	**133,380**	4,889	2,649	51,759	295,614
122		Sep	112,493	69,480	67	2,342	11,978	**196,360**	76,713	52,363	**129,076**	4,475	2,033	44,245	253,853
123		Oct	142,862	71,652	63	1,542	12,433	**228,551**	73,166	54,416	**127,582**	3,381	1,071	40,400	209,014
124		Nov	228,766	95,429	51	987	12,901	**338,135**	66,915	52,636	**119,551**	3,286	988	37,434	195,717
125		Dec	365,272	111,215	37	630	13,383	**490,538**	67,936	54,997	**122,933**	3,128	1,048	36,513	193,064
126															
127	2015	Jan	350,085	109,169	27	440	9,206	**468,926**	76,928	56,252	**133,180**	2,855	1,062	36,042	179,399
128		Feb	295,995	101,638	39	487	9,505	**407,665**	68,592	49,854	**118,446**	2,570	907	32,084	160,125
129		Mar	269,651	90,745	34	913	9,894	**371,237**	74,445	52,891	**127,336**	2,873	996	35,328	177,801
130		Apr	210,889	80,511	25	1,501	10,254	**303,181**	70,723	51,182	**121,905**	2,975	1,211	36,074	181,744
131		May	153,552	77,344	59	1,849	10,651	**243,456**	71,505	52,819	**124,324**	3,260	1,118	37,726	188,455
132		Jun	120,349	71,127	30	2,239	11,056	**204,801**	67,294	50,762	**118,056**	3,532	1,380	38,722	201,588
133		Jul	114,129	64,967	56	2,368	11,478	**192,998**	72,381	52,842	**125,223**	4,706	2,470	46,806	293,315
134		Aug	113,795	63,997	66	2,290	11,920	**192,068**	77,992	53,552	**131,544**	4,861	2,751	47,450	296,561
135		Sep	112,163	68,560	59	2,328	12,380	**195,491**	75,560	51,685	**127,245**	4,330	2,242	40,747	253,048
136		Oct	142,443	70,679	56	1,533	12,850	**227,562**	72,061	53,727	**125,788**	3,507	1,655	39,671	213,362
137		Nov	228,095	94,347	46	981	13,335	**336,804**	65,869	51,963	**117,832**	3,059	1,450	37,059	195,354
138		Dec	364,200	110,092	33	626	13,833	**488,785**	66,814	54,289	**121,103**	3,037	1,147	36,335	191,104
139															
140	2016	Jan	349,669	109,173	23	438	9,518	**468,821**	75,623	55,396	**131,019**	2,887	1,137	35,340	186,813
141		Feb	295,644	101,625	34	484	9,815	**407,603**	67,995	50,474	**118,469**	2,481	896	32,491	161,584
142		Mar	269,331	90,701	30	909	10,216	**371,187**	73,118	51,840	**124,958**	2,815	942	35,883	176,489
143		Apr	210,639	80,446	22	1,495	10,588	**303,190**	69,478	50,158	**119,637**	2,795	1,075	35,314	179,259
144		May	153,370	77,277	52	1,841	10,998	**243,537**	70,271	51,760	**122,031**	3,404	1,163	38,463	191,882
145		Jun	120,206	71,048	26	2,230	11,416	**204,926**	66,141	49,745	**115,886**	3,609	1,335	38,688	206,391
146		Jul	113,993	64,880	49	2,358	11,852	**193,132**	71,166	51,788	**122,953**	4,747	2,366	47,492	304,318
147		Aug	113,659	63,902	58	2,280	12,309	**192,208**	76,701	52,480	**129,181**	5,023	2,998	47,502	301,246
148		Sep	112,030	68,476	52	2,318	12,784	**195,660**	74,251	50,643	**124,894**	4,510	2,514	41,635	264,190
149		Oct	142,274	70,581	49	1,526	13,269	**227,700**	70,796	52,666	**123,462**	3,392	1,390	39,630	211,575
150		Nov	227,824	94,321	40	977	13,769	**336,931**	64,658	50,923	**115,581**	2,992	1,112	37,017	192,268
151		Dec	363,768	110,130	29	624	14,283	**488,834**	65,503	53,196	**118,699**	3,025	1,086	36,697	194,569

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

Row	*MONTHLY FORECAST DATA*		ratiion			Noncore - EOR			Total	Wholesale Noncore				Total
60			EG (<3MMThms)	EG (>=3MMThms)	EG (Total)	EOR (Dist.)	EOR (Trans.)	EOR (Total)	Retail Noncore	Long Beach	SDG&E	Southwest Gas	Vernon	Wholesale
61	**Average Year Throughput (Mth)**													
62	2010	Jan	4,515	179,274	183,789	7,928	6,562	14,490	335,528	9,061	137,684	10,020	8,428	165,193
63		Feb	3,551	171,202	174,753	6,704	5,086	11,790	313,409	8,629	122,025	7,929	7,661	146,243
64		Mar	4,250	198,225	202,475	7,772	5,578	13,350	348,108	9,016	115,345	6,847	8,331	139,539
65		Apr	3,844	187,427	191,271	7,274	5,216	12,490	328,437	7,049	111,617	5,757	8,102	132,525
66		May	4,466	181,194	185,660	7,774	5,076	12,850	326,990	6,212	93,952	4,136	2,697	106,997
67		Jun	5,043	197,683	202,726	7,137	5,153	12,290	338,158	4,887	83,347	2,989	2,773	93,996
68		Jul	6,545	262,787	269,332	6,972	5,708	12,680	412,880	5,013	68,887	2,602	5,746	82,248
69		Aug	6,644	319,860	326,504	6,904	5,376	12,280	475,469	4,900	84,337	2,836	6,910	98,983
70		Sep	6,780	278,968	285,749	6,493	5,447	11,940	435,633	4,851	90,176	3,009	8,410	106,446
71		Oct	5,136	295,424	300,559	6,845	5,715	12,560	451,813	5,558	85,766	4,115	8,743	104,182
72		Nov	4,603	258,734	263,337	7,178	5,322	12,500	400,484	8,024	101,546	7,597	8,733	125,901
73		Dec	3,742	224,314	228,056	7,406	5,524	12,930	367,191	9,287	124,410	9,209	7,877	150,783
74														
75	2011	Jan	5,228	181,881	187,108	6,802	5,748	12,550	339,315	9,491	101,896	10,001	8,428	129,816
76		Feb	3,861	163,698	167,559	6,146	5,194	11,340	303,180	9,204	91,673	8,471	7,661	117,008
77		Mar	4,254	181,641	185,895	6,802	5,748	12,550	332,142	8,964	89,998	6,923	8,331	114,216
78		Apr	5,250	185,458	190,708	6,593	5,567	12,160	330,882	7,185	84,597	5,434	8,102	105,317
79		May	6,238	202,879	209,117	6,802	5,748	12,550	352,151	6,164	79,275	3,584	2,697	91,720
80		Jun	6,739	228,541	235,280	6,593	5,567	12,160	371,337	4,870	83,729	2,921	2,773	94,293
81		Jul	11,276	313,002	324,277	6,802	5,748	12,550	468,089	5,022	117,077	2,510	5,746	130,355
82		Aug	12,185	326,558	338,743	6,802	5,748	12,550	489,026	4,779	119,631	2,558	6,910	133,879
83		Sep	9,747	271,539	281,286	6,593	5,567	12,160	426,945	4,726	114,006	2,563	8,410	129,705
84		Oct	8,269	221,467	229,736	6,802	5,748	12,550	374,347	5,364	89,949	3,705	8,743	107,760
85		Nov	7,785	212,154	219,938	6,593	5,567	12,160	356,145	7,857	96,147	6,167	8,733	118,903
86		Dec	5,460	199,906	205,366	6,802	5,748	12,550	345,799	9,191	129,194	10,104	7,877	156,367
87														
88	2012	Jan	4,835	189,001	193,836	6,836	5,884	12,720	344,952	9,317	105,189	10,101	8,246	132,853
89		Feb	3,846	168,214	172,060	6,400	5,500	11,900	308,417	9,376	95,375	8,668	6,592	120,011
90		Mar	4,868	186,651	191,518	6,836	5,884	12,720	335,708	8,809	95,390	6,989	1,351	112,539
91		Apr	6,166	192,370	198,537	6,621	5,689	12,310	336,673	7,077	89,424	5,485	2,383	104,368
92		May	6,036	206,067	212,102	6,836	5,884	12,720	353,078	6,127	79,652	3,615	2,088	91,483
93		Jun	7,352	234,541	241,894	6,621	5,689	12,310	375,976	4,863	86,909	2,944	7,590	102,307
94		Jul	10,911	337,338	348,249	6,836	5,884	12,720	490,040	5,005	120,156	2,530	7,979	135,671
95		Aug	11,665	329,287	340,952	6,836	5,884	12,720	489,178	4,802	119,519	2,580	7,836	134,737
96		Sep	9,303	283,222	292,525	6,621	5,689	12,310	436,107	4,765	114,571	2,585	7,728	129,650
97		Oct	8,932	233,444	242,375	6,836	5,884	12,720	384,900	5,484	91,411	3,739	8,349	108,982
98		Nov	9,125	216,286	225,411	6,621	5,689	12,310	359,520	7,990	98,387	6,228	6,717	119,322
99		Dec	5,248	205,030	210,279	6,836	5,884	12,720	348,447	9,266	129,322	10,211	8,683	157,482
100														
101	2013	Jan	4,431	200,119	204,549	6,836	5,884	12,720	353,451	9,523	106,567	10,213	8,457	134,759
102		Feb	3,794	176,080	179,874	6,179	5,311	11,490	312,426	9,352	97,913	8,648	6,802	122,716
103		Mar	4,142	197,881	202,023	6,836	5,884	12,720	345,015	9,024	96,498	7,064	1,562	114,148
104		Apr	4,942	201,589	206,531	6,621	5,689	12,310	343,529	7,223	91,418	5,542	2,594	106,777
105		May	5,203	220,512	225,716	6,836	5,884	12,720	365,549	6,265	82,363	3,652	2,299	94,579
106		Jun	5,610	251,203	256,813	6,621	5,689	12,310	389,812	5,004	90,155	2,972	7,800	105,931
107		Jul	7,691	362,632	370,322	6,836	5,884	12,720	511,009	5,120	119,267	2,555	8,190	135,133
108		Aug	8,789	368,190	376,979	6,836	5,884	12,720	524,092	4,918	119,166	2,604	8,047	134,735
109		Sep	7,404	317,387	324,791	6,621	5,689	12,310	467,222	4,883	115,262	2,611	7,939	130,696
110		Oct	4,756	250,438	255,194	6,836	5,884	12,720	396,547	5,499	90,498	3,780	8,559	108,336
111		Nov	4,205	234,412	238,617	6,621	5,689	12,310	371,535	7,938	92,444	6,300	6,928	113,609
112		Dec	4,162	226,614	230,775	6,836	5,884	12,720	367,607	9,326	129,333	10,338	8,894	157,890

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

	A	B	U	V	W	Y	Z	AA	AC	AE	AF	AG	AH	AI
59	***MONTHLY FORECAST DATA***		ratiion			Noncore - EOR			**Total**	Wholesale Noncore				**Total**
60			**EG (<3MMThms)**	**EG (>=3MMThms)**	**EG (Total)**	EOR (Dist.)	EOR (Trans.)	**EOR (Total)**	**Retail Noncore**	Long Beach	SDG&E	Southwest Gas	Vernon	**Wholesale**
61	**Average Year Throughput (Mth)**													
113														
114	2014	Jan	**4,024**	**215,541**	**219,565**	6,836	5,884	**12,720**	**367,166**	9,440	**106,649**	10,347	8,667	**135,103**
115		Feb	**3,440**	**191,279**	**194,720**	6,179	5,311	**11,490**	**326,238**	9,365	**97,889**	8,761	7,013	**123,028**
116		Mar	**3,910**	**212,451**	**216,361**	6,836	5,884	**12,720**	**358,269**	8,988	**96,545**	7,154	1,773	**114,460**
117		Apr	**4,636**	**224,789**	**229,425**	6,621	5,689	**12,310**	**365,397**	7,181	**90,877**	5,611	2,805	**106,474**
118		May	**4,862**	**233,559**	**238,420**	6,836	5,884	**12,720**	**377,229**	6,210	**81,501**	3,695	2,510	**93,916**
119		Jun	**4,964**	**242,250**	**247,214**	6,621	5,689	**12,310**	**379,245**	4,930	**88,567**	3,004	8,011	**104,512**
120		Jul	**6,744**	**353,716**	**360,459**	6,836	5,884	**12,720**	**500,153**	5,061	**119,614**	2,583	8,401	**135,659**
121		Aug	**7,538**	**347,373**	**354,911**	6,836	5,884	**12,720**	**501,011**	4,847	**120,557**	2,635	8,258	**136,296**
122		Sep	**6,509**	**298,098**	**304,607**	6,621	5,689	**12,310**	**445,993**	4,808	**115,204**	2,642	8,150	**130,804**
123		Oct	**4,452**	**249,415**	**253,867**	6,836	5,884	**12,720**	**394,169**	5,479	**91,045**	3,827	8,770	**109,122**
124		Nov	**4,274**	**233,151**	**237,424**	6,621	5,689	**12,310**	**369,285**	7,974	**94,015**	6,387	7,139	**115,514**
125		Dec	**4,176**	**229,578**	**233,754**	6,836	5,884	**12,720**	**369,407**	9,275	**130,832**	10,494	9,105	**159,705**
126														
127	2015	Jan	**3,917**	**215,441**	**219,358**	6,836	5,884	**12,720**	**365,258**	9,553	**107,398**	10,502	8,878	**136,330**
128		Feb	**3,477**	**192,209**	**195,686**	6,179	5,311	**11,490**	**325,622**	9,369	**98,051**	8,890	7,224	**123,535**
129		Mar	**3,869**	**213,130**	**216,999**	6,836	5,884	**12,720**	**357,054**	9,061	**96,958**	7,257	1,984	**115,260**
130		Apr	**4,186**	**217,819**	**222,005**	6,621	5,689	**12,310**	**356,220**	7,283	**89,652**	5,691	3,016	**105,642**
131		May	**4,378**	**226,181**	**230,559**	6,836	5,884	**12,720**	**367,603**	6,325	**80,774**	3,744	2,721	**93,564**
132		Jun	**4,912**	**240,310**	**245,222**	6,621	5,689	**12,310**	**375,588**	5,034	**87,724**	3,041	8,222	**104,021**
133		Jul	**7,176**	**340,121**	**347,297**	6,836	5,884	**12,720**	**485,240**	5,144	**120,715**	2,616	8,612	**137,087**
134		Aug	**7,612**	**344,011**	**351,623**	6,836	5,884	**12,720**	**495,887**	4,947	**120,890**	2,669	8,468	**136,975**
135		Sep	**6,573**	**293,795**	**300,368**	6,621	5,689	**12,310**	**439,923**	4,908	**115,994**	2,677	8,361	**131,941**
136		Oct	**5,162**	**253,032**	**258,195**	6,836	5,884	**12,720**	**396,702**	5,564	**92,546**	3,881	8,981	**110,971**
137		Nov	**4,509**	**232,413**	**236,922**	6,621	5,689	**12,310**	**367,064**	8,029	**94,451**	6,478	7,350	**116,307**
138		Dec	**4,184**	**227,440**	**231,624**	6,836	5,884	**12,720**	**365,446**	9,383	**130,789**	10,649	9,315	**160,137**
139														
140	2016	Jan	**4,025**	**222,154**	**226,178**	6,836	5,884	**12,720**	**369,917**	9,548	**107,742**	10,659	8,878	**136,828**
141		Feb	**3,377**	**194,075**	**197,453**	6,400	5,500	**11,900**	**327,822**	9,598	**98,425**	9,143	7,224	**124,391**
142		Mar	**3,756**	**212,372**	**216,129**	6,836	5,884	**12,720**	**353,807**	9,108	**97,057**	7,362	1,984	**115,511**
143		Apr	**3,870**	**214,573**	**218,444**	6,621	5,689	**12,310**	**350,390**	7,300	**90,259**	5,773	3,016	**106,348**
144		May	**4,567**	**230,345**	**234,912**	6,836	5,884	**12,720**	**369,663**	6,334	**81,927**	3,796	2,721	**94,777**
145		Jun	**4,945**	**245,079**	**250,024**	6,621	5,689	**12,310**	**378,220**	5,047	**89,239**	3,080	8,222	**105,588**
146		Jul	**7,113**	**351,810**	**358,923**	6,836	5,884	**12,720**	**494,597**	5,160	**121,010**	2,650	8,612	**137,432**
147		Aug	**8,022**	**348,748**	**356,769**	6,836	5,884	**12,720**	**498,671**	4,967	**121,487**	2,705	8,468	**137,627**
148		Sep	**7,024**	**305,825**	**312,849**	6,621	5,689	**12,310**	**450,053**	4,930	**116,834**	2,714	8,361	**132,838**
149		Oct	**4,782**	**251,205**	**255,987**	6,836	5,884	**12,720**	**392,169**	5,558	**91,734**	3,936	8,981	**110,209**
150		Nov	**4,104**	**229,285**	**233,389**	6,621	5,689	**12,310**	**361,280**	8,031	**93,578**	6,576	7,350	**115,534**
151		Dec	**4,111**	**231,266**	**235,378**	6,836	5,884	**12,720**	**366,796**	9,391	**132,000**	10,818	9,315	**161,525**

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

MONTHLY FORECAST DATA

Average Year Throughput (Mth)		International NC Ecogas	Total Noncore	Total System End-Use Dmd	System Total (Mdth/d)	Co-Use-Fuel	"Un-Acnt'd-For" (UAF)	Total System Throughput
2010	Jan	5,748	**506,469**	**971,694**	**3,134**	**4,511**	**7,396**	**983,601**
	Feb	5,377	**465,030**	**868,981**	**3,104**	**4,034**	**6,615**	**879,630**
	Mar	5,814	**493,460**	**862,362**	**2,782**	**4,003**	**6,564**	**872,930**
	Apr	4,637	**465,599**	**766,701**	**2,556**	**3,559**	**5,836**	**776,096**
	May	5,730	**439,716**	**680,656**	**2,196**	**3,160**	**5,181**	**688,997**
	Jun	5,717	**437,871**	**640,837**	**2,136**	**2,975**	**4,878**	**648,690**
	Jul	5,437	**500,565**	**690,952**	**2,229**	**3,208**	**5,259**	**699,419**
	Aug	5,194	**579,646**	**768,667**	**2,480**	**3,568**	**5,851**	**778,086**
	Sep	5,153	**547,232**	**738,631**	**2,462**	**3,429**	**5,622**	**747,682**
	Oct	5,543	**561,539**	**784,945**	**2,532**	**3,644**	**5,975**	**794,564**
	Nov	5,356	**531,741**	**862,287**	**2,874**	**4,003**	**6,564**	**872,854**
	Dec	4,985	**522,959**	**1,003,648**	**3,238**	**4,659**	**7,640**	**1,015,946**
2011	Jan	5,654	**474,784**	**955,386**	**3,082**	**4,435**	**7,272**	**967,094**
	Feb	5,489	**425,678**	**843,476**	**3,012**	**3,916**	**6,420**	**853,813**
	Mar	5,966	**452,324**	**833,002**	**2,687**	**3,867**	**6,341**	**843,210**
	Apr	5,604	**441,802**	**752,813**	**2,509**	**3,495**	**5,730**	**762,038**
	May	5,464	**449,335**	**698,439**	**2,253**	**3,242**	**5,316**	**706,997**
	Jun	5,438	**471,068**	**680,601**	**2,269**	**3,160**	**5,181**	**688,941**
	Jul	5,404	**603,848**	**801,189**	**2,584**	**3,719**	**6,099**	**811,007**
	Aug	5,393	**628,298**	**824,621**	**2,660**	**3,828**	**6,277**	**834,726**
	Sep	5,382	**562,032**	**761,325**	**2,538**	**3,534**	**5,795**	**770,654**
	Oct	5,156	**487,264**	**719,609**	**2,321**	**3,341**	**5,478**	**728,427**
	Nov	5,209	**480,257**	**824,395**	**2,748**	**3,827**	**6,275**	**834,497**
	Dec	5,235	**507,400**	**1,007,480**	**3,250**	**4,677**	**7,669**	**1,019,826**
2012	Jan	5,682	**483,486**	**961,277**	**3,101**	**4,463**	**7,317**	**973,057**
	Feb	5,516	**433,945**	**849,320**	**3,033**	**3,943**	**6,465**	**859,728**
	Mar	5,996	**454,243**	**832,663**	**2,686**	**3,866**	**6,338**	**842,866**
	Apr	5,632	**446,673**	**755,828**	**2,519**	**3,509**	**5,753**	**765,090**
	May	5,492	**450,052**	**697,852**	**2,251**	**3,240**	**5,312**	**706,403**
	Jun	5,465	**483,748**	**692,205**	**2,307**	**3,213**	**5,269**	**700,688**
	Jul	5,431	**631,142**	**827,499**	**2,669**	**3,842**	**6,299**	**837,639**
	Aug	5,419	**629,334**	**824,693**	**2,660**	**3,829**	**6,277**	**834,799**
	Sep	5,409	**571,165**	**769,614**	**2,565**	**3,573**	**5,858**	**779,045**
	Oct	5,182	**499,064**	**730,316**	**2,356**	**3,390**	**5,559**	**739,266**
	Nov	5,235	**484,077**	**826,495**	**2,755**	**3,837**	**6,291**	**836,623**
	Dec	5,261	**511,189**	**1,008,551**	**3,253**	**4,682**	**7,677**	**1,020,910**
2013	Jan	5,710	**493,920**	**965,945**	**3,116**	**4,484**	**7,353**	**977,782**
	Feb	5,544	**440,686**	**851,300**	**3,040**	**3,952**	**6,480**	**861,732**
	Mar	6,026	**465,188**	**839,106**	**2,707**	**3,895**	**6,387**	**849,388**
	Apr	5,660	**455,966**	**761,141**	**2,537**	**3,533**	**5,794**	**770,468**
	May	5,519	**465,647**	**710,663**	**2,292**	**3,299**	**5,410**	**719,372**
	Jun	5,493	**501,236**	**707,514**	**2,358**	**3,285**	**5,386**	**716,184**
	Jul	5,459	**651,600**	**846,272**	**2,730**	**3,929**	**6,442**	**856,642**
	Aug	5,447	**664,273**	**858,292**	**2,769**	**3,984**	**6,533**	**868,810**
	Sep	5,436	**603,354**	**800,198**	**2,667**	**3,715**	**6,091**	**810,004**
	Oct	5,208	**510,091**	**739,053**	**2,384**	**3,431**	**5,626**	**748,110**
	Nov	5,261	**490,405**	**829,281**	**2,764**	**3,850**	**6,312**	**839,443**
	Dec	5,287	**530,784**	**1,022,602**	**3,299**	**4,747**	**7,784**	**1,035,133**

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

MONTHLY FORECAST DATA

Row	A	B	International NC Ecogas	Total Noncore	Total System End-Use Dmd	System Total (Mdth/d)	Co-Use-Fuel	"Un-Acnt'd-For" (UAF)	Total System Throughput
61	**Average Year Throughput (Mth)**								
113									
114	2014	Jan	5,739	**508,008**	**978,853**	**3,158**	**4,544**	**7,451**	**990,848**
115		Feb	5,572	**454,838**	**864,255**	**3,087**	**4,012**	**6,579**	**874,846**
116		Mar	6,056	**478,784**	**851,677**	**2,747**	**3,954**	**6,483**	**862,114**
117		Apr	5,688	**477,559**	**782,218**	**2,607**	**3,631**	**5,954**	**791,804**
118		May	5,547	**476,692**	**721,328**	**2,327**	**3,349**	**5,491**	**730,167**
119		Jun	5,520	**489,277**	**695,154**	**2,317**	**3,227**	**5,291**	**703,672**
120		Jul	5,486	**641,298**	**835,274**	**2,694**	**3,878**	**6,358**	**845,510**
121		Aug	5,474	**642,780**	**835,804**	**2,696**	**3,880**	**6,362**	**846,046**
122		Sep	5,463	**582,260**	**778,620**	**2,595**	**3,615**	**5,927**	**788,162**
123		Oct	5,234	**508,524**	**737,076**	**2,378**	**3,422**	**5,611**	**746,108**
124		Nov	5,287	**490,087**	**828,222**	**2,761**	**3,845**	**6,304**	**838,371**
125		Dec	5,313	**534,425**	**1,024,963**	**3,306**	**4,758**	**7,802**	**1,037,524**
126									
127	2015	Jan	5,768	**507,356**	**976,282**	**3,149**	**4,532**	**7,431**	**988,246**
128		Feb	5,600	**454,756**	**862,421**	**3,080**	**4,004**	**6,565**	**872,989**
129		Mar	6,086	**478,400**	**849,638**	**2,741**	**3,944**	**6,467**	**860,049**
130		Apr	5,716	**467,578**	**770,759**	**2,569**	**3,578**	**5,867**	**780,204**
131		May	5,574	**466,741**	**710,196**	**2,291**	**3,297**	**5,406**	**718,899**
132		Jun	5,548	**485,157**	**689,958**	**2,300**	**3,203**	**5,252**	**698,413**
133		Jul	5,513	**627,841**	**820,839**	**2,648**	**3,811**	**6,248**	**830,898**
134		Aug	5,501	**638,364**	**830,431**	**2,679**	**3,855**	**6,321**	**840,608**
135		Sep	5,490	**577,354**	**772,846**	**2,576**	**3,588**	**5,883**	**782,317**
136		Oct	5,260	**512,934**	**740,495**	**2,389**	**3,438**	**5,637**	**749,569**
137		Nov	5,314	**488,685**	**825,489**	**2,752**	**3,832**	**6,284**	**835,605**
138		Dec	5,340	**530,923**	**1,019,708**	**3,289**	**4,734**	**7,762**	**1,032,204**
139									
140	2016	Jan	5,796	**512,542**	**981,363**	**3,166**	**4,556**	**7,470**	**993,389**
141		Feb	5,628	**457,840**	**865,443**	**3,091**	**4,018**	**6,588**	**876,049**
142		Mar	6,117	**475,434**	**846,621**	**2,731**	**3,930**	**6,444**	**856,996**
143		Apr	5,745	**462,483**	**765,673**	**2,552**	**3,555**	**5,828**	**775,056**
144		May	5,602	**470,042**	**713,579**	**2,302**	**3,313**	**5,432**	**722,324**
145		Jun	5,576	**489,384**	**694,309**	**2,314**	**3,223**	**5,285**	**702,817**
146		Jul	5,541	**637,569**	**830,702**	**2,680**	**3,856**	**6,323**	**840,881**
147		Aug	5,529	**641,827**	**834,034**	**2,690**	**3,872**	**6,349**	**844,255**
148		Sep	5,518	**588,409**	**784,069**	**2,614**	**3,640**	**5,968**	**793,677**
149		Oct	5,286	**507,664**	**735,363**	**2,372**	**3,414**	**5,598**	**744,375**
150		Nov	5,340	**482,155**	**819,086**	**2,730**	**3,802**	**6,235**	**829,123**
151		Dec	5,367	**533,688**	**1,022,522**	**3,298**	**4,747**	**7,783**	**1,035,052**

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1																
2																
154							Nonresidential Core					**Total**		Noncore - G-30		
155						Residential	G-10		G-AC	G-GE	G-NGV	**Core**		G-30 (Dist.)	G-30 (Trans.)	**G-30 (Total)**
156	**Average Year Sales (Mth)**															
157	2010	Jan	31			345,197	101,383		49	507	7,641	**454,777**		0	0	**0**
158		Feb	28			291,863	94,665		48	287	7,440	**394,303**		0	0	**0**
159		Mar	31			265,886	84,969		64	738	8,562	**360,218**		0	0	**0**
160		Apr	30			207,945	75,934		64	1,203	8,296	**293,442**		0	0	**0**
161		May	31			151,408	72,589		66	1,517	8,201	**233,781**		0	0	**0**
162		Jun	30			118,668	67,122		80	1,936	8,608	**196,415**		0	0	**0**
163		Jul	31			112,535	61,367		89	2,200	8,189	**184,380**		0	0	**0**
164		Aug	31			112,206	60,462		91	1,897	8,442	**183,098**		0	0	**0**
165		Sep	30			110,597	64,202		81	2,136	8,126	**185,142**		0	0	**0**
166		Oct	31			140,455	66,283		74	1,473	8,572	**216,857**		0	0	**0**
167		Nov	30			224,911	87,762		64	858	8,159	**321,754**		0	0	**0**
168		Dec	31			359,116	101,943		49	621	8,408	**470,137**		0	0	**0**
169																
170	2011	Jan	31			359,382	102,220		36	446	7,943	**470,027**		0	0	**0**
171		Feb	28			303,856	95,395		54	494	8,238	**408,038**		0	0	**0**
172		Mar	31			276,812	85,542		47	926	8,575	**371,903**		0	0	**0**
173		Apr	30			216,490	76,344		35	1,524	8,887	**303,279**		0	0	**0**
174		May	31			157,630	73,056		81	1,877	9,231	**241,875**		0	0	**0**
175		Jun	30			123,545	67,485		42	2,273	9,582	**202,926**		0	0	**0**
176		Jul	31			117,159	61,692		77	2,404	9,948	**191,281**		0	0	**0**
177		Aug	31			116,817	60,782		91	2,324	10,331	**190,346**		0	0	**0**
178		Sep	30			115,142	64,652		82	2,364	10,730	**192,969**		0	0	**0**
179		Oct	31			146,226	66,729		77	1,556	11,137	**225,725**		0	0	**0**
180		Nov	30			234,153	88,468		63	996	11,557	**335,236**		0	0	**0**
181		Dec	31			373,872	102,838		46	636	11,989	**489,381**		0	0	**0**
182																
183	2012	Jan	31			356,685	101,848		33	445	8,247	**467,258**		0	0	**0**
184		Feb	29			301,576	94,996		49	492	8,545	**405,657**		0	0	**0**
185		Mar	31			274,734	85,098		43	923	8,894	**369,692**		0	0	**0**
186		Apr	30			214,865	75,842		31	1,518	9,218	**301,473**		0	0	**0**
187		May	31			156,447	72,647		74	1,869	9,574	**240,611**		0	0	**0**
188		Jun	30			122,618	67,037		38	2,263	9,938	**201,894**		0	0	**0**
189		Jul	31			116,280	61,274		70	2,394	10,318	**190,336**		0	0	**0**
190		Aug	31			115,940	60,369		83	2,315	10,715	**189,421**		0	0	**0**
191		Sep	30			114,278	64,322		74	2,354	11,129	**192,156**		0	0	**0**
192		Oct	31			145,129	66,368		70	1,549	11,551	**224,668**		0	0	**0**
193		Nov	30			232,395	88,122		57	992	11,987	**333,553**		0	0	**0**
194		Dec	31			371,066	102,525		42	633	12,434	**486,700**		0	0	**0**
195																
196	2013	Jan	31			351,086	101,437		30	442	8,554	**461,548**		0	0	**0**
197		Feb	28			296,842	94,561		44	651	8,853	**400,950**		0	0	**0**
198		Mar	31			270,422	84,626		39	944	9,214	**365,245**		0	0	**0**
199		Apr	30			211,492	75,319		28	1,164	9,550	**297,554**		0	0	**0**
200		May	31			153,991	72,217		66	1,681	9,919	**237,875**		0	0	**0**
201		Jun	30			120,693	66,571		34	2,169	10,297	**199,763**		0	0	**0**
202		Jul	31			114,455	60,840		63	2,647	10,690	**188,695**		0	0	**0**
203		Aug	31			114,120	59,940		75	2,885	11,102	**188,121**		0	0	**0**
204		Sep	30			112,484	63,974		67	2,533	11,530	**190,587**		0	0	**0**
205		Oct	31			142,851	65,992		63	1,545	11,968	**222,418**		0	0	**0**
206		Nov	30			228,747	87,741		51	1,097	12,419	**330,056**		0	0	**0**
207		Dec	31			365,242	102,159		37	887	12,883	**481,208**		0	0	**0**

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

Row	A	B	C	F	G	I	J	K	L	N	O	P
154					Nonresidential Core				**Total**	Noncore - G-30		
155				Residential	G-10	G-AC	G-GE	G-NGV	**Core**	G-30 (Dist.)	G-30 (Trans.)	**G-30 (Total)**
156	**Average Year Sales (Mth)**											
208												
209	2014	Jan	31	349,880	101,182	30	440	8,862	**460,394**	0	0	**0**
210		Feb	28	295,822	94,267	44	487	9,162	**399,783**	0	0	**0**
211		Mar	31	269,493	84,273	39	913	9,537	**364,255**	0	0	**0**
212		Apr	30	210,766	74,895	28	1,502	9,884	**297,075**	0	0	**0**
213		May	31	153,462	71,879	66	1,851	10,266	**237,525**	0	0	**0**
214		Jun	30	120,278	66,186	34	2,241	10,657	**199,396**	0	0	**0**
215		Jul	31	114,062	60,475	63	2,370	11,064	**188,034**	0	0	**0**
216		Aug	31	113,728	59,578	75	2,292	11,490	**187,163**	0	0	**0**
217		Sep	30	112,098	63,700	67	2,330	11,933	**190,128**	0	0	**0**
218		Oct	31	142,360	65,691	63	1,534	12,387	**222,035**	0	0	**0**
219		Nov	30	227,962	87,491	51	982	12,853	**329,339**	0	0	**0**
220		Dec	31	363,988	101,964	37	627	13,333	**479,949**	0	0	**0**
221												
222	2015	Jan	31	348,854	100,088	27	438	9,172	**458,577**	0	0	**0**
223		Feb	28	294,955	93,183	39	484	9,470	**398,131**	0	0	**0**
224		Mar	31	268,703	83,197	34	908	9,857	**362,699**	0	0	**0**
225		Apr	30	210,147	73,814	25	1,494	10,216	**295,696**	0	0	**0**
226		May	31	153,012	70,910	59	1,840	10,611	**236,433**	0	0	**0**
227		Jun	30	119,926	65,210	30	2,228	11,015	**198,408**	0	0	**0**
228		Jul	31	113,727	59,563	56	2,357	11,435	**187,138**	0	0	**0**
229		Aug	31	113,394	58,673	66	2,279	11,876	**186,288**	0	0	**0**
230		Sep	30	111,769	62,857	59	2,317	12,334	**189,336**	0	0	**0**
231		Oct	31	141,942	64,799	56	1,525	12,803	**221,126**	0	0	**0**
232		Nov	30	227,293	86,499	46	976	13,285	**328,099**	0	0	**0**
233		Dec	31	362,920	100,934	33	623	13,781	**478,291**	0	0	**0**
234												
235	2016	Jan	31	348,439	100,091	23	436	9,483	**458,472**	0	0	**0**
236		Feb	29	294,604	93,172	34	482	9,779	**398,071**	0	0	**0**
237		Mar	31	268,383	83,156	30	904	10,178	**362,652**	0	0	**0**
238		Apr	30	209,898	73,754	22	1,487	10,549	**295,711**	0	0	**0**
239		May	31	152,830	70,848	52	1,832	10,957	**236,520**	0	0	**0**
240		Jun	30	119,783	65,138	26	2,219	11,373	**198,539**	0	0	**0**
241		Jul	31	113,592	59,483	49	2,346	11,808	**187,279**	0	0	**0**
242		Aug	31	113,260	58,586	58	2,269	12,263	**186,435**	0	0	**0**
243		Sep	30	111,636	62,779	52	2,307	12,736	**189,510**	0	0	**0**
244		Oct	31	141,774	64,710	49	1,519	13,220	**221,271**	0	0	**0**
245		Nov	30	227,023	86,475	40	972	13,718	**328,228**	0	0	**0**
246		Dec	31	362,489	100,969	29	621	14,230	**478,337**	0	0	**0**

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

	A	B	C	D	E	Q	R	S	T	U	V	W	X
1													
2													
154						Noncore - Electric Generatiion							
155						EG-Dist. (<3MMThms)	EG-Trans. (<3MMThms)	EG-Dist. (>=3MMThms)	EG-Trans. (>=3MMThms)	**EG (<3MMThms)**	**EG (>=3MMThms)**	**EG (Total)**	
156	**Average Year Sales (Mth)**												
157	2010	Jan	31			0	0	0	0	**0**	**0**	**0**	
158		Feb	28			0	0	0	0	**0**	**0**	**0**	
159		Mar	31			0	0	0	0	**0**	**0**	**0**	
160		Apr	30			0	0	0	0	**0**	**0**	**0**	
161		May	31			0	0	0	0	**0**	**0**	**0**	
162		Jun	30			0	0	0	0	**0**	**0**	**0**	
163		Jul	31			0	0	0	0	**0**	**0**	**0**	
164		Aug	31			0	0	0	0	**0**	**0**	**0**	
165		Sep	30			0	0	0	0	**0**	**0**	**0**	
166		Oct	31			0	0	0	0	**0**	**0**	**0**	
167		Nov	30			0	0	0	0	**0**	**0**	**0**	
168		Dec	31			0	0	0	0	**0**	**0**	**0**	
169													
170	2011	Jan	31			0	0	0	0	**0**	**0**	**0**	
171		Feb	28			0	0	0	0	**0**	**0**	**0**	
172		Mar	31			0	0	0	0	**0**	**0**	**0**	
173		Apr	30			0	0	0	0	**0**	**0**	**0**	
174		May	31			0	0	0	0	**0**	**0**	**0**	
175		Jun	30			0	0	0	0	**0**	**0**	**0**	
176		Jul	31			0	0	0	0	**0**	**0**	**0**	
177		Aug	31			0	0	0	0	**0**	**0**	**0**	
178		Sep	30			0	0	0	0	**0**	**0**	**0**	
179		Oct	31			0	0	0	0	**0**	**0**	**0**	
180		Nov	30			0	0	0	0	**0**	**0**	**0**	
181		Dec	31			0	0	0	0	**0**	**0**	**0**	
182													
183	2012	Jan	31			0	0	0	0	**0**	**0**	**0**	
184		Feb	29			0	0	0	0	**0**	**0**	**0**	
185		Mar	31			0	0	0	0	**0**	**0**	**0**	
186		Apr	30			0	0	0	0	**0**	**0**	**0**	
187		May	31			0	0	0	0	**0**	**0**	**0**	
188		Jun	30			0	0	0	0	**0**	**0**	**0**	
189		Jul	31			0	0	0	0	**0**	**0**	**0**	
190		Aug	31			0	0	0	0	**0**	**0**	**0**	
191		Sep	30			0	0	0	0	**0**	**0**	**0**	
192		Oct	31			0	0	0	0	**0**	**0**	**0**	
193		Nov	30			0	0	0	0	**0**	**0**	**0**	
194		Dec	31			0	0	0	0	**0**	**0**	**0**	
195													
196	2013	Jan	31			0	0	0	0	**0**	**0**	**0**	
197		Feb	28			0	0	0	0	**0**	**0**	**0**	
198		Mar	31			0	0	0	0	**0**	**0**	**0**	
199		Apr	30			0	0	0	0	**0**	**0**	**0**	
200		May	31			0	0	0	0	**0**	**0**	**0**	
201		Jun	30			0	0	0	0	**0**	**0**	**0**	
202		Jul	31			0	0	0	0	**0**	**0**	**0**	
203		Aug	31			0	0	0	0	**0**	**0**	**0**	
204		Sep	30			0	0	0	0	**0**	**0**	**0**	
205		Oct	31			0	0	0	0	**0**	**0**	**0**	
206		Nov	30			0	0	0	0	**0**	**0**	**0**	
207		Dec	31			0	0	0	0	**0**	**0**	**0**	

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

Row	A	B	C	EG-Dist. (<3MMThms)	EG-Trans. (<3MMThms)	EG-Dist. (>=3MMThms)	EG-Trans. (>=3MMThms)	**EG (<3MMThms)**	**EG (>=3MMThms)**	**EG (Total)**
154				Noncore - Electric Generatiion						
156	**Average Year Sales (Mth)**									
208										
209	2014	Jan	31	0	0	0	0	**0**	**0**	**0**
210		Feb	28	0	0	0	0	**0**	**0**	**0**
211		Mar	31	0	0	0	0	**0**	**0**	**0**
212		Apr	30	0	0	0	0	**0**	**0**	**0**
213		May	31	0	0	0	0	**0**	**0**	**0**
214		Jun	30	0	0	0	0	**0**	**0**	**0**
215		Jul	31	0	0	0	0	**0**	**0**	**0**
216		Aug	31	0	0	0	0	**0**	**0**	**0**
217		Sep	30	0	0	0	0	**0**	**0**	**0**
218		Oct	31	0	0	0	0	**0**	**0**	**0**
219		Nov	30	0	0	0	0	**0**	**0**	**0**
220		Dec	31	0	0	0	0	**0**	**0**	**0**
221										
222	2015	Jan	31	0	0	0	0	**0**	**0**	**0**
223		Feb	28	0	0	0	0	**0**	**0**	**0**
224		Mar	31	0	0	0	0	**0**	**0**	**0**
225		Apr	30	0	0	0	0	**0**	**0**	**0**
226		May	31	0	0	0	0	**0**	**0**	**0**
227		Jun	30	0	0	0	0	**0**	**0**	**0**
228		Jul	31	0	0	0	0	**0**	**0**	**0**
229		Aug	31	0	0	0	0	**0**	**0**	**0**
230		Sep	30	0	0	0	0	**0**	**0**	**0**
231		Oct	31	0	0	0	0	**0**	**0**	**0**
232		Nov	30	0	0	0	0	**0**	**0**	**0**
233		Dec	31	0	0	0	0	**0**	**0**	**0**
234										
235	2016	Jan	31	0	0	0	0	**0**	**0**	**0**
236		Feb	29	0	0	0	0	**0**	**0**	**0**
237		Mar	31	0	0	0	0	**0**	**0**	**0**
238		Apr	30	0	0	0	0	**0**	**0**	**0**
239		May	31	0	0	0	0	**0**	**0**	**0**
240		Jun	30	0	0	0	0	**0**	**0**	**0**
241		Jul	31	0	0	0	0	**0**	**0**	**0**
242		Aug	31	0	0	0	0	**0**	**0**	**0**
243		Sep	30	0	0	0	0	**0**	**0**	**0**
244		Oct	31	0	0	0	0	**0**	**0**	**0**
245		Nov	30	0	0	0	0	**0**	**0**	**0**
246		Dec	31	0	0	0	0	**0**	**0**	**0**

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

Row	A	B	C	Y	Z	AA	AC	AE	AF	AG	AH	AI
154				Noncore - EOR			**Total**	Wholesale Noncore				**Total**
155				EOR (Dist.)	EOR (Trans.)	**EOR (Total)**	**Retail Noncore**	Long Beach	SDG&E	Southwest Gas	Vernon	**Wholesale**
156	**Average Year Sales (Mth)**											
157	2010	Jan	31	0	0	**0**	**0**	0	**0**	0	0	**0**
158		Feb	28	0	0	**0**	**0**	0	**0**	0	0	**0**
159		Mar	31	0	0	**0**	**0**	0	**0**	0	0	**0**
160		Apr	30	0	0	**0**	**0**	0	**0**	0	0	**0**
161		May	31	0	0	**0**	**0**	0	**0**	0	0	**0**
162		Jun	30	0	0	**0**	**0**	0	**0**	0	0	**0**
163		Jul	31	0	0	**0**	**0**	0	**0**	0	0	**0**
164		Aug	31	0	0	**0**	**0**	0	**0**	0	0	**0**
165		Sep	30	0	0	**0**	**0**	0	**0**	0	0	**0**
166		Oct	31	0	0	**0**	**0**	0	**0**	0	0	**0**
167		Nov	30	0	0	**0**	**0**	0	**0**	0	0	**0**
168		Dec	31	0	0	**0**	**0**	0	**0**	0	0	**0**
169												
170	2011	Jan	31	0	0	**0**	**0**	0	**0**	0	0	**0**
171		Feb	28	0	0	**0**	**0**	0	**0**	0	0	**0**
172		Mar	31	0	0	**0**	**0**	0	**0**	0	0	**0**
173		Apr	30	0	0	**0**	**0**	0	**0**	0	0	**0**
174		May	31	0	0	**0**	**0**	0	**0**	0	0	**0**
175		Jun	30	0	0	**0**	**0**	0	**0**	0	0	**0**
176		Jul	31	0	0	**0**	**0**	0	**0**	0	0	**0**
177		Aug	31	0	0	**0**	**0**	0	**0**	0	0	**0**
178		Sep	30	0	0	**0**	**0**	0	**0**	0	0	**0**
179		Oct	31	0	0	**0**	**0**	0	**0**	0	0	**0**
180		Nov	30	0	0	**0**	**0**	0	**0**	0	0	**0**
181		Dec	31	0	0	**0**	**0**	0	**0**	0	0	**0**
182												
183	2012	Jan	31	0	0	**0**	**0**	0	**0**	0	0	**0**
184		Feb	29	0	0	**0**	**0**	0	**0**	0	0	**0**
185		Mar	31	0	0	**0**	**0**	0	**0**	0	0	**0**
186		Apr	30	0	0	**0**	**0**	0	**0**	0	0	**0**
187		May	31	0	0	**0**	**0**	0	**0**	0	0	**0**
188		Jun	30	0	0	**0**	**0**	0	**0**	0	0	**0**
189		Jul	31	0	0	**0**	**0**	0	**0**	0	0	**0**
190		Aug	31	0	0	**0**	**0**	0	**0**	0	0	**0**
191		Sep	30	0	0	**0**	**0**	0	**0**	0	0	**0**
192		Oct	31	0	0	**0**	**0**	0	**0**	0	0	**0**
193		Nov	30	0	0	**0**	**0**	0	**0**	0	0	**0**
194		Dec	31	0	0	**0**	**0**	0	**0**	0	0	**0**
195												
196	2013	Jan	31	0	0	**0**	**0**	0	**0**	0	0	**0**
197		Feb	28	0	0	**0**	**0**	0	**0**	0	0	**0**
198		Mar	31	0	0	**0**	**0**	0	**0**	0	0	**0**
199		Apr	30	0	0	**0**	**0**	0	**0**	0	0	**0**
200		May	31	0	0	**0**	**0**	0	**0**	0	0	**0**
201		Jun	30	0	0	**0**	**0**	0	**0**	0	0	**0**
202		Jul	31	0	0	**0**	**0**	0	**0**	0	0	**0**
203		Aug	31	0	0	**0**	**0**	0	**0**	0	0	**0**
204		Sep	30	0	0	**0**	**0**	0	**0**	0	0	**0**
205		Oct	31	0	0	**0**	**0**	0	**0**	0	0	**0**
206		Nov	30	0	0	**0**	**0**	0	**0**	0	0	**0**
207		Dec	31	0	0	**0**	**0**	0	**0**	0	0	**0**

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

			Noncore - EOR			Total	Wholesale Noncore				Total
			EOR (Dist.)	EOR (Trans.)	**EOR (Total)**	**Retail Noncore**	Long Beach	SDG&E	Southwest Gas	Vernon	**Wholesale**
Average Year Sales (Mth)											
2014	Jan	31	0	0	0	0	0	0	0	0	0
	Feb	28	0	0	0	0	0	0	0	0	0
	Mar	31	0	0	0	0	0	0	0	0	0
	Apr	30	0	0	0	0	0	0	0	0	0
	May	31	0	0	0	0	0	0	0	0	0
	Jun	30	0	0	0	0	0	0	0	0	0
	Jul	31	0	0	0	0	0	0	0	0	0
	Aug	31	0	0	0	0	0	0	0	0	0
	Sep	30	0	0	0	0	0	0	0	0	0
	Oct	31	0	0	0	0	0	0	0	0	0
	Nov	30	0	0	0	0	0	0	0	0	0
	Dec	31	0	0	0	0	0	0	0	0	0
2015	Jan	31	0	0	0	0	0	0	0	0	0
	Feb	28	0	0	0	0	0	0	0	0	0
	Mar	31	0	0	0	0	0	0	0	0	0
	Apr	30	0	0	0	0	0	0	0	0	0
	May	31	0	0	0	0	0	0	0	0	0
	Jun	30	0	0	0	0	0	0	0	0	0
	Jul	31	0	0	0	0	0	0	0	0	0
	Aug	31	0	0	0	0	0	0	0	0	0
	Sep	30	0	0	0	0	0	0	0	0	0
	Oct	31	0	0	0	0	0	0	0	0	0
	Nov	30	0	0	0	0	0	0	0	0	0
	Dec	31	0	0	0	0	0	0	0	0	0
2016	Jan	31	0	0	0	0	0	0	0	0	0
	Feb	29	0	0	0	0	0	0	0	0	0
	Mar	31	0	0	0	0	0	0	0	0	0
	Apr	30	0	0	0	0	0	0	0	0	0
	May	31	0	0	0	0	0	0	0	0	0
	Jun	30	0	0	0	0	0	0	0	0	0
	Jul	31	0	0	0	0	0	0	0	0	0
	Aug	31	0	0	0	0	0	0	0	0	0
	Sep	30	0	0	0	0	0	0	0	0	0
	Oct	31	0	0	0	0	0	0	0	0	0
	Nov	30	0	0	0	0	0	0	0	0	0
	Dec	31	0	0	0	0	0	0	0	0	0

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

	A	B	C	D	E	AK	AL	AM	AN	AO	AP	AQ
154						International NC		**Total**		**Total**		**System Total**
155						Ecogas		**Noncore**		**System End-Use Dmd**		**(Mdth/d)**
156	**Average Year Sales (Mth)**											
157	2010	Jan	31			0		**0**		**454,777**		**1,467**
158		Feb	28			0		**0**		**394,303**		**1,408**
159		Mar	31			0		**0**		**360,218**		**1,162**
160		Apr	30			0		**0**		**293,442**		**978**
161		May	31			0		**0**		**233,781**		**754**
162		Jun	30			0		**0**		**196,415**		**655**
163		Jul	31			0		**0**		**184,380**		**595**
164		Aug	31			0		**0**		**183,098**		**591**
165		Sep	30			0		**0**		**185,142**		**617**
166		Oct	31			0		**0**		**216,857**		**700**
167		Nov	30			0		**0**		**321,754**		**1,073**
168		Dec	31			0		**0**		**470,137**		**1,517**
169												
170	2011	Jan	31			0		**0**		**470,027**		**1,516**
171		Feb	28			0		**0**		**408,038**		**1,457**
172		Mar	31			0		**0**		**371,903**		**1,200**
173		Apr	30			0		**0**		**303,279**		**1,011**
174		May	31			0		**0**		**241,875**		**780**
175		Jun	30			0		**0**		**202,926**		**676**
176		Jul	31			0		**0**		**191,281**		**617**
177		Aug	31			0		**0**		**190,346**		**614**
178		Sep	30			0		**0**		**192,969**		**643**
179		Oct	31			0		**0**		**225,725**		**728**
180		Nov	30			0		**0**		**335,236**		**1,117**
181		Dec	31			0		**0**		**489,381**		**1,579**
182												
183	2012	Jan	31			0		**0**		**467,258**		**1,507**
184		Feb	29			0		**0**		**405,657**		**1,399**
185		Mar	31			0		**0**		**369,692**		**1,193**
186		Apr	30			0		**0**		**301,473**		**1,005**
187		May	31			0		**0**		**240,611**		**776**
188		Jun	30			0		**0**		**201,894**		**673**
189		Jul	31			0		**0**		**190,336**		**614**
190		Aug	31			0		**0**		**189,421**		**611**
191		Sep	30			0		**0**		**192,156**		**641**
192		Oct	31			0		**0**		**224,668**		**725**
193		Nov	30			0		**0**		**333,553**		**1,112**
194		Dec	31			0		**0**		**486,700**		**1,570**
195												
196	2013	Jan	31			0		**0**		**461,548**		**1,489**
197		Feb	28			0		**0**		**400,950**		**1,432**
198		Mar	31			0		**0**		**365,245**		**1,178**
199		Apr	30			0		**0**		**297,554**		**992**
200		May	31			0		**0**		**237,875**		**767**
201		Jun	30			0		**0**		**199,763**		**666**
202		Jul	31			0		**0**		**188,695**		**609**
203		Aug	31			0		**0**		**188,121**		**607**
204		Sep	30			0		**0**		**190,587**		**635**
205		Oct	31			0		**0**		**222,418**		**717**
206		Nov	30			0		**0**		**330,056**		**1,100**
207		Dec	31			0		**0**		**481,208**		**1,552**

	A	B	C	D	E	AK	AL	AM	AN	AO	AP	AQ
1	**2013 TCAP: SoCalGas Consolidated Gas Demand**											
2	**Forecast Summary (Mtherms)**											
154						International NC		**Total**		**Total System End-**		**System Total**
155						Ecogas		**Noncore**		**Use Dmd**		**(Mdth/d)**
156	**Average Year Sales (Mth)**											
208												
209	2014	Jan	31			0		**0**		**460,394**		**1,485**
210		Feb	28			0		**0**		**399,783**		**1,428**
211		Mar	31			0		**0**		**364,255**		**1,175**
212		Apr	30			0		**0**		**297,075**		**990**
213		May	31			0		**0**		**237,525**		**766**
214		Jun	30			0		**0**		**199,396**		**665**
215		Jul	31			0		**0**		**188,034**		**607**
216		Aug	31			0		**0**		**187,163**		**604**
217		Sep	30			0		**0**		**190,128**		**634**
218		Oct	31			0		**0**		**222,035**		**716**
219		Nov	30			0		**0**		**329,339**		**1,098**
220		Dec	31			0		**0**		**479,949**		**1,548**
221												
222	2015	Jan	31			0		**0**		**458,577**		**1,479**
223		Feb	28			0		**0**		**398,131**		**1,422**
224		Mar	31			0		**0**		**362,699**		**1,170**
225		Apr	30			0		**0**		**295,696**		**986**
226		May	31			0		**0**		**236,433**		**763**
227		Jun	30			0		**0**		**198,408**		**661**
228		Jul	31			0		**0**		**187,138**		**604**
229		Aug	31			0		**0**		**186,288**		**601**
230		Sep	30			0		**0**		**189,336**		**631**
231		Oct	31			0		**0**		**221,126**		**713**
232		Nov	30			0		**0**		**328,099**		**1,094**
233		Dec	31			0		**0**		**478,291**		**1,543**
234												
235	2016	Jan	31			0		**0**		**458,472**		**1,479**
236		Feb	29			0		**0**		**398,071**		**1,373**
237		Mar	31			0		**0**		**362,652**		**1,170**
238		Apr	30			0		**0**		**295,711**		**986**
239		May	31			0		**0**		**236,520**		**763**
240		Jun	30			0		**0**		**198,539**		**662**
241		Jul	31			0		**0**		**187,279**		**604**
242		Aug	31			0		**0**		**186,435**		**601**
243		Sep	30			0		**0**		**189,510**		**632**
244		Oct	31			0		**0**		**221,271**		**714**
245		Nov	30			0		**0**		**328,228**		**1,094**
246		Dec	31			0		**0**		**478,337**		**1,543**

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

			Nonresidential Core				Total	Noncore - G-30				
		Residential	G-10	G-AC	G-GE	G-NGV	Core	G-30 (Dist.)	G-30 (Trans.)	**G-30 (Total)**	EG-Dist. (<3MMThms)	EG-Trans. (<3MMThms)
Cold Year Throughput (Mth)												
2010	Jan	392,342	119,749	49	509	7,670	**520,319**	80,154	57,946	**138,100**	3,805	710
	Feb	328,244	110,915	48	288	7,467	**446,963**	72,771	54,785	**127,557**	3,100	450
	Mar	296,889	98,170	64	742	8,594	**404,458**	77,480	55,365	**132,845**	3,817	433
	Apr	233,788	86,305	64	1,209	8,328	**329,693**	72,835	52,223	**125,058**	3,414	430
	May	161,023	81,928	66	1,525	8,232	**252,773**	73,717	54,913	**128,629**	3,731	735
	Jun	121,476	74,746	80	1,946	8,641	**206,888**	69,582	53,602	**123,184**	4,303	740
	Jul	113,586	67,159	89	2,211	8,219	**191,264**	74,794	56,080	**130,874**	4,834	1,711
	Aug	113,173	65,986	91	1,907	8,474	**189,630**	80,294	56,397	**136,691**	5,116	1,528
	Sep	112,220	70,918	81	2,147	8,157	**193,522**	79,670	58,288	**137,958**	5,298	1,482
	Oct	148,544	73,633	74	1,480	8,604	**232,335**	76,864	61,942	**138,806**	4,429	707
	Nov	253,953	101,853	64	862	8,190	**364,922**	69,279	55,811	**125,090**	3,608	995
	Dec	406,391	120,487	49	625	8,439	**535,991**	70,431	56,669	**127,099**	3,277	465
2011	Jan	408,464	120,797	36	449	7,972	**537,718**	80,921	59,587	**140,508**	3,239	1,988
	Feb	341,733	111,824	54	496	8,269	**462,376**	72,090	52,881	**124,971**	2,659	1,202
	Mar	309,088	98,876	47	931	8,607	**417,549**	77,994	56,265	**134,259**	3,028	1,226
	Apr	243,395	86,802	35	1,531	8,920	**340,684**	73,914	54,482	**128,396**	3,187	2,063
	May	167,640	82,477	81	1,887	9,265	**261,350**	74,429	56,204	**130,634**	3,591	2,647
	Jun	126,468	75,164	42	2,284	9,618	**213,575**	69,931	54,008	**123,938**	4,092	2,647
	Jul	118,253	67,518	77	2,416	9,985	**198,249**	75,067	56,201	**131,268**	5,985	5,291
	Aug	117,823	66,336	91	2,336	10,370	**196,956**	80,781	56,957	**137,739**	6,148	6,037
	Sep	116,831	71,422	82	2,375	10,770	**201,479**	78,510	55,001	**133,511**	4,827	4,920
	Oct	154,648	74,137	77	1,564	11,179	**241,604**	75,054	57,119	**132,174**	3,890	4,379
	Nov	264,388	102,713	63	1,001	11,600	**379,765**	69,167	55,322	**124,489**	3,626	4,159
	Dec	423,090	121,605	46	639	12,033	**557,414**	70,915	57,862	**128,778**	3,297	2,163
2012	Jan	405,398	120,420	33	447	8,278	**534,576**	80,294	58,953	**139,247**	3,125	1,710
	Feb	339,168	111,412	49	494	8,576	**459,699**	71,914	53,233	**125,147**	2,703	1,143
	Mar	306,769	98,406	43	927	8,927	**415,072**	77,125	54,906	**132,032**	3,139	1,728
	Apr	241,568	86,264	31	1,525	9,252	**338,641**	73,084	53,125	**126,209**	3,440	2,727
	May	166,382	82,039	74	1,879	9,610	**259,983**	73,607	54,799	**128,405**	3,733	2,303
	Jun	125,518	74,679	38	2,275	9,975	**212,485**	69,158	52,656	**121,813**	4,260	3,092
	Jul	117,366	67,063	70	2,406	10,356	**197,261**	74,277	54,800	**129,077**	5,459	5,452
	Aug	116,939	65,884	83	2,326	10,755	**195,988**	79,974	55,537	**135,511**	5,788	5,877
	Sep	115,954	71,064	74	2,365	11,170	**200,628**	77,662	53,622	**131,284**	4,927	4,376
	Oct	153,487	73,744	70	1,557	11,595	**240,453**	74,205	55,712	**129,917**	4,098	4,834
	Nov	262,404	102,355	57	997	12,032	**377,844**	68,303	53,939	**122,242**	3,912	5,213
	Dec	419,915	121,297	42	636	12,481	**554,370**	69,934	56,409	**126,342**	3,393	1,856
2013	Jan	399,034	119,993	30	444	8,586	**528,087**	79,484	57,550	**137,033**	3,044	1,387
	Feb	333,844	110,955	44	654	8,886	**454,383**	70,786	50,967	**121,753**	2,630	1,164
	Mar	301,953	97,904	39	949	9,249	**410,094**	76,648	54,186	**130,834**	2,930	1,213
	Apr	237,776	85,701	28	1,170	9,586	**334,261**	72,644	52,425	**125,070**	3,048	1,894
	May	163,770	81,576	66	1,689	9,957	**257,058**	73,186	54,078	**127,264**	3,481	1,722
	Jun	123,548	74,174	34	2,180	10,335	**210,271**	68,768	51,962	**120,730**	3,797	1,813
	Jul	115,523	66,589	63	2,660	10,730	**195,566**	73,890	54,083	**127,973**	4,536	3,154
	Aug	115,103	65,417	75	2,899	11,143	**194,637**	79,587	54,810	**134,398**	4,882	3,907
	Sep	114,134	70,686	67	2,545	11,573	**199,005**	77,220	52,914	**130,134**	4,274	3,130
	Oct	151,078	73,335	63	1,552	12,013	**238,041**	73,758	54,987	**128,746**	3,471	1,284
	Nov	258,285	101,955	51	1,102	12,465	**373,859**	67,824	53,227	**121,050**	3,143	1,062
	Dec	413,323	120,923	37	892	12,931	**548,107**	69,349	55,657	**125,006**	3,110	1,052

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

Row	A	B	F	G	I	J	K	L	N	O	P	Q	R
1	2013 TCAP: SoCalGas Consolidated Gas Demand												
2	Forecast Summary (Mtherms)												
249				Nonresidential Core				**Total**	Noncore - G-30				
250			Residential	G-10	G-AC	G-GE	G-NGV	**Core**	G-30 (Dist.)	G-30 (Trans.)	**G-30 (Total)**	EG-Dist. (<3MMThms)	EG-Trans. (<3MMThms)
251	**Cold Year Throughput (Mth)**												
303													
304	2014	Jan	397,664	119,758	30	442	8,895	**526,790**	78,861	56,872	**135,733**	2,963	1,061
305		Feb	332,698	110,671	44	489	9,197	**453,099**	70,271	50,447	**120,718**	2,571	870
306		Mar	300,916	97,543	39	918	9,572	**408,988**	76,123	53,627	**129,750**	2,981	929
307		Apr	236,960	85,253	28	1,510	9,921	**333,672**	72,161	51,883	**124,043**	3,174	1,462
308		May	163,208	81,220	66	1,860	10,305	**256,658**	72,721	53,519	**126,239**	3,487	1,375
309		Jun	123,124	73,761	34	2,252	10,697	**209,868**	68,337	51,425	**119,762**	3,740	1,224
310		Jul	115,127	66,193	63	2,382	11,105	**194,870**	73,453	53,527	**126,980**	4,620	2,123
311		Aug	114,708	65,022	75	2,303	11,533	**193,640**	79,138	54,247	**133,385**	4,889	2,649
312		Sep	113,742	70,392	67	2,342	11,978	**198,521**	76,725	52,364	**129,089**	4,475	2,033
313		Oct	150,559	73,010	63	1,542	12,433	**237,606**	73,268	54,426	**127,694**	3,381	1,071
314		Nov	257,398	101,710	51	987	12,901	**373,048**	67,318	52,675	**119,994**	3,286	988
315		Dec	411,904	120,759	37	630	13,383	**546,714**	68,752	55,076	**123,828**	3,128	1,048
316													
317	2015	Jan	396,498	118,540	27	440	9,206	**524,710**	77,704	56,328	**134,032**	2,855	1,062
318		Feb	331,721	109,468	39	487	9,505	**451,221**	69,221	49,915	**119,136**	2,570	907
319		Mar	300,033	96,352	34	913	9,894	**407,226**	74,958	52,940	**127,898**	2,873	996
320		Apr	236,265	84,062	25	1,501	10,254	**332,108**	71,071	51,216	**122,287**	2,975	1,211
321		May	162,729	80,154	59	1,849	10,651	**255,442**	71,642	52,832	**124,474**	3,260	1,118
322		Jun	122,763	72,692	30	2,239	11,056	**208,780**	67,332	50,766	**118,098**	3,532	1,380
323		Jul	114,789	65,198	56	2,368	11,478	**193,889**	72,387	52,843	**125,230**	4,706	2,470
324		Aug	114,371	64,033	66	2,290	11,920	**192,681**	77,997	53,552	**131,549**	4,861	2,751
325		Sep	113,409	69,469	59	2,328	12,380	**197,646**	75,572	51,686	**127,258**	4,330	2,242
326		Oct	150,117	72,029	56	1,533	12,850	**236,586**	72,163	53,737	**125,900**	3,507	1,655
327		Nov	256,643	100,612	46	981	13,335	**371,617**	66,273	52,002	**118,274**	3,059	1,450
328		Dec	410,696	119,619	33	626	13,833	**544,807**	67,629	54,368	**121,997**	3,037	1,147
329													
330	2016	Jan	396,027	118,564	23	438	9,518	**524,570**	76,399	55,471	**131,870**	2,887	1,137
331		Feb	331,327	109,471	34	484	9,815	**451,133**	68,624	50,535	**119,159**	2,481	896
332		Mar	299,677	96,317	30	909	10,216	**407,150**	73,631	51,890	**125,521**	2,815	942
333		Apr	235,984	84,003	22	1,495	10,588	**332,092**	69,826	50,192	**120,019**	2,795	1,075
334		May	162,535	80,092	52	1,841	10,998	**255,518**	70,408	51,773	**122,181**	3,404	1,163
335		Jun	122,617	72,616	26	2,230	11,416	**208,905**	66,179	49,749	**115,927**	3,609	1,335
336		Jul	114,653	65,112	49	2,358	11,852	**194,024**	71,172	51,788	**122,960**	4,747	2,366
337		Aug	114,236	63,938	58	2,280	12,309	**192,820**	76,706	52,481	**129,187**	5,023	2,998
338		Sep	113,274	69,386	52	2,318	12,784	**197,814**	74,263	50,644	**124,907**	4,510	2,514
339		Oct	149,939	71,930	49	1,526	13,269	**236,713**	70,899	52,676	**123,574**	3,392	1,390
340		Nov	256,338	100,599	40	977	13,769	**371,724**	65,061	50,962	**116,023**	2,992	1,112
341		Dec	410,208	119,683	29	624	14,283	**544,827**	66,318	53,275	**119,593**	3,025	1,086
342													
343													
344				Nonresidential Core				**Total**	Noncore - G-30				
345	**Peak Day Throughput (Mth/Day)**		Residential	G-10	G-AC	G-GE	G-NGV	**Core**	G-30 (Dist.)	G-30 (Trans.)	**G-30 (Total)**	EG-Dist. (<3MMThms)	EG-Trans. (<3MMThms)
346	2,010		24,566	6,002	2	20	272	**30,863**	2,432	1,844	**4,276**	114	18
347	2,011		25,576	6,071	1	21	388	**32,056**	2,448	1,882	**4,330**	110	154
348	2,012		25,384	6,068	1	21	403	**31,876**	2,416	1,835	**4,251**	169	94
349	2,013		24,985	6,062	1	29	417	**31,494**	2,397	1,811	**4,208**	121	41
350	2,014		24,899	6,068	1	20	432	**31,421**	2,378	1,792	**4,170**	140	30
351	2,015		24,826	6,027	1	20	446	**31,321**	2,342	1,769	**4,111**	100	40
352	2,016		24,797	6,035	1	20	461	**31,314**	2,300	1,734	**4,034**	107	45

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

		Noncore - Electric Generatiion					Noncore - EOR			Total
		EG-Dist. (>=3MMThms)	EG-Trans. (>=3MMThms)	EG (<3MMThms)	EG (>=3MMThms)	EG (Total)	EOR (Dist.)	EOR (Trans.)	EOR (Total)	Retail Noncore
Cold Year Throughput (Mth)										
2010	Jan	39,416	139,858	**4,515**	**179,274**	**183,789**	7,381	7,109	**14,490**	**336,380**
	Feb	47,902	123,300	**3,551**	**171,202**	**174,753**	6,358	5,433	**11,790**	**314,100**
	Mar	34,317	163,908	**4,250**	**198,225**	**202,475**	7,268	6,082	**13,350**	**348,670**
	Apr	29,531	157,896	**3,844**	**187,427**	**191,271**	6,833	5,657	**12,490**	**328,818**
	May	35,852	145,343	**4,466**	**181,194**	**185,660**	7,174	5,676	**12,850**	**327,140**
	Jun	37,830	159,853	**5,043**	**197,683**	**202,726**	6,613	5,677	**12,290**	**338,200**
	Jul	50,036	212,751	**6,545**	**262,787**	**269,332**	6,598	6,082	**12,680**	**412,887**
	Aug	43,675	276,185	**6,644**	**319,860**	**326,504**	6,498	5,782	**12,280**	**475,474**
	Sep	49,709	229,259	**6,780**	**278,968**	**285,749**	6,135	5,805	**11,940**	**435,646**
	Oct	60,153	235,271	**5,136**	**295,424**	**300,559**	6,590	5,970	**12,560**	**451,926**
	Nov	55,770	202,964	**4,603**	**258,734**	**263,337**	6,805	5,695	**12,500**	**400,927**
	Dec	44,791	179,523	**3,742**	**224,314**	**228,056**	6,986	5,944	**12,930**	**368,085**
2011	Jan	39,578	142,303	**5,228**	**181,881**	**187,108**	6,714	5,836	**12,550**	**340,166**
	Feb	36,648	127,050	**3,861**	**163,698**	**167,559**	6,066	5,274	**11,340**	**303,870**
	Mar	39,651	141,990	**4,254**	**181,641**	**185,895**	6,714	5,836	**12,550**	**332,704**
	Apr	38,909	146,548	**5,250**	**185,458**	**190,708**	6,508	5,652	**12,160**	**331,264**
	May	39,677	163,202	**6,238**	**202,879**	**209,117**	6,714	5,836	**12,550**	**352,301**
	Jun	40,803	187,738	**6,739**	**228,541**	**235,280**	6,508	5,652	**12,160**	**371,378**
	Jul	44,189	268,812	**11,276**	**313,002**	**324,277**	6,714	5,836	**12,550**	**468,095**
	Aug	45,615	280,943	**12,185**	**326,558**	**338,743**	6,714	5,836	**12,550**	**489,031**
	Sep	41,480	230,059	**9,747**	**271,539**	**281,286**	6,508	5,652	**12,160**	**426,958**
	Oct	40,357	181,110	**8,269**	**221,467**	**229,736**	6,714	5,836	**12,550**	**374,460**
	Nov	37,796	174,357	**7,785**	**212,154**	**219,938**	6,508	5,652	**12,160**	**356,588**
	Dec	37,120	162,786	**5,460**	**199,906**	**205,366**	6,714	5,836	**12,550**	**346,693**
2012	Jan	35,873	153,127	**4,835**	**189,001**	**193,836**	6,836	5,884	**12,720**	**345,803**
	Feb	33,868	134,346	**3,846**	**168,214**	**172,060**	6,400	5,500	**11,900**	**309,108**
	Mar	36,508	150,143	**4,868**	**186,651**	**191,518**	6,836	5,884	**12,720**	**336,270**
	Apr	36,323	156,047	**6,166**	**192,370**	**198,537**	6,621	5,689	**12,310**	**337,055**
	May	38,908	167,159	**6,036**	**206,067**	**212,102**	6,836	5,884	**12,720**	**353,228**
	Jun	39,499	195,042	**7,352**	**234,541**	**241,894**	6,621	5,689	**12,310**	**376,017**
	Jul	48,500	288,838	**10,911**	**337,338**	**348,249**	6,836	5,884	**12,720**	**490,046**
	Aug	48,519	280,768	**11,665**	**329,287**	**340,952**	6,836	5,884	**12,720**	**489,183**
	Sep	42,577	240,645	**9,303**	**283,222**	**292,525**	6,621	5,689	**12,310**	**436,120**
	Oct	40,587	192,857	**8,932**	**233,444**	**242,375**	6,836	5,884	**12,720**	**385,012**
	Nov	37,453	178,833	**9,125**	**216,286**	**225,411**	6,621	5,689	**12,310**	**359,963**
	Dec	37,107	167,924	**5,248**	**205,030**	**210,279**	6,836	5,884	**12,720**	**349,341**
2013	Jan	35,987	164,132	**4,431**	**200,119**	**204,549**	6,836	5,884	**12,720**	**354,303**
	Feb	31,710	144,370	**3,794**	**176,080**	**179,874**	6,179	5,311	**11,490**	**313,116**
	Mar	36,185	161,696	**4,142**	**197,881**	**202,023**	6,836	5,884	**12,720**	**345,577**
	Apr	35,583	166,006	**4,942**	**201,589**	**206,531**	6,621	5,689	**12,310**	**343,911**
	May	38,322	182,191	**5,203**	**220,512**	**225,716**	6,836	5,884	**12,720**	**365,699**
	Jun	40,192	211,011	**5,610**	**251,203**	**256,813**	6,621	5,689	**12,310**	**389,854**
	Jul	51,328	311,303	**7,691**	**362,632**	**370,322**	6,836	5,884	**12,720**	**511,015**
	Aug	51,447	316,744	**8,789**	**368,190**	**376,979**	6,836	5,884	**12,720**	**524,097**
	Sep	45,033	272,354	**7,404**	**317,387**	**324,791**	6,621	5,689	**12,310**	**467,235**
	Oct	40,023	210,415	**4,756**	**250,438**	**255,194**	6,836	5,884	**12,720**	**396,660**
	Nov	36,869	197,543	**4,205**	**234,412**	**238,617**	6,621	5,689	**12,310**	**371,977**
	Dec	35,977	190,637	**4,162**	**226,614**	**230,775**	6,836	5,884	**12,720**	**368,501**

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

Row	A	B	S	T	U	V	W	Y	Z	AA	AC
249			Noncore - Electric Generatiion					Noncore - EOR			**Total**
250			EG-Dist. (>=3MMThms)	EG-Trans. (>=3MMThms)	**EG (<3MMThms)**	**EG (>=3MMThms)**	**EG (Total)**	EOR (Dist.)	EOR (Trans.)	**EOR (Total)**	**Retail Noncore**
251	**Cold Year Throughput (Mth)**										
303											
304	2014	Jan	35,952	179,589	**4,024**	**215,541**	**219,565**	6,836	5,884	**12,720**	**368,017**
305		Feb	32,028	159,251	**3,440**	**191,279**	**194,720**	6,179	5,311	**11,490**	**326,928**
306		Mar	35,857	176,594	**3,910**	**212,451**	**216,361**	6,836	5,884	**12,720**	**358,831**
307		Apr	36,235	188,555	**4,636**	**224,789**	**229,425**	6,621	5,689	**12,310**	**365,779**
308		May	37,878	195,680	**4,862**	**233,559**	**238,420**	6,836	5,884	**12,720**	**377,379**
309		Jun	39,582	202,668	**4,964**	**242,250**	**247,214**	6,621	5,689	**12,310**	**379,286**
310		Jul	50,969	302,746	**6,744**	**353,716**	**360,459**	6,836	5,884	**12,720**	**500,159**
311		Aug	51,759	295,614	**7,538**	**347,373**	**354,911**	6,836	5,884	**12,720**	**501,016**
312		Sep	44,245	253,853	**6,509**	**298,098**	**304,607**	6,621	5,689	**12,310**	**446,006**
313		Oct	40,400	209,014	**4,452**	**249,415**	**253,867**	6,836	5,884	**12,720**	**394,281**
314		Nov	37,434	195,717	**4,274**	**233,151**	**237,424**	6,621	5,689	**12,310**	**369,728**
315		Dec	36,513	193,064	**4,176**	**229,578**	**233,754**	6,836	5,884	**12,720**	**370,301**
316											
317	2015	Jan	36,042	179,399	**3,917**	**215,441**	**219,358**	6,836	5,884	**12,720**	**366,110**
318		Feb	32,084	160,125	**3,477**	**192,209**	**195,686**	6,179	5,311	**11,490**	**326,312**
319		Mar	35,328	177,801	**3,869**	**213,130**	**216,999**	6,836	5,884	**12,720**	**357,617**
320		Apr	36,074	181,744	**4,186**	**217,819**	**222,005**	6,621	5,689	**12,310**	**356,602**
321		May	37,726	188,455	**4,378**	**226,181**	**230,559**	6,836	5,884	**12,720**	**367,753**
322		Jun	38,722	201,588	**4,912**	**240,310**	**245,222**	6,621	5,689	**12,310**	**375,629**
323		Jul	46,806	293,315	**7,176**	**340,121**	**347,297**	6,836	5,884	**12,720**	**485,247**
324		Aug	47,450	296,561	**7,612**	**344,011**	**351,623**	6,836	5,884	**12,720**	**495,892**
325		Sep	40,747	253,048	**6,573**	**293,795**	**300,368**	6,621	5,689	**12,310**	**439,936**
326		Oct	39,671	213,362	**5,162**	**253,032**	**258,195**	6,836	5,884	**12,720**	**396,815**
327		Nov	37,059	195,354	**4,509**	**232,413**	**236,922**	6,621	5,689	**12,310**	**367,507**
328		Dec	36,335	191,104	**4,184**	**227,440**	**231,624**	6,836	5,884	**12,720**	**366,341**
329											
330	2016	Jan	35,340	186,813	**4,025**	**222,154**	**226,178**	6,836	5,884	**12,720**	**370,769**
331		Feb	32,491	161,584	**3,377**	**194,075**	**197,453**	6,400	5,500	**11,900**	**328,512**
332		Mar	35,883	176,489	**3,756**	**212,372**	**216,129**	6,836	5,884	**12,720**	**354,369**
333		Apr	35,314	179,259	**3,870**	**214,573**	**218,444**	6,621	5,689	**12,310**	**350,772**
334		May	38,463	191,882	**4,567**	**230,345**	**234,912**	6,836	5,884	**12,720**	**369,813**
335		Jun	38,688	206,391	**4,945**	**245,079**	**250,024**	6,621	5,689	**12,310**	**378,261**
336		Jul	47,492	304,318	**7,113**	**351,810**	**358,923**	6,836	5,884	**12,720**	**494,603**
337		Aug	47,502	301,246	**8,022**	**348,748**	**356,769**	6,836	5,884	**12,720**	**498,676**
338		Sep	41,635	264,190	**7,024**	**305,825**	**312,849**	6,621	5,689	**12,310**	**450,066**
339		Oct	39,630	211,575	**4,782**	**251,205**	**255,987**	6,836	5,884	**12,720**	**392,281**
340		Nov	37,017	192,268	**4,104**	**229,285**	**233,389**	6,621	5,689	**12,310**	**361,723**
341		Dec	36,697	194,569	**4,111**	**231,266**	**235,378**	6,836	5,884	**12,720**	**367,691**
342											
343											
344			Noncore - Electric Generatiion					Noncore - EOR			**Total**
345	**Peak Day Throughput (Mth/Day)**		EG-Dist. (>=3MMThms)	EG-Trans. (>=3MMThms)	**EG (<3MMThms)**	**EG (>=3MMThms)**	**EG (Total)**	EOR (Dist.)	EOR (Trans.)	**EOR (Total)**	**Retail Noncore**
346	2,010		1,478	7,357	**132**	**8,836**	**8,968**	239	178	**417**	**13,661**
347	2,011		1,274	6,437	**263**	**7,712**	**7,975**	219	185	**405**	**12,710**
348	2,012		1,354	6,748	**263**	**8,102**	**8,365**	221	190	**410**	**13,027**
349	2,013		1,357	7,216	**162**	**8,572**	**8,734**	221	190	**410**	**13,353**
350	2,014		1,155	7,762	**170**	**8,918**	**9,087**	221	190	**410**	**13,668**
351	2,015		1,351	7,943	**141**	**9,294**	**9,435**	221	190	**410**	**13,957**
352	2,016		1,224	8,251	**152**	**9,476**	**9,627**	221	190	**410**	**14,071**

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

		Wholesale Noncore				**Total**	International NC	**Total**
		Long Beach	SDG&E	Southwest Gas	Vernon	**Wholesale**	Ecogas	**Noncore**
Cold Year Throughput (Mth)								
2010	Jan	9,965	**146,424**	10,020	8,428	**174,837**	5,748	**516,965**
	Feb	9,486	**129,512**	7,929	7,661	**154,588**	5,377	**474,065**
	Mar	9,717	**121,356**	6,847	8,331	**146,252**	5,814	**500,736**
	Apr	7,453	**115,655**	5,757	8,102	**136,966**	4,637	**470,421**
	May	6,348	**95,478**	4,136	2,697	**108,659**	5,730	**441,528**
	Jun	4,909	**83,233**	2,989	2,773	**93,904**	5,717	**437,820**
	Jul	5,013	**68,260**	2,602	5,746	**81,621**	5,437	**499,945**
	Aug	4,900	**85,598**	2,836	6,910	**100,244**	5,194	**580,912**
	Sep	4,853	**89,637**	3,009	8,410	**105,909**	5,153	**546,708**
	Oct	5,627	**86,025**	4,115	8,743	**104,510**	5,543	**561,979**
	Nov	8,497	**105,800**	7,597	8,733	**130,627**	5,356	**536,910**
	Dec	10,240	**133,542**	9,209	7,877	**160,868**	4,985	**533,939**
2011	Jan	10,395	**110,813**	11,117	8,428	**140,754**	5,654	**486,574**
	Feb	10,062	**99,306**	9,207	7,661	**126,235**	5,489	**435,594**
	Mar	9,665	**96,141**	7,961	8,331	**122,098**	5,966	**460,768**
	Apr	7,588	**88,719**	6,137	8,102	**110,545**	5,604	**447,413**
	May	6,299	**80,833**	3,848	2,697	**93,677**	5,464	**451,442**
	Jun	4,891	**83,617**	3,083	2,773	**94,365**	5,438	**471,181**
	Jul	5,022	**116,442**	2,622	5,746	**129,833**	5,404	**603,332**
	Aug	4,779	**120,865**	2,661	6,910	**135,215**	5,393	**629,639**
	Sep	4,727	**113,460**	2,744	8,410	**129,342**	5,382	**561,682**
	Oct	5,432	**90,220**	4,013	8,743	**108,409**	5,156	**488,024**
	Nov	8,329	**100,487**	7,038	8,733	**124,587**	5,209	**486,384**
	Dec	10,145	**138,516**	10,995	7,877	**167,534**	5,235	**519,461**
2012	Jan	10,221	**114,076**	10,999	8,246	**143,542**	5,682	**495,027**
	Feb	10,234	**102,980**	9,210	6,592	**129,016**	5,516	**443,640**
	Mar	9,510	**101,515**	7,854	1,351	**120,230**	5,996	**462,496**
	Apr	7,480	**93,533**	6,027	2,383	**109,423**	5,632	**452,110**
	May	6,263	**81,205**	3,745	2,088	**93,301**	5,492	**452,021**
	Jun	4,885	**86,799**	2,994	7,590	**102,268**	5,465	**483,750**
	Jul	5,005	**119,526**	2,530	7,979	**135,041**	5,431	**630,519**
	Aug	4,802	**120,728**	2,580	7,836	**135,946**	5,419	**630,548**
	Sep	4,767	**114,028**	2,653	7,728	**129,177**	5,409	**570,705**
	Oct	5,552	**91,685**	3,921	8,349	**109,507**	5,182	**499,700**
	Nov	8,462	**102,713**	6,920	6,717	**124,812**	5,235	**490,010**
	Dec	10,220	**138,614**	10,883	8,683	**168,400**	5,261	**523,002**
2013	Jan	10,429	**115,323**	11,120	8,457	**145,329**	5,710	**505,342**
	Feb	10,212	**105,406**	9,197	6,802	**131,617**	5,544	**450,277**
	Mar	9,727	**102,532**	7,939	1,562	**121,760**	6,026	**473,363**
	Apr	7,627	**95,466**	6,092	2,594	**111,779**	5,660	**461,350**
	May	6,401	**83,894**	3,783	2,299	**96,377**	5,519	**467,596**
	Jun	5,026	**90,047**	3,021	7,800	**105,894**	5,493	**501,241**
	Jul	5,121	**118,646**	2,555	8,190	**134,512**	5,459	**650,986**
	Aug	4,918	**120,359**	2,604	8,047	**135,928**	5,447	**665,472**
	Sep	4,885	**114,728**	2,680	7,939	**130,232**	5,436	**602,903**
	Oct	5,568	**90,767**	3,964	8,559	**108,858**	5,208	**510,725**
	Nov	8,411	**96,706**	7,001	6,928	**119,045**	5,261	**496,284**
	Dec	10,281	**138,486**	11,019	8,894	**168,681**	5,287	**542,469**

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

	A	B	C	D	E	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN
1	2013 TCAP: SoCalGas Consolidated Gas Demand														
2	Forecast Summary (Mtherms)														
249							Wholesale Noncore			**Total**		International NC		**Total**	
250						Long Beach	SDG&E	Southwest Gas	Vernon	**Wholesale**		Ecogas		**Noncore**	
251	**Cold Year Throughput (Mth)**														
303															
304	2014	Jan				10,348	**115,391**	11,267	8,667	**145,674**		5,739		**519,430**	
305		Feb				10,227	**105,367**	9,317	7,013	**131,925**		5,572		**464,424**	
306		Mar				9,692	**102,573**	8,042	1,773	**122,080**		6,056		**486,968**	
307		Apr				7,586	**94,920**	6,169	2,805	**111,480**		5,688		**482,947**	
308		May				6,346	**83,030**	3,828	2,510	**95,714**		5,547		**478,640**	
309		Jun				4,951	**88,461**	3,054	8,011	**104,478**		5,520		**489,284**	
310		Jul				5,061	**118,997**	2,583	8,401	**135,042**		5,486		**640,687**	
311		Aug				4,847	**121,726**	2,635	8,258	**137,466**		5,474		**643,955**	
312		Sep				4,810	**114,671**	2,712	8,150	**130,343**		5,463		**581,812**	
313		Oct				5,548	**91,316**	4,014	8,770	**109,649**		5,234		**509,164**	
314		Nov				8,448	**98,270**	7,099	7,139	**120,956**		5,287		**495,972**	
315		Dec				10,233	**139,973**	11,186	9,105	**170,496**		5,313		**546,111**	
316															
317	2015	Jan				10,463	**116,123**	11,436	8,878	**146,901**		5,768		**518,778**	
318		Feb				10,233	**105,511**	9,455	7,224	**132,424**		5,600		**464,335**	
319		Mar				9,767	**102,980**	8,159	1,984	**122,890**		6,086		**486,593**	
320		Apr				7,689	**93,689**	6,258	3,016	**110,652**		5,716		**472,970**	
321		May				6,462	**82,299**	3,880	2,721	**95,361**		5,574		**468,689**	
322		Jun				5,055	**87,620**	3,092	8,222	**103,990**		5,548		**485,167**	
323		Jul				5,144	**120,102**	2,616	8,612	**136,474**		5,513		**627,234**	
324		Aug				4,947	**122,029**	2,669	8,468	**138,114**		5,501		**639,507**	
325		Sep				4,910	**115,465**	2,748	8,361	**131,484**		5,490		**576,910**	
326		Oct				5,633	**92,821**	4,070	8,981	**111,505**		5,260		**513,580**	
327		Nov				8,505	**98,698**	7,201	7,350	**121,753**		5,314		**494,574**	
328		Dec				10,343	**139,916**	11,353	9,315	**170,927**		5,340		**542,608**	
329															
330	2016	Jan				10,461	**116,464**	11,608	8,878	**147,411**		5,796		**523,976**	
331		Feb				10,464	**105,879**	9,717	7,224	**133,284**		5,628		**467,424**	
332		Mar				9,815	**103,080**	8,280	1,984	**123,159**		6,117		**483,646**	
333		Apr				7,707	**94,296**	6,350	3,016	**111,368**		5,745		**467,886**	
334		May				6,471	**83,452**	3,933	2,721	**96,577**		5,602		**471,992**	
335		Jun				5,068	**89,138**	3,131	8,222	**105,559**		5,576		**489,396**	
336		Jul				5,160	**120,399**	2,650	8,612	**136,822**		5,541		**636,965**	
337		Aug				4,967	**122,599**	2,705	8,468	**138,739**		5,529		**642,943**	
338		Sep				4,931	**116,306**	2,786	8,361	**132,384**		5,518		**587,968**	
339		Oct				5,627	**92,012**	4,129	8,981	**110,749**		5,286		**508,316**	
340		Nov				8,507	**97,824**	7,311	7,350	**120,992**		5,340		**488,055**	
341		Dec				10,353	**141,125**	11,533	9,315	**172,327**		5,367		**545,384**	
342															
343															
344							Wholesale Noncore			**Total**		International NC		**Total**	
345	**Peak Day Throughput (Mth/Day)**					Long Beach	SDG&E	Southwest Gas	Vernon	**Wholesale**		Ecogas		**Noncore**	
346	2,010					627	**5,732**	522	254	**7,135**		161		**20,957**	
347	2,011					617	**6,005**	573	254	**7,449**		169		**20,327**	
348	2,012					622	**6,158**	579	280	**7,639**		170		**20,836**	
349	2,013					622	**6,055**	586	287	**7,550**		171		**21,073**	
350	2,014					621	**6,067**	594	294	**7,576**		171		**21,416**	
351	2,015					624	**5,652**	603	300	**7,180**		172		**21,309**	
352	2,016					625	**5,953**	613	300	**7,491**		173		**21,735**	

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

Cold Year Throughput (Mth)		Total System End-Use Dmd	System Total (Mdth/d)	Co-Use-Fuel	"Un-Acnt'd-For" (UAF)	Total System Throughput
2010	Jan	1,037,284	3,346	4,815	7,896	1,049,995
	Feb	921,028	3,289	4,276	7,011	932,315
	Mar	905,194	2,920	4,202	6,890	916,286
	Apr	800,114	2,667	3,714	6,090	809,919
	May	694,301	2,240	3,223	5,285	702,810
	Jun	644,708	2,149	2,993	4,907	652,608
	Jul	691,209	2,230	3,209	5,261	699,680
	Aug	770,542	2,486	3,577	5,865	779,985
	Sep	740,230	2,467	3,436	5,635	749,301
	Oct	794,315	2,562	3,687	6,046	804,048
	Nov	901,833	3,006	4,187	6,865	912,884
	Dec	1,069,930	3,451	4,967	8,144	1,083,041
2011	Jan	1,024,292	3,304	4,755	7,797	1,036,844
	Feb	897,970	3,207	4,169	6,835	908,974
	Mar	878,318	2,833	4,077	6,686	889,081
	Apr	788,096	2,627	3,659	5,999	797,754
	May	712,792	2,299	3,309	5,426	721,527
	Jun	684,756	2,283	3,179	5,212	693,147
	Jul	801,581	2,586	3,721	6,102	811,404
	Aug	826,596	2,666	3,837	6,292	836,725
	Sep	763,161	2,544	3,543	5,809	772,513
	Oct	729,629	2,354	3,387	5,554	738,570
	Nov	866,149	2,887	4,021	6,593	876,763
	Dec	1,076,875	3,474	4,999	8,197	1,090,071
2012	Jan	1,029,603	3,321	4,780	7,837	1,042,220
	Feb	903,339	3,115	4,194	6,876	914,409
	Mar	877,568	2,831	4,074	6,680	888,322
	Apr	790,751	2,636	3,671	6,019	800,441
	May	712,003	2,297	3,305	5,420	720,728
	Jun	696,236	2,321	3,232	5,300	704,768
	Jul	827,779	2,670	3,843	6,301	837,923
	Aug	826,536	2,666	3,837	6,292	836,664
	Sep	771,333	2,571	3,581	5,871	780,785
	Oct	740,153	2,388	3,436	5,634	749,224
	Nov	867,854	2,893	4,029	6,606	878,489
	Dec	1,077,372	3,475	5,002	8,201	1,090,574
2013	Jan	1,033,429	3,334	4,798	7,866	1,046,093
	Feb	904,660	3,231	4,200	6,886	915,746
	Mar	883,457	2,850	4,101	6,725	894,283
	Apr	795,611	2,652	3,694	6,056	805,361
	May	724,653	2,338	3,364	5,516	733,534
	Jun	711,512	2,372	3,303	5,416	720,231
	Jul	846,552	2,731	3,930	6,444	856,926
	Aug	860,109	2,775	3,993	6,547	870,649
	Sep	801,908	2,673	3,723	6,104	811,735
	Oct	748,766	2,415	3,476	5,700	757,942
	Nov	870,143	2,900	4,040	6,623	880,806
	Dec	1,090,576	3,518	5,063	8,301	1,103,940

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

Row	A	B	Total System End-Use Dmd	System Total (Mdth/d)	Co-Use-Fuel	"Un-Acnt'd-For" (UAF)	Total System Throughput
251	**Cold Year Throughput (Mth)**						
303							
304	2014	Jan	1,046,220	3,375	4,857	7,964	1,059,041
305		Feb	917,523	3,277	4,259	6,984	928,766
306		Mar	895,956	2,890	4,159	6,820	906,935
307		Apr	816,619	2,722	3,791	6,216	826,626
308		May	735,298	2,372	3,414	5,597	744,309
309		Jun	699,152	2,331	3,246	5,322	707,720
310		Jul	835,557	2,695	3,879	6,360	845,796
311		Aug	837,595	2,702	3,888	6,376	847,860
312		Sep	780,333	2,601	3,623	5,940	789,896
313		Oct	746,771	2,409	3,467	5,684	755,922
314		Nov	869,019	2,897	4,034	6,615	879,668
315		Dec	1,092,825	3,525	5,073	8,318	1,106,217
316							
317	2015	Jan	1,043,489	3,366	4,844	7,943	1,056,276
318		Feb	915,556	3,270	4,250	6,969	926,775
319		Mar	893,819	2,883	4,149	6,804	904,772
320		Apr	805,078	2,684	3,737	6,128	814,944
321		May	724,131	2,336	3,362	5,512	733,005
322		Jun	693,947	2,313	3,222	5,282	702,451
323		Jul	821,123	2,649	3,812	6,250	831,185
324		Aug	832,188	2,684	3,863	6,335	842,386
325		Sep	774,556	2,582	3,596	5,896	784,048
326		Oct	750,165	2,420	3,483	5,710	759,358
327		Nov	866,191	2,887	4,021	6,593	876,806
328		Dec	1,087,414	3,508	5,048	8,277	1,100,740
329							
330	2016	Jan	1,048,546	3,382	4,868	7,981	1,061,395
331		Feb	918,556	3,167	4,264	6,992	929,813
332		Mar	890,795	2,874	4,135	6,781	901,711
333		Apr	799,978	2,667	3,714	6,089	809,781
334		May	727,510	2,347	3,377	5,538	736,425
335		Jun	698,301	2,328	3,242	5,315	706,858
336		Jul	830,989	2,681	3,858	6,325	841,172
337		Aug	835,763	2,696	3,880	6,362	846,005
338		Sep	785,782	2,619	3,648	5,981	795,411
339		Oct	745,029	2,403	3,459	5,671	754,159
340		Nov	859,779	2,866	3,991	6,545	870,314
341		Dec	1,090,211	3,517	5,061	8,299	1,103,571

Row	Peak Day Throughput (Mth/Day)	Total System End-Use Dmd
346	2,010	51,819
347	2,011	52,384
348	2,012	52,712
349	2,013	52,568
350	2,014	52,836
351	2,015	52,630
352	2,016	53,049

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

Row	Year	Month	Residential	G-10	G-AC	G-GE	G-NGV	Total Core	G-30 (Dist.)	G-30 (Trans.)	G-30 (Total)
				Nonresidential Core					Noncore - G-30		
357	**Forecast Number of Customers**										
358	2010	Jan	5,291,747	208,050	12	730	252	**5,500,791**	605	32	**637**
359		Feb	5,297,941	207,958	12	720	252	**5,506,883**	605	32	**637**
360		Mar	5,302,810	207,493	13	726	252	**5,511,294**	605	32	**637**
361		Apr	5,306,426	206,698	10	710	252	**5,514,096**	605	32	**637**
362		May	5,308,820	205,929	12	718	252	**5,515,731**	605	32	**637**
363		Jun	5,308,791	205,727	10	704	252	**5,515,484**	605	32	**637**
364		Jul	5,307,288	205,220	12	709	252	**5,513,481**	605	32	**637**
365		Aug	5,308,978	204,775	12	706	252	**5,514,723**	605	32	**637**
366		Sep	5,312,166	204,516	12	713	252	**5,517,659**	605	32	**637**
367		Oct	5,316,622	204,332	12	708	252	**5,521,926**	605	32	**637**
368		Nov	5,321,384	204,630	12	710	252	**5,526,988**	605	32	**637**
369		Dec	5,327,207	206,028	12	708	252	**5,534,207**	605	32	**637**
370											
371	2011	Jan	5,340,343	211,043	11	725	263	**5,552,385**	646	34	**680**
372		Feb	5,345,625	211,509	11	721	263	**5,558,129**	646	34	**680**
373		Mar	5,348,612	211,088	11	725	263	**5,560,698**	645	35	**680**
374		Apr	5,356,372	210,376	11	714	263	**5,567,736**	645	35	**680**
375		May	5,355,357	209,659	11	717	263	**5,566,007**	645	35	**680**
376		Jun	5,354,234	209,157	11	707	263	**5,564,371**	645	35	**680**
377		Jul	5,355,817	207,904	11	711	263	**5,564,707**	645	35	**680**
378		Aug	5,355,020	208,471	11	707	263	**5,564,472**	645	35	**680**
379		Sep	5,358,085	208,163	11	706	263	**5,567,228**	645	35	**680**
380		Oct	5,364,348	207,071	11	702	263	**5,572,395**	645	35	**680**
381		Nov	5,369,263	207,261	11	697	263	**5,577,495**	645	35	**680**
382		Dec	5,374,102	208,267	11	688	263	**5,583,331**	645	35	**680**
383											
384	2012	Jan	5,392,444	211,029	10	722	274	**5,604,480**	645	35	**680**
385		Feb	5,397,780	211,495	10	718	274	**5,610,277**	645	35	**680**
386		Mar	5,400,797	211,074	10	721	274	**5,612,877**	645	35	**680**
387		Apr	5,410,836	210,285	10	711	274	**5,622,116**	645	35	**680**
388		May	5,409,812	209,568	10	714	274	**5,620,378**	645	35	**680**
389		Jun	5,408,677	209,066	10	704	274	**5,618,731**	645	35	**680**
390		Jul	5,412,370	207,907	10	708	274	**5,621,270**	645	35	**680**
391		Aug	5,411,565	208,475	10	704	274	**5,621,028**	645	35	**680**
392		Sep	5,414,663	208,167	10	703	274	**5,623,817**	645	35	**680**
393		Oct	5,422,816	207,260	10	699	274	**5,631,059**	645	35	**680**
394		Nov	5,427,785	207,450	10	694	274	**5,636,213**	645	35	**680**
395		Dec	5,432,678	208,457	10	685	274	**5,642,105**	645	35	**680**
396											
397	2013	Jan	5,453,071	211,431	9	718	285	**5,665,515**	646	35	**681**
398		Feb	5,458,468	211,898	9	713	285	**5,671,374**	646	35	**681**
399		Mar	5,461,521	211,476	9	717	285	**5,674,009**	646	35	**681**
400		Apr	5,473,397	210,827	9	707	285	**5,685,224**	646	35	**681**
401		May	5,472,361	210,108	9	710	285	**5,683,473**	646	35	**681**
402		Jun	5,471,213	209,605	9	700	285	**5,681,812**	646	35	**681**
403		Jul	5,476,655	208,507	9	704	285	**5,686,160**	646	35	**681**
404		Aug	5,475,841	209,075	9	700	285	**5,685,911**	646	35	**681**
405		Sep	5,478,977	208,767	9	699	285	**5,688,737**	646	35	**681**
406		Oct	5,488,907	207,886	9	695	285	**5,697,782**	646	35	**681**
407		Nov	5,493,939	208,077	9	691	285	**5,703,000**	646	35	**681**
408		Dec	5,498,893	209,087	9	681	285	**5,708,956**	646	35	**681**

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

Row			Residential	Nonresidential Core G-10	Nonresidential Core G-AC	Nonresidential Core G-GE	Nonresidential Core G-NGV	Total Core	Noncore - G-30 G-30 (Dist.)	Noncore - G-30 G-30 (Trans.)	Noncore - G-30 G-30 (Total)
357	**Forecast Number of Customers**										
409											
410	2014	Jan	5,521,296	212,071	9	715	296	**5,734,387**	647	35	**682**
411		Feb	5,526,765	212,539	9	710	296	**5,740,319**	647	35	**682**
412		Mar	5,529,859	212,115	9	714	296	**5,742,993**	647	35	**682**
413		Apr	5,543,637	211,480	9	704	296	**5,756,126**	647	35	**682**
414		May	5,542,589	210,758	9	707	296	**5,754,359**	647	35	**682**
415		Jun	5,541,426	210,254	9	697	296	**5,752,681**	647	35	**682**
416		Jul	5,548,709	209,186	9	701	296	**5,758,901**	647	35	**682**
417		Aug	5,547,886	209,757	9	698	296	**5,758,645**	647	35	**682**
418		Sep	5,551,067	209,447	9	696	296	**5,761,515**	647	35	**682**
419		Oct	5,562,805	208,591	9	692	296	**5,772,394**	647	35	**682**
420		Nov	5,567,908	208,783	9	688	296	**5,777,683**	647	35	**682**
421		Dec	5,572,931	209,797	9	678	296	**5,783,711**	647	35	**682**
422											
423	2015	Jan	5,597,244	212,812	8	711	307	**5,811,082**	647	35	**682**
424		Feb	5,602,796	213,281	8	706	307	**5,817,099**	647	35	**682**
425		Mar	5,605,940	212,855	8	710	307	**5,819,820**	647	35	**682**
426		Apr	5,621,449	212,272	8	699	307	**5,834,735**	647	35	**682**
427		May	5,620,385	211,549	8	703	307	**5,832,952**	647	35	**682**
428		Jun	5,619,204	211,042	8	693	307	**5,831,253**	647	35	**682**
429		Jul	5,627,992	210,038	8	697	307	**5,839,043**	647	35	**682**
430		Aug	5,627,159	210,612	8	694	307	**5,838,779**	647	35	**682**
431		Sep	5,630,392	210,301	8	692	307	**5,841,700**	647	35	**682**
432		Oct	5,643,538	209,504	8	688	307	**5,854,046**	647	35	**682**
433		Nov	5,648,720	209,696	8	684	307	**5,859,415**	647	35	**682**
434		Dec	5,653,819	210,714	8	674	307	**5,865,522**	647	35	**682**
435											
436	2016	Jan	5,679,646	213,804	7	708	319	**5,894,484**	648	35	**683**
437		Feb	5,685,294	214,275	7	703	319	**5,900,599**	648	35	**683**
438		Mar	5,688,494	213,847	7	707	319	**5,903,374**	648	35	**683**
439		Apr	5,705,075	213,283	7	696	319	**5,919,381**	648	35	**683**
440		May	5,703,996	212,556	7	700	319	**5,917,578**	648	35	**683**
441		Jun	5,702,793	212,047	7	690	319	**5,915,856**	648	35	**683**
442		Jul	5,712,338	211,031	7	694	319	**5,924,389**	648	35	**683**
443		Aug	5,711,494	211,607	7	691	319	**5,924,118**	648	35	**683**
444		Sep	5,714,785	211,294	7	689	319	**5,927,095**	648	35	**683**
445		Oct	5,728,535	210,486	7	685	319	**5,940,033**	648	35	**683**
446		Nov	5,733,802	210,680	7	681	319	**5,945,488**	648	35	**683**
447		Dec	5,738,979	211,703	7	672	319	**5,951,680**	648	35	**683**

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

		Noncore - Electric Generatiion							Noncore - EOR			Total
		EG-Dist. (<3MMThms)	EG-Trans. (<3MMThms)	EG-Dist. (>=3MMThms)	EG-Trans. (>=3MMThms)	**EG (<3MMThms)**	**EG (>=3MMThms)**	**EG (Total)**	EOR (Dist.)	EOR (Trans.)	**EOR (Total)**	**Retail Noncore**
Forecast Number of Customers												
2010	Jan	119	16	31	31	**135**	**62**	**197**	15	15	**30**	**864**
	Feb	119	16	31	31	**135**	**62**	**197**	15	15	**30**	**864**
	Mar	119	16	31	31	**135**	**62**	**197**	15	16	**31**	**865**
	Apr	119	16	31	31	**135**	**62**	**197**	15	16	**31**	**865**
	May	119	16	31	31	**135**	**62**	**197**	15	16	**31**	**865**
	Jun	119	16	31	31	**135**	**62**	**197**	15	16	**31**	**865**
	Jul	119	16	31	31	**135**	**62**	**197**	15	16	**31**	**865**
	Aug	119	16	31	31	**135**	**62**	**197**	15	16	**31**	**865**
	Sep	119	16	31	31	**135**	**62**	**197**	16	15	**31**	**865**
	Oct	119	16	31	31	**135**	**62**	**197**	16	15	**31**	**865**
	Nov	119	16	31	31	**135**	**62**	**197**	16	15	**31**	**865**
	Dec	119	16	31	31	**135**	**62**	**197**	16	15	**31**	**865**
2011	Jan	125	16	32	31	**141**	**63**	**205**	16	15	**31**	**916**
	Feb	125	16	32	31	**141**	**63**	**205**	16	15	**31**	**916**
	Mar	125	16	31	32	**141**	**63**	**205**	16	15	**31**	**916**
	Apr	125	16	31	32	**141**	**63**	**205**	17	15	**32**	**917**
	May	125	16	31	32	**141**	**63**	**205**	17	15	**32**	**917**
	Jun	125	16	31	33	**141**	**64**	**206**	17	15	**32**	**918**
	Jul	125	17	31	33	**142**	**64**	**207**	17	15	**32**	**919**
	Aug	125	17	31	33	**142**	**64**	**207**	17	15	**32**	**919**
	Sep	125	17	31	33	**142**	**64**	**207**	17	15	**32**	**919**
	Oct	125	17	31	33	**142**	**64**	**207**	17	15	**32**	**919**
	Nov	125	17	31	33	**142**	**64**	**207**	17	15	**32**	**919**
	Dec	125	17	31	33	**142**	**64**	**207**	17	15	**32**	**919**
2012	Jan	125	17	31	33	**142**	**64**	**207**	17	15	**32**	**919**
	Feb	125	17	31	33	**142**	**64**	**207**	17	15	**32**	**919**
	Mar	125	17	31	33	**142**	**64**	**207**	17	15	**32**	**919**
	Apr	125	17	31	33	**142**	**64**	**207**	17	15	**32**	**919**
	May	125	17	31	33	**142**	**64**	**207**	17	15	**32**	**919**
	Jun	125	17	31	34	**142**	**65**	**208**	17	15	**32**	**920**
	Jul	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**921**
	Aug	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**921**
	Sep	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**921**
	Oct	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**921**
	Nov	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**921**
	Dec	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**921**
2013	Jan	125	17	31	35	**143**	**66**	**209**	17	15	**32**	**922**
	Feb	125	17	31	35	**143**	**66**	**209**	17	15	**32**	**922**
	Mar	125	17	31	35	**143**	**66**	**209**	17	15	**32**	**922**
	Apr	125	17	31	35	**143**	**66**	**209**	17	15	**32**	**922**
	May	125	17	31	35	**143**	**66**	**209**	17	15	**32**	**922**
	Jun	125	17	31	35	**143**	**66**	**209**	17	15	**32**	**922**
	Jul	125	17	31	35	**143**	**66**	**209**	17	15	**32**	**922**
	Aug	125	17	31	35	**143**	**66**	**209**	17	15	**32**	**922**
	Sep	125	17	31	35	**143**	**66**	**209**	17	15	**32**	**922**
	Oct	125	17	31	35	**143**	**66**	**209**	17	15	**32**	**922**
	Nov	125	17	31	35	**143**	**66**	**209**	17	15	**32**	**922**
	Dec	125	17	31	35	**143**	**66**	**209**	17	15	**32**	**922**

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

Row	A	B	Noncore - Electric Generatiion EG-Dist. (<3MMThms)	EG-Trans. (<3MMThms)	EG-Dist. (>=3MMThms)	EG-Trans. (>=3MMThms)	**EG (<3MMThms)**	**EG (>=3MMThms)**	**EG (Total)**	Noncore - EOR EOR (Dist.)	EOR (Trans.)	**EOR (Total)**	**Total Retail Noncore**
357	**Forecast Number of Customers**												
409													
410	2014	Jan	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**
411		Feb	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**
412		Mar	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**
413		Apr	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**
414		May	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**
415		Jun	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**
416		Jul	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**
417		Aug	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**
418		Sep	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**
419		Oct	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**
420		Nov	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**
421		Dec	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**
422													
423	2015	Jan	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**
424		Feb	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**
425		Mar	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**
426		Apr	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**
427		May	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**
428		Jun	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**
429		Jul	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**
430		Aug	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**
431		Sep	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**
432		Oct	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**
433		Nov	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**
434		Dec	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**
435													
436	2016	Jan	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**
437		Feb	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**
438		Mar	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**
439		Apr	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**
440		May	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**
441		Jun	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**
442		Jul	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**
443		Aug	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**
444		Sep	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**
445		Oct	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**
446		Nov	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**
447		Dec	125	17	31	35	**142**	**66**	**209**	17	15	**32**	**923**

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

Row	Year	Month	Wholesale Noncore: Long Beach	Wholesale Noncore: SDG&E	Wholesale Noncore: Southwest Gas	Wholesale Noncore: Vernon	**Total Wholesale**	International NC: Ecogas	**Total Noncore**	**Total System**
357	**Forecast Number of Customers**									
358	2010	Jan	1	1	1	1	**4**	1	**869**	**5,501,660**
359		Feb	1	1	1	1	**4**	1	**869**	**5,507,752**
360		Mar	1	1	1	1	**4**	1	**870**	**5,512,164**
361		Apr	1	1	1	1	**4**	1	**870**	**5,514,966**
362		May	1	1	1	1	**4**	1	**870**	**5,516,601**
363		Jun	1	1	1	1	**4**	1	**870**	**5,516,354**
364		Jul	1	1	1	1	**4**	1	**870**	**5,514,351**
365		Aug	1	1	1	1	**4**	1	**870**	**5,515,593**
366		Sep	1	1	1	1	**4**	1	**870**	**5,518,529**
367		Oct	1	1	1	1	**4**	1	**870**	**5,522,796**
368		Nov	1	1	1	1	**4**	1	**870**	**5,527,858**
369		Dec	1	1	1	1	**4**	1	**870**	**5,535,077**
370										
371	2011	Jan	1	1	1	1	**4**	1	**921**	**5,553,306**
372		Feb	1	1	1	1	**4**	1	**921**	**5,559,049**
373		Mar	1	1	1	1	**4**	1	**921**	**5,561,619**
374		Apr	1	1	1	1	**4**	1	**922**	**5,568,657**
375		May	1	1	1	1	**4**	1	**922**	**5,566,929**
376		Jun	1	1	1	1	**4**	1	**923**	**5,565,294**
377		Jul	1	1	1	1	**4**	1	**924**	**5,565,630**
378		Aug	1	1	1	1	**4**	1	**924**	**5,565,396**
379		Sep	1	1	1	1	**4**	1	**924**	**5,568,151**
380		Oct	1	1	1	1	**4**	1	**924**	**5,573,319**
381		Nov	1	1	1	1	**4**	1	**924**	**5,578,418**
382		Dec	1	1	1	1	**4**	1	**924**	**5,584,255**
383										
384	2012	Jan	1	1	1	1	**4**	1	**924**	**5,605,404**
385		Feb	1	1	1	1	**4**	1	**924**	**5,611,201**
386		Mar	1	1	1	1	**4**	1	**924**	**5,613,801**
387		Apr	1	1	1	1	**4**	1	**924**	**5,623,041**
388		May	1	1	1	1	**4**	1	**924**	**5,621,302**
389		Jun	1	1	1	1	**4**	1	**925**	**5,619,657**
390		Jul	1	1	1	1	**4**	1	**926**	**5,622,196**
391		Aug	1	1	1	1	**4**	1	**926**	**5,621,954**
392		Sep	1	1	1	1	**4**	1	**926**	**5,624,743**
393		Oct	1	1	1	1	**4**	1	**926**	**5,631,985**
394		Nov	1	1	1	1	**4**	1	**926**	**5,637,140**
395		Dec	1	1	1	1	**4**	1	**926**	**5,643,031**
396										
397	2013	Jan	1	1	1	1	**4**	1	**927**	**5,666,442**
398		Feb	1	1	1	1	**4**	1	**927**	**5,672,301**
399		Mar	1	1	1	1	**4**	1	**927**	**5,674,936**
400		Apr	1	1	1	1	**4**	1	**927**	**5,686,151**
401		May	1	1	1	1	**4**	1	**927**	**5,684,400**
402		Jun	1	1	1	1	**4**	1	**927**	**5,682,739**
403		Jul	1	1	1	1	**4**	1	**927**	**5,687,087**
404		Aug	1	1	1	1	**4**	1	**927**	**5,686,838**
405		Sep	1	1	1	1	**4**	1	**927**	**5,689,664**
406		Oct	1	1	1	1	**4**	1	**927**	**5,698,710**
407		Nov	1	1	1	1	**4**	1	**927**	**5,703,927**
408		Dec	1	1	1	1	**4**	1	**927**	**5,709,883**

2013 TCAP: SoCalGas Consolidated Gas Demand Forecast Summary (Mtherms)

Row	A	B	Wholesale Noncore: Long Beach	Wholesale Noncore: SDG&E	Wholesale Noncore: Southwest Gas	Wholesale Noncore: Vernon	**Total Wholesale**	International NC: Ecogas	**Total Noncore**	**Total System**
357	**Forecast Number of Customers**									
409										
410	2014	Jan	1	1	1	1	**4**	1	**928**	**5,735,315**
411		Feb	1	1	1	1	**4**	1	**928**	**5,741,247**
412		Mar	1	1	1	1	**4**	1	**928**	**5,743,921**
413		Apr	1	1	1	1	**4**	1	**928**	**5,757,053**
414		May	1	1	1	1	**4**	1	**928**	**5,755,287**
415		Jun	1	1	1	1	**4**	1	**928**	**5,753,609**
416		Jul	1	1	1	1	**4**	1	**928**	**5,759,828**
417		Aug	1	1	1	1	**4**	1	**928**	**5,759,572**
418		Sep	1	1	1	1	**4**	1	**928**	**5,762,442**
419		Oct	1	1	1	1	**4**	1	**928**	**5,773,322**
420		Nov	1	1	1	1	**4**	1	**928**	**5,778,611**
421		Dec	1	1	1	1	**4**	1	**928**	**5,784,639**
422										
423	2015	Jan	1	1	1	1	**4**	1	**928**	**5,812,010**
424		Feb	1	1	1	1	**4**	1	**928**	**5,818,027**
425		Mar	1	1	1	1	**4**	1	**928**	**5,820,748**
426		Apr	1	1	1	1	**4**	1	**928**	**5,835,663**
427		May	1	1	1	1	**4**	1	**928**	**5,833,880**
428		Jun	1	1	1	1	**4**	1	**928**	**5,832,181**
429		Jul	1	1	1	1	**4**	1	**928**	**5,839,970**
430		Aug	1	1	1	1	**4**	1	**928**	**5,839,707**
431		Sep	1	1	1	1	**4**	1	**928**	**5,842,628**
432		Oct	1	1	1	1	**4**	1	**928**	**5,854,974**
433		Nov	1	1	1	1	**4**	1	**928**	**5,860,343**
434		Dec	1	1	1	1	**4**	1	**928**	**5,866,450**
435										
436	2016	Jan	1	1	1	1	**4**	1	**928**	**5,895,412**
437		Feb	1	1	1	1	**4**	1	**928**	**5,901,527**
438		Mar	1	1	1	1	**4**	1	**928**	**5,904,303**
439		Apr	1	1	1	1	**4**	1	**928**	**5,920,309**
440		May	1	1	1	1	**4**	1	**928**	**5,918,506**
441		Jun	1	1	1	1	**4**	1	**928**	**5,916,784**
442		Jul	1	1	1	1	**4**	1	**928**	**5,925,317**
443		Aug	1	1	1	1	**4**	1	**928**	**5,925,046**
444		Sep	1	1	1	1	**4**	1	**928**	**5,928,023**
445		Oct	1	1	1	1	**4**	1	**928**	**5,940,962**
446		Nov	1	1	1	1	**4**	1	**928**	**5,946,417**
447		Dec	1	1	1	1	**4**	1	**928**	**5,952,608**

SDG&E Consolidated Gas Demand

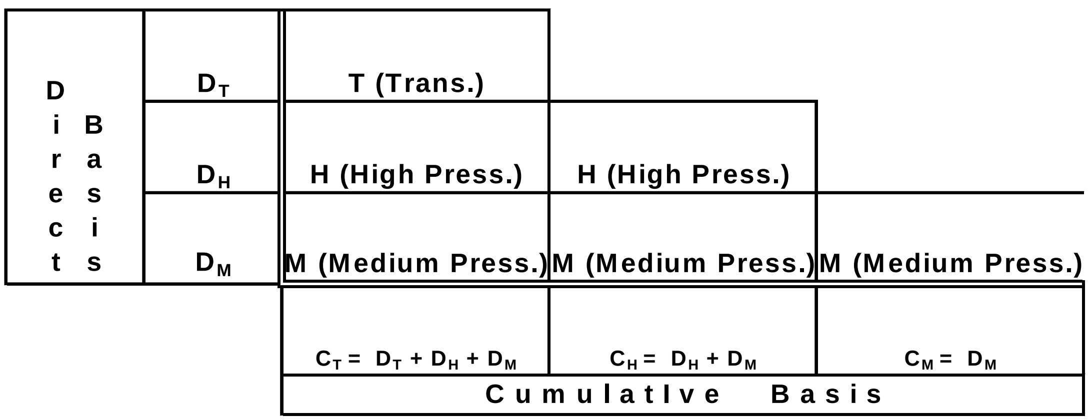
Marginal Demand Measures (MDM)

Marginal Demand Measures (MDMs) are used for rate design and cost allocation calculations. Figure 1, below, shows the relationships among the various MDMs that are provided in the accompanying tables.

Figure 1

LENART Diagram Depicting the Relationships

Among "Direct" and "Cumulative" MDMs



For example, the MDM data in the tables below for Noncore C&I, Avearge Year throughput gas demand have *direct* values for various segments of pressure service:

D_T = 15,070 MTh, D_H = 9,041 MTh, and D_M = 24,522 MTh.

The corresponding *cumulative* totals are:

C_T = 48,633 MTh, C_H = 33,562 MTh, and C_M = 24,522 MTh,

using the formulas indicated in the Figure 1, above.

2013 TCAP: SDG&E Consolidated Gas Demand Forecast Summary (Mtherms)

Unaccounted Fcst (%*AYTP)		Btu Factor:	1.0194
1.195%			
MDM #Yrs Av (2- or 3-yr)			
3			

	Co-Use-Fuel	UAF
	0.190%	1.178%
	0.193%	1.195%

Forecast Summary	**MDM**		Nonresidential Core		**Total**			**Noncore - C&I**
		Residential	GN-3	G-NGV	**Core**	C&I (Dist.)	C&I (Trans.)	**C&I**
<< TCAP Period >> January 2013 - December 2015								
DIRECT (%'s Load or Cust/Mtrs Sum to 100%)								
Transmission	%-Load:	0.00%	0.00%	0.00%				
	Average Year Throughput (MTh)	0	0	0	0	0	15,070	15,070
	Cold Year Throughput (1-in-35) (MTh)	0	0	0	0	0	15,070	15,070
	Cold Year Peak Month (December) (MTh)	0	0	0	0	0	1,278	1,278
	Peak Day (see note a/ below) (MTh)	-	-	-	0	0	41	41
	%-Cust/Mtrs:	0.0000%	0.0000%	0.0000%				
	Number of Customers	-	-	-	0	0	9	9
High Pressure	%-Load:	0.05%	2.81%	2.81%				
	Average Year Throughput (MTh)	143	5,125	326	5,595	9,041	0	9,041
	Cold Year Throughput (1-in-35) (MTh)	159	5,353	326	5,837	9,041	0	9,041
	Cold Year Peak Month (December) (MTh)	24	574	29	626	766	0	766
	Peak Day (see note a/ below) (MTh)	1	25	1	27	25	0	25
	%-Cust/Mtrs:	0.0001%	0.0214%	15.9091%				
	Number of Customers	1	7	5	13	10	0	10
Medium Pressure	%-Load:	99.95%	97.19%	97.19%				
	Average Year Throughput (MTh)	307,698	177,469	11,281	496,447	24,522	0	24,522
	Cold Year Throughput (1-in-35) (MTh)	340,408	185,347	11,281	537,035	24,522	0	24,522
	Cold Year Peak Month (December) (MTh)	50,943	19,872	998	71,814	2,079	0	2,079
	Peak Day (see note a/ below) (MTh)	2,801	858	32	3,691	67	0	67
	%-Cust/Mtrs:	99.9999%	99.9786%	84.0909%				
	Number of Customers	850,343	30,417	27	880,787	44	0	44
CUMULATIVE (Calc'd from DIRECT %s)								
Transmission	%-Load:	100.0000%	100.0000%	100.0000%				
	Average Year Throughput (MTh)	307,841	182,595	11,606	502,042	33,562	15,070	48,633
	Cold Year Throughput (1-in-35) (MTh)	340,566	190,700	11,606	542,872	33,562	15,070	48,633
	Cold Year Peak Month (December) (MTh)	50,967	20,446	1,027	72,440	2,845	1,278	4,123
	Peak Day (see note a/ below) (MTh)	2,803	883	33	3,718	92	41	133
	%-Cust/Mtrs:	100.0000%	100.0000%	100.0000%				
	Number of Customers	850,344	30,423	32	880,799	54	9	63
High Pressure	%-Load:	0.0466%	2.8070%	2.8070%				
	Average Year Throughput (MTh)	307,841	182,595	11,606	502,042	33,562	0	33,562
	Cold Year Throughput (1-in-35) (MTh)	340,566	190,700	11,606	542,872	33,562	0	33,562
	Cold Year Peak Month (December) (MTh)	50,967	20,446	1,027	72,440	2,845	0	2,845
	Peak Day (see note a/ below) (MTh)	2,803	883	33	3,718	92	0	92
	%-Cust/Mtrs:	0.0001%	0.0214%	15.9091%				
	Number of Customers	850,344	30,423	32	880,799	54	0	54
Medium Pressure	%-Load:	99.9534%	97.1930%	97.1930%				
	Average Year Throughput (MTh)	307,698	177,469	11,281	496,447	24,522	0	24,522
	Cold Year Throughput (1-in-35) (MTh)	340,408	185,347	11,281	537,035	24,522	0	24,522
	Cold Year Peak Month (December) (MTh)	50,943	19,872	998	71,814	2,079	0	2,079
	Peak Day (see note a/ below) (MTh)	2,801	858	32	3,691	67	0	67
	%-Cust/Mtrs:	99.9999%	99.9786%	84.0909%				
	Number of Customers	850,343	30,417	27	880,787	44	0	44

Note: a/ **Core HDD-sensitive markets (Res & GN3) at 1-in-35 exceedance peak-day design temp.; all other market segments at average daily load in DECEMBER month.**

2013 TCAP: SDG&E Consolidated Gas Demand Forecast Summary (Mtherms)

Unaccounted Fcst (%*AYTP)
1.195%
MDM #Yrs Av (2- or 3-yr)
3

Forecast Summary — MDM	EG-Dist. (<3MMThms)	EG-Trans. (<3MMThms)	EG-Dist. (>=3MMThms)	EG-Trans. (>=3MMThms)	Noncore - Electric Generatiion: EG (<3MMThms)	EG (>=3MMThms)	EG (Total)	Noncore Total	System-Wide Total
<< TCAP Period >> January 2013 - December 2015									
DIRECT (%'s Load or Cust/Mtrs Sum to 100%)									
Transmission %-Load:									
Average Year Throughput (MTh)	0	21,305	0	547,042	21,305	547,042	568,347	**583,417**	**583,417**
Cold Year Throughput (1-in-35) (MTh)	0	21,305	0	547,042	21,305	547,042	568,347	**583,417**	**583,417**
Cold Year Peak Month (December) (MTh)	0	692	0	52,023	692	52,023	52,716	**53,993**	**53,993**
Peak Day (see note a/ below) (MTh)	0	46	0	1,679	46	1,679	1,726	**1,767**	**1,767**
%-Cust/Mtrs:									
Number of Customers	0	12	0	8	12	8	20	**29**	**29**
High Pressure %-Load:									
Average Year Throughput (MTh)	11,879	0	71,224	0	11,879	71,224	83,104	**92,144**	**97,739**
Cold Year Throughput (1-in-35) (MTh)	11,879	0	71,224	0	11,879	71,224	83,104	**92,144**	**97,981**
Cold Year Peak Month (December) (MTh)	984	0	6,064	0	984	6,064	7,048	**7,814**	**8,441**
Peak Day (see note a/ below) (MTh)	32	0	196	0	32	196	227	**252**	**279**
%-Cust/Mtrs:									
Number of Customers	9	0	4	0	9	4	13	**23**	**36**
Medium Pressure %-Load:									
Average Year Throughput (MTh)	6,944	0	7,426	0	6,944	7,426	14,369	**38,891**	**535,338**
Cold Year Throughput (1-in-35) (MTh)	6,944	0	7,426	0	6,944	7,426	14,369	**38,891**	**575,926**
Cold Year Peak Month (December) (MTh)	591	0	632	0	591	632	1,223	**3,302**	**75,116**
Peak Day (see note a/ below) (MTh)	19	0	20	0	19	20	39	**107**	**3,798**
%-Cust/Mtrs:									
Number of Customers	31	0	2	0	31	2	33	**77**	**880,864**
CUMULATIVE (Calc'd from DIRECT %'s)									
Transmission %-Load:									
Average Year Throughput (MTh)	18,823	21,305	78,650	547,042	40,128	625,692	665,820	**714,453**	**1,216,495**
Cold Year Throughput (1-in-35) (MTh)	18,823	21,305	78,650	547,042	40,128	625,692	665,820	**714,453**	**1,257,325**
Cold Year Peak Month (December) (MTh)	1,575	692	6,696	52,023	2,267	58,719	60,987	**65,110**	**137,550**
Peak Day (see note a/ below) (MTh)	51	46	216	1,679	97	1,895	1,992	**2,125**	**5,844**
%-Cust/Mtrs:									
Number of Customers	40	12	6	8	52	14	66	**129**	**880,928**
High Pressure %-Load:									
Average Year Throughput (MTh)	18,823	0	78,650	0	18,823	78,650	97,473	**131,035**	**633,077**
Cold Year Throughput (1-in-35) (MTh)	18,823	0	78,650	0	18,823	78,650	97,473	**131,035**	**673,907**
Cold Year Peak Month (December) (MTh)	1,575	0	6,696	0	1,575	6,696	8,271	**11,116**	**83,557**
Peak Day (see note a/ below) (MTh)	51	0	216	0	51	216	267	**359**	**4,077**
%-Cust/Mtrs:									
Number of Customers	40	0	6	0	40	6	46	**100**	**880,899**
Medium Pressure %-Load:									
Average Year Throughput (MTh)	6,944	0	7,426	0	6,944	7,426	14,369	**38,891**	**535,338**
Cold Year Throughput (1-in-35) (MTh)	6,944	0	7,426	0	6,944	7,426	14,369	**38,891**	**575,926**
Cold Year Peak Month (December) (MTh)	591	0	632	0	591	632	1,223	**3,302**	**75,116**
Peak Day (see note a/ below) (MTh)	19	0	20	0	19	20	39	**107**	**3,798**
%-Cust/Mtrs:									
Number of Customers	31	0	2	0	31	2	33	**77**	**880,864**

Note: a/ **Power-Plant facilities' peak daily load in month of DECEMBER for BASE HYDRO water year; all other market segments at average daily load in DECEMBER month.**

2013 TCAP: SDG&E Consolidated Gas Demand Forecast Summary (Mtherms)

ANNUAL FORECAST DATA

Average Year Throughput (Mth)

				Nonresidential Core		Total	Noncore - C&I			Noncore - Electric Generatiion				
			Residential	GN-3	G-NGV	Core	C&I (Dist.)	C&I (Trans.)	C&I (Total)	EG-Dist. (<3MMThms)	EG-Trans. (<3MMThms)	EG-Dist. (>=3MMThms)	EG-Trans. (>=3MMThms)	EG (<3MMThms)
2,010	Jan		304,083	192,312	10,309	**506,704**	30,859	13,856	**44,715**	20,783	4,989	70,909	554,309	**25,772**
2,011	Jan		312,413	190,554	10,618	**513,586**	31,716	14,241	**45,957**	18,221	34,713	72,413	495,899	**52,934**
2,012	Jan		312,169	187,756	10,937	**510,863**	32,663	14,666	**47,329**	18,777	38,394	75,200	517,977	**57,171**
2,013	Jan		307,399	185,438	11,265	**504,103**	33,317	14,960	**48,278**	18,623	16,791	77,278	548,965	**35,414**
2,014	Jan		307,754	182,923	11,603	**502,280**	33,611	15,092	**48,704**	18,758	17,268	78,752	550,656	**36,026**
2,015	Jan		308,370	179,423	11,951	**499,743**	33,758	15,158	**48,917**	19,088	29,855	79,919	541,506	**48,943**
2,016	Jan		309,300	176,548	12,310	**498,158**	33,897	15,221	**49,117**	19,385	26,438	81,069	550,140	**45,822**

Average Year Sales (Mth)

				Nonresidential Core		Total	Noncore - C&I			Noncore - Electric Generatiion				
			Residential	GN-3	G-NGV	Core	C&I (Dist.)	C&I (Trans.)	C&I (Total)	EG-Dist. (<3MMThms)	EG-Trans. (<3MMThms)	EG-Dist. (>=3MMThms)	EG-Trans. (>=3MMThms)	EG (<3MMThms)
2,010	Jan	365	303,578	160,163	3,106	**466,846**	0	0	**0**	0	0	0	0	**0**
2,011	Jan	365	311,894	158,699	3,199	**473,792**	0	0	**0**	0	0	0	0	**0**
2,012	Jan	366	311,651	156,369	3,295	**471,315**	0	0	**0**	0	0	0	0	**0**
2,013	Jan	365	306,888	154,439	3,394	**464,721**	0	0	**0**	0	0	0	0	**0**
2,014	Jan	365	307,242	152,344	3,495	**463,082**	0	0	**0**	0	0	0	0	**0**
2,015	Jan	365	307,857	149,429	3,600	**460,886**	0	0	**0**	0	0	0	0	**0**
2,016	Jan	366	308,786	147,035	3,708	**459,529**	0	0	**0**	0	0	0	0	**0**

Cold Year Throughput (Mth)

				Nonresidential Core		Total	Noncore - C&I			Noncore - Electric Generatiion				
			Residential	GN-3	G-NGV	Core	C&I (Dist.)	C&I (Trans.)	C&I (Total)	EG-Dist. (<3MMThms)	EG-Trans. (<3MMThms)	EG-Dist. (>=3MMThms)	EG-Trans. (>=3MMThms)	EG (<3MMThms)
2,010	Jan		336,409	200,848	10,309	**547,566**	30,859	13,856	**44,715**	20,783	4,989	70,909	554,309	**25,772**
2,011	Jan		345,625	199,013	10,618	**555,256**	31,716	14,241	**45,957**	18,221	34,713	72,413	495,899	**52,934**
2,012	Jan		345,355	196,091	10,937	**552,382**	32,663	14,666	**47,329**	18,777	38,394	75,200	517,977	**57,171**
2,013	Jan		340,077	193,670	11,265	**545,012**	33,317	14,960	**48,278**	18,623	16,791	77,278	548,965	**35,414**
2,014	Jan		340,470	191,043	11,603	**543,116**	33,611	15,092	**48,704**	18,758	17,268	78,752	550,656	**36,026**
2,015	Jan		341,151	187,387	11,951	**540,489**	33,758	15,158	**48,917**	19,088	29,855	79,919	541,506	**48,943**
2,016	Jan		342,180	184,385	12,310	**538,875**	33,897	15,221	**49,117**	19,385	26,438	81,069	550,140	**45,822**

Peak Day Thrughput (Mth/Day)

				Nonresidential Core		Total	Noncore - C&I			Noncore - Electric Generatiion				
			Residential	GN-3	G-NGV	Core	C&I (Dist.)	C&I (Trans.)	C&I (Total)	EG-Dist. (<3MMThms)	EG-Trans. (<3MMThms)	EG-Dist. (>=3MMThms)	EG-Trans. (>=3MMThms)	EG (<3MMThms)
2,010			2,769	930	29.4	**3,728**	84	38	**122**	79	59	179	1,512	**138**
2,011			2,844	922	30.3	**3,796**	88	40	**127**	51	174	202	1,572	**225**
2,012			2,842	908	31.2	**3,781**	90	40	**130**	52	88	208	1,814	**140**
2,013			2,799	896	32.2	**3,727**	91	41	**132**	50	26	213	1,824	**76**
2,014			2,802	884	33.1	**3,719**	92	41	**133**	51	14	216	1,851	**65**
2,015			2,808	867	34.1	**3,709**	92	41	**134**	51	98	219	1,363	**150**
2,016			2,816	853	35.1	**3,704**	93	42	**134**	52	108	222	1,650	**160**

Forecast Number of Customers

				Nonresidential Core		Total	Noncore - C&I			Noncore - Electric Generatiion				
			Residential	GN-3	G-NGV	Core	C&I (Dist.)	C&I (Trans.)	C&I (Total)	EG-Dist. (<3MMThms)	EG-Trans. (<3MMThms)	EG-Dist. (>=3MMThms)	EG-Trans. (>=3MMThms)	EG (<3MMThms)
2,010	Jan		817,006	30,150	28	**847,184**	54	9	**63**	41	4	6	12	**45**
2,011	Jan		822,459	30,240	30	**852,729**	54	9	**63**	40	11	6	8	**51**
2,012	Jan		829,666	30,300	30	**859,997**	54	9	**63**	40	11	6	8	**51**
2,013	Jan		838,837	30,358	31	**869,227**	54	9	**63**	40	11	6	8	**51**
2,014	Jan		849,935	30,419	32	**880,386**	54	9	**63**	40	12	6	8	**52**
2,015	Jan		862,261	30,492	32	**892,785**	54	9	**63**	40	13	6	8	**53**
2,016	Jan		875,213	30,579	32	**905,824**	54	9	**63**	40	13	6	8	**53**

2013 TCAP: SDG&E Consolidated Gas Demand Forecast Summary (Mtherms)

ANNUAL FORECAST DATA

Row	A	B	C	EG (>=3MMThms)	EG (Total)	Noncore Total	System-Wide Total End-Use Dmd	System Total (Mdth/d)	Co-Use-Fuel	"Un-Acnt'd-For" (UAF)	Total System Throughput	Check Sum of Monthl CoUseFue	UAF
61	**Average Year Throughput (Mth)**												
62	2,010	Jan		**625,218**	**650,990**	**695,705**	**1,202,408**	**329**	**2,316**	**14,367**	**1,219,091**	2,316	14,367
63	2,011	Jan		**568,313**	**621,246**	**667,203**	**1,180,789**	**324**	**2,275**	**14,108**	**1,197,172**	2,275	14,108
64	2,012	Jan		**593,177**	**650,348**	**697,676**	**1,208,539**	**330**	**2,328**	**14,440**	**1,225,307**	2,328	14,440
65	2,013	Jan		**626,243**	**661,657**	**709,935**	**1,214,038**	**333**	**2,339**	**14,505**	**1,230,882**	2,339	14,505
66	2,014	Jan		**629,408**	**665,434**	**714,138**	**1,216,418**	**333**	**2,343**	**14,534**	**1,233,295**	2,343	14,534
67	2,015	Jan		**621,426**	**670,368**	**719,285**	**1,219,029**	**334**	**2,348**	**14,565**	**1,235,942**	2,348	14,565
68	2,016	Jan		**631,209**	**677,031**	**726,148**	**1,224,306**	**335**	**2,359**	**14,628**	**1,241,293**	2,359	14,628

Row	A	B	C	EG (>=3MMThms)	EG (Total)	Noncore Total	System-Wide Total End-Use Dmd	Check of System Total (Mdth/d)
73	**Average Year Sales (Mth)**							
74	2,010	Jan	365	**0**	**0**	**0**	**466,846**	**128**
75	2,011	Jan	365	**0**	**0**	**0**	**473,792**	**130**
76	2,012	Jan	366	**0**	**0**	**0**	**471,315**	**129**
77	2,013	Jan	365	**0**	**0**	**0**	**464,721**	**127**
78	2,014	Jan	365	**0**	**0**	**0**	**463,082**	**127**
79	2,015	Jan	365	**0**	**0**	**0**	**460,886**	**126**
80	2,016	Jan	366	**0**	**0**	**0**	**459,529**	**126**

Row	A	B	EG (>=3MMThms)	EG (Total)	Noncore Total	System-Wide Total End-Use Dmd	Check of System Total (Mdth/d)	Co-Use-Fuel	"Un-Acnt'd-For" (UAF)	System Throughput	Check Sum of Monthl CoUseFue	UAF
85	**Cold Year Throughput (Mth)**											
86	2,010	Jan	**625,218**	**650,990**	**695,705**	**1,243,271**	**341**	**2,395**	**14,855**	**1,260,521**	2,395	14,855
87	2,011	Jan	**568,313**	**621,246**	**667,203**	**1,222,459**	**335**	**2,355**	**14,606**	**1,239,420**	2,355	14,606
88	2,012	Jan	**593,177**	**650,348**	**697,676**	**1,250,059**	**342**	**2,408**	**14,936**	**1,267,403**	2,408	14,936
89	2,013	Jan	**626,243**	**661,657**	**709,935**	**1,254,947**	**344**	**2,418**	**14,994**	**1,272,359**	2,418	14,994
90	2,014	Jan	**629,408**	**665,434**	**714,138**	**1,257,253**	**344**	**2,422**	**15,022**	**1,274,697**	2,422	15,022
91	2,015	Jan	**621,426**	**670,368**	**719,285**	**1,259,774**	**345**	**2,427**	**15,052**	**1,277,253**	2,427	15,052
92	2,016	Jan	**631,209**	**677,031**	**726,148**	**1,265,023**	**346**	**2,437**	**15,115**	**1,282,574**	2,437	15,115

Row	A	EG (>=3MMThms)	EG (Total)	Noncore Total	System-Wide Total End-Use Dmd
96	**Peak Day Thrughput (Mth/Day)**				
97	2,010	**1,690**	**1,828**	**1,950**	**5,678**
98	2,011	**1,774**	**1,999**	**2,126**	**5,923**
99	2,012	**2,022**	**2,162**	**2,293**	**6,074**
100	2,013	**2,037**	**2,113**	**2,245**	**5,972**
101	2,014	**2,067**	**2,132**	**2,265**	**5,984**
102	2,015	**1,583**	**1,732**	**1,866**	**5,575**
103	2,016	**1,872**	**2,033**	**2,167**	**5,871**

Row	A	B	EG (>=3MMThms)	EG (Total)	Noncore Total	System-Wide Total
108	**Forecast Number of Customers**					
109	2,010	Jan	**18**	**63**	**126**	**847,310**
110	2,011	Jan	**14**	**65**	**128**	**852,857**
111	2,012	Jan	**14**	**65**	**128**	**860,125**
112	2,013	Jan	**14**	**65**	**128**	**869,355**
113	2,014	Jan	**14**	**66**	**129**	**880,515**
114	2,015	Jan	**14**	**67**	**130**	**892,915**
115	2,016	Jan	**14**	**67**	**130**	**905,954**

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Consolidated Gas Demand
Forecast Summary (Mtherms)

MONTHLY FORECAST DATA

			Nonresidential Core		Total	Noncore - C&I			Noncore - Electric Gene			
		Residential	GN-3	G-NGV	Core	C&I (Dist.)	C&I (Trans.)	C&I (Total)	EG-Dist. (<3MMThms)	EG-Trans. (<3MMThms)	EG-Dist. (>=3MMThms)	EG-Trans. (>=3MMThms)
Average Year Throughput (Mth)												
2010	Jan	41,280	20,194	845	**62,318**	2,532	1,137	**3,670**	1,733	358	6,404	61,317
	Feb	35,462	19,946	879	**56,286**	2,477	1,112	**3,589**	1,579	247	6,413	52,240
	Mar	34,146	17,425	804	**52,375**	2,308	1,036	**3,344**	1,460	109	5,913	50,565
	Apr	27,231	16,660	899	**44,790**	2,512	1,128	**3,640**	1,646	106	6,900	53,008
	May	20,178	15,149	822	**36,149**	2,382	1,069	**3,451**	1,494	274	5,931	45,366
	Jun	15,252	13,629	854	**29,735**	2,693	1,209	**3,902**	1,401	201	5,376	41,592
	Jul	14,395	13,055	823	**28,273**	2,641	1,186	**3,827**	1,778	639	5,479	27,949
	Aug	14,322	12,478	822	**27,623**	2,661	1,195	**3,855**	2,074	795	5,779	43,057
	Sep	13,984	13,244	904	**28,132**	2,657	1,193	**3,851**	2,092	543	6,073	48,251
	Oct	17,188	13,549	863	**31,601**	2,593	1,165	**3,758**	1,769	695	5,459	41,310
	Nov	27,705	17,039	882	**45,626**	2,794	1,255	**4,048**	2,070	468	5,649	42,295
	Dec	42,939	19,944	912	**63,796**	2,608	1,171	**3,780**	1,687	552	5,534	47,360
2011	Jan	42,410	20,008	871	**63,289**	2,497	1,121	**3,618**	1,327	1,528	5,479	25,259
	Feb	36,433	19,763	905	**57,101**	2,536	1,139	**3,675**	1,343	416	5,704	22,180
	Mar	35,081	17,266	828	**53,175**	2,576	1,157	**3,733**	1,380	733	5,862	23,884
	Apr	27,977	16,508	926	**45,411**	2,593	1,164	**3,757**	1,434	1,718	5,935	25,184
	May	20,731	15,012	847	**36,589**	2,627	1,180	**3,807**	1,487	2,919	6,042	27,347
	Jun	15,670	13,505	879	**30,055**	2,661	1,195	**3,856**	1,554	2,386	6,136	38,596
	Jul	14,789	12,937	847	**28,573**	2,685	1,206	**3,890**	1,762	4,970	6,174	70,104
	Aug	14,715	12,365	847	**27,927**	2,692	1,209	**3,900**	1,780	5,806	6,192	72,390
	Sep	14,368	13,124	931	**28,422**	2,692	1,209	**3,901**	1,635	4,399	6,188	67,901
	Oct	17,659	13,425	889	**31,973**	2,709	1,216	**3,925**	1,504	4,071	6,207	41,036
	Nov	28,464	16,882	908	**46,255**	2,720	1,221	**3,941**	1,512	4,125	6,238	32,761
	Dec	44,116	19,759	940	**64,815**	2,727	1,225	**3,952**	1,502	1,641	6,258	49,258
2012	Jan	42,377	19,713	897	**62,987**	2,604	1,169	**3,773**	1,406	1,159	5,935	28,490
	Feb	36,405	19,472	933	**56,809**	2,634	1,183	**3,817**	1,425	336	6,029	25,656
	Mar	35,054	17,012	853	**52,919**	2,668	1,198	**3,866**	1,438	1,565	6,119	28,178
	Apr	27,955	16,266	954	**45,175**	2,678	1,202	**3,880**	1,452	2,577	6,158	28,957
	May	20,714	14,792	872	**36,378**	2,708	1,216	**3,924**	1,502	2,535	6,248	27,973
	Jun	15,658	13,308	906	**29,871**	2,739	1,230	**3,969**	1,587	2,817	6,334	41,141
	Jul	14,777	12,747	873	**28,398**	2,760	1,239	**4,000**	1,748	5,410	6,365	72,593
	Aug	14,703	12,184	872	**27,760**	2,763	1,241	**4,004**	1,794	5,946	6,380	71,998
	Sep	14,356	12,932	959	**28,247**	2,761	1,240	**4,001**	1,676	4,343	6,374	68,363
	Oct	17,645	13,228	916	**31,789**	2,773	1,245	**4,018**	1,587	4,978	6,390	41,398
	Nov	28,442	16,634	935	**46,012**	2,783	1,250	**4,033**	1,622	5,361	6,422	33,591
	Dec	44,081	19,468	968	**64,517**	2,791	1,253	**4,044**	1,541	1,368	6,445	49,638
2013	Jan	41,730	19,468	924	**62,122**	2,667	1,197	**3,864**	1,452	819	6,121	30,730
	Feb	35,849	19,230	961	**56,039**	2,697	1,211	**3,907**	1,465	587	6,214	28,361
	Mar	34,518	16,802	878	**52,199**	2,730	1,226	**3,956**	1,484	786	6,305	30,449
	Apr	27,528	16,066	982	**44,576**	2,741	1,231	**3,972**	1,502	1,863	6,344	31,910
	May	20,398	14,611	898	**35,907**	2,769	1,243	**4,012**	1,528	1,354	6,431	32,003
	Jun	15,419	13,145	933	**29,496**	2,797	1,256	**4,053**	1,574	1,321	6,514	45,962
	Jul	14,552	12,591	899	**28,042**	2,816	1,264	**4,080**	1,661	2,630	6,542	74,680
	Aug	14,479	12,036	899	**27,413**	2,816	1,264	**4,080**	1,682	3,468	6,552	74,340
	Sep	14,137	12,773	988	**27,898**	2,810	1,262	**4,072**	1,643	2,700	6,539	70,834
	Oct	17,376	13,065	943	**31,384**	2,819	1,266	**4,085**	1,538	691	6,549	45,013
	Nov	28,007	16,428	963	**45,399**	2,826	1,269	**4,096**	1,545	298	6,575	33,267
	Dec	43,408	19,224	997	**63,629**	2,830	1,271	**4,101**	1,549	275	6,592	51,417

2013 TCAP: SDG&E Consolidated Gas Demand Forecast Summary (Mtherms)

MONTHLY FORECAST DATA

Row	Year	Month	Residential	Nonresidential Core: GN-3	Nonresidential Core: G-NGV	Total Core	Noncore - C&I: C&I (Dist.)	Noncore - C&I: C&I (Trans.)	Noncore - C&I: **C&I (Total)**	Noncore - Electric Gene: EG-Dist. (<3MMThms)	Noncore - Electric Gene: EG-Trans. (<3MMThms)	Noncore - Electric Gene: EG-Dist. (>=3MMThms)	Noncore - Electric Gene: EG-Trans. (>=3MMThms)
113													
114	2014	Jan	41,778	19,203	951	**61,933**	2,698	1,212	**3,910**	1,469	305	6,253	31,319
115		Feb	35,890	18,968	989	**55,847**	2,727	1,224	**3,951**	1,490	163	6,345	28,753
116		Mar	34,558	16,574	905	**52,037**	2,759	1,239	**3,998**	1,512	45	6,435	31,197
117		Apr	27,560	15,848	1,012	**44,419**	2,769	1,243	**4,012**	1,549	827	6,473	32,353
118		May	20,421	14,413	925	**35,760**	2,796	1,255	**4,051**	1,552	746	6,559	31,719
119		Jun	15,437	12,967	961	**29,365**	2,823	1,268	**4,091**	1,581	1,254	6,641	44,424
120		Jul	14,568	12,421	926	**27,916**	2,840	1,275	**4,115**	1,619	3,733	6,666	73,930
121		Aug	14,495	11,874	926	**27,295**	2,838	1,274	**4,113**	1,655	4,563	6,673	74,608
122		Sep	14,153	12,601	1,017	**27,771**	2,831	1,271	**4,102**	1,618	2,693	6,657	70,786
123		Oct	17,396	12,887	971	**31,255**	2,839	1,275	**4,114**	1,565	1,321	6,663	44,882
124		Nov	28,040	16,205	992	**45,237**	2,845	1,277	**4,122**	1,571	898	6,687	34,213
125		Dec	43,458	18,962	1,027	**63,446**	2,847	1,278	**4,126**	1,577	719	6,701	52,472
126													
127	2015	Jan	41,862	18,835	980	**61,677**	2,712	1,218	**3,929**	1,492	1,236	6,353	31,241
128		Feb	35,962	18,605	1,019	**55,586**	2,740	1,230	**3,970**	1,517	812	6,445	28,380
129		Mar	34,627	16,257	932	**51,816**	2,772	1,245	**4,017**	1,535	1,169	6,535	30,560
130		Apr	27,615	15,545	1,042	**44,202**	2,781	1,249	**4,030**	1,549	1,773	6,572	30,300
131		May	20,462	14,138	953	**35,553**	2,808	1,261	**4,069**	1,567	1,558	6,658	30,265
132		Jun	15,467	12,719	990	**29,177**	2,835	1,273	**4,109**	1,618	2,262	6,740	42,618
133		Jul	14,598	12,184	954	**27,735**	2,852	1,281	**4,133**	1,653	4,406	6,764	74,373
134		Aug	14,524	11,647	953	**27,125**	2,850	1,280	**4,130**	1,678	4,979	6,770	74,554
135		Sep	14,182	12,360	1,048	**27,589**	2,843	1,276	**4,119**	1,673	3,421	6,752	70,852
136		Oct	17,431	12,641	1,001	**31,072**	2,850	1,280	**4,130**	1,610	3,840	6,756	43,872
137		Nov	28,096	15,894	1,022	**45,012**	2,856	1,282	**4,139**	1,596	3,318	6,781	32,313
138		Dec	43,545	18,598	1,058	**63,200**	2,859	1,284	**4,143**	1,599	1,083	6,795	52,180
139													
140	2016	Jan	41,988	18,533	1,009	**61,530**	2,723	1,223	**3,945**	1,522	1,350	6,442	31,480
141		Feb	36,070	18,306	1,050	**55,426**	2,751	1,235	**3,987**	1,538	571	6,535	29,022
142		Mar	34,732	15,997	960	**51,688**	2,784	1,250	**4,034**	1,557	697	6,627	31,126
143		Apr	27,698	15,296	1,073	**44,067**	2,793	1,254	**4,046**	1,571	1,121	6,665	31,554
144		May	20,524	13,912	982	**35,418**	2,820	1,266	**4,086**	1,589	1,483	6,752	31,478
145		Jun	15,514	12,516	1,019	**29,050**	2,847	1,278	**4,126**	1,630	2,192	6,836	44,184
146		Jul	14,642	11,989	982	**27,613**	2,864	1,286	**4,149**	1,682	4,437	6,862	74,610
147		Aug	14,568	11,462	982	**27,012**	2,862	1,285	**4,147**	1,718	5,140	6,868	74,939
148		Sep	14,224	12,162	1,079	**27,466**	2,854	1,282	**4,136**	1,719	3,974	6,851	71,089
149		Oct	17,483	12,438	1,031	**30,952**	2,862	1,285	**4,147**	1,610	2,694	6,856	44,220
150		Nov	28,181	15,639	1,053	**44,872**	2,868	1,288	**4,155**	1,625	1,660	6,880	33,105
151		Dec	43,676	18,298	1,089	**63,063**	2,870	1,289	**4,159**	1,622	1,120	6,894	53,334

2013 TCAP: SDG&E Consolidated Gas Demand Forecast Summary (Mtherms)

Row	Year	Month	EG (<3MMThms)	EG (>=3MMThms)	EG (Total)	Noncore Total	System-Wide Total End-Use Dmd	System Total (Mdth/d)	Co-Use-Fuel	"Un-Acnt'd-For" (UAF)	Total System Throughput
59	***MONTHLY FORECAST DATA***		ratiion			Noncore	System-Wide	**System Total**			**Total**
60			**EG (<3MMThms)**	**EG (>=3MMThms)**	**EG (Total)**	**Total**	**Total End-Use Dmd**	**(Mdth/d)**	**Co-Use-Fuel**	**"Un-Acnt'd-For" (UAF)**	**System Throughput**
61	**Average Year Throughput (Mth)**										
62	2010	Jan	2,091	67,721	69,812	73,481	135,800	438	262	1,623	137,684
63		Feb	1,827	58,653	60,479	64,068	120,355	430	232	1,438	122,025
64		Mar	1,569	56,478	58,047	61,391	113,766	367	219	1,359	115,345
65		Apr	1,752	59,907	61,659	65,300	110,090	367	212	1,315	111,617
66		May	1,769	51,297	53,066	56,517	92,666	299	179	1,107	93,952
67		Jun	1,602	46,968	48,569	52,471	82,206	274	158	982	83,347
68		Jul	2,417	33,427	35,844	39,672	67,945	219	131	812	68,887
69		Aug	2,869	48,836	51,705	55,560	83,183	268	160	994	84,337
70		Sep	2,635	54,324	56,959	60,810	88,942	296	171	1,063	90,176
71		Oct	2,464	46,769	49,234	52,992	84,592	273	163	1,011	85,766
72		Nov	2,538	47,944	50,482	54,531	100,156	334	193	1,197	101,546
73		Dec	2,239	52,894	55,133	58,912	122,708	396	236	1,466	124,410
74											
75	2011	Jan	2,856	30,738	33,594	37,212	100,501	324	194	1,201	101,896
76		Feb	1,759	27,883	29,642	33,317	90,419	323	174	1,080	91,673
77		Mar	2,113	29,746	31,858	35,591	88,766	286	171	1,061	89,998
78		Apr	3,152	31,119	34,271	38,028	83,439	278	161	997	84,597
79		May	4,406	33,389	37,795	41,602	78,191	252	151	934	79,275
80		Jun	3,940	44,732	48,672	52,529	82,584	275	159	987	83,729
81		Jul	6,732	76,279	83,011	86,901	115,475	372	222	1,380	117,077
82		Aug	7,586	78,581	86,167	90,067	117,994	381	227	1,410	119,631
83		Sep	6,034	74,089	80,123	84,024	112,446	375	217	1,344	114,006
84		Oct	5,576	47,243	52,819	56,744	88,718	286	171	1,060	89,949
85		Nov	5,636	38,999	44,635	48,576	94,831	316	183	1,133	96,147
86		Dec	3,144	55,516	58,660	62,611	127,426	411	245	1,523	129,194
87											
88	2012	Jan	2,565	34,425	36,989	40,762	103,750	335	200	1,240	105,189
89		Feb	1,760	31,684	33,444	37,261	94,070	324	181	1,124	95,375
90		Mar	3,002	34,297	37,300	41,165	94,084	303	181	1,124	95,390
91		Apr	4,029	35,116	39,145	43,025	88,200	294	170	1,054	89,424
92		May	4,037	34,222	38,259	42,183	78,562	253	151	939	79,652
93		Jun	4,404	47,475	51,879	55,849	85,720	286	165	1,024	86,909
94		Jul	7,157	78,958	86,115	90,114	118,512	382	228	1,416	120,156
95		Aug	7,741	78,379	86,119	90,124	117,884	380	227	1,408	119,519
96		Sep	6,019	74,737	80,756	84,757	113,003	377	218	1,350	114,571
97		Oct	6,565	47,788	54,353	58,371	90,160	291	174	1,077	91,411
98		Nov	6,983	40,013	46,996	51,029	97,041	323	187	1,159	98,387
99		Dec	2,909	56,083	58,992	63,036	127,553	411	246	1,524	129,322
100											
101	2013	Jan	2,272	36,851	39,122	42,987	105,109	339	202	1,256	106,567
102		Feb	2,052	34,575	36,627	40,534	96,573	345	186	1,154	97,913
103		Mar	2,269	36,753	39,023	42,978	95,177	307	183	1,137	96,498
104		Apr	3,365	38,254	41,619	45,591	90,167	301	174	1,077	91,418
105		May	2,882	38,435	41,317	45,329	81,236	262	156	971	82,363
106		Jun	2,895	52,476	55,371	59,425	88,921	296	171	1,062	90,155
107		Jul	4,291	81,222	85,513	89,593	117,635	379	227	1,406	119,267
108		Aug	5,150	80,892	86,042	90,122	117,535	379	226	1,404	119,166
109		Sep	4,343	77,373	81,716	85,787	113,685	379	219	1,358	115,262
110		Oct	2,229	51,561	53,790	57,875	89,259	288	172	1,066	90,498
111		Nov	1,842	39,842	41,684	45,780	91,179	304	176	1,089	92,444
112		Dec	1,824	58,009	59,833	63,934	127,563	411	246	1,524	129,333

2013 TCAP: SDG&E Consolidated Gas Demand Forecast Summary (Mtherms)

MONTHLY FORECAST DATA

Row	Year	Month	EG (<3MMThms)	EG (>=3MMThms)	EG (Total)	Noncore Total	System-Wide Total End-Use Dmd	System Total (Mdth/d)	Co-Use-Fuel	"Un-Acnt'd-For" (UAF)	Total System Throughput
	A	B	S	T	U	V	W	Y	AA	AB	AC
59			ratiion								
113											
114	2014	Jan	1,774	37,572	39,347	43,257	105,189	339	203	1,257	106,649
115		Feb	1,653	35,098	36,751	40,702	96,550	345	186	1,154	97,889
116		Mar	1,557	37,632	39,189	43,187	95,224	307	183	1,138	96,545
117		Apr	2,376	38,826	41,202	45,214	89,634	299	173	1,071	90,877
118		May	2,298	38,277	40,575	44,626	80,386	259	155	960	81,501
119		Jun	2,835	51,065	53,900	57,990	87,355	291	168	1,044	88,567
120		Jul	5,351	80,596	85,947	90,062	117,977	381	227	1,410	119,614
121		Aug	6,218	81,281	87,499	91,612	118,907	384	229	1,421	120,557
122		Sep	4,311	77,443	81,754	85,856	113,627	379	219	1,358	115,204
123		Oct	2,886	51,544	54,431	58,544	89,799	290	173	1,073	91,045
124		Nov	2,469	40,900	43,370	47,492	92,728	309	179	1,108	94,015
125		Dec	2,296	59,174	61,470	65,596	129,042	416	249	1,542	130,832
126											
127	2015	Jan	2,728	37,593	40,322	44,251	105,928	342	204	1,266	107,398
128		Feb	2,328	34,825	37,153	41,124	96,709	345	186	1,155	98,051
129		Mar	2,704	37,095	39,798	43,815	95,631	308	184	1,143	96,958
130		Apr	3,322	36,872	40,194	44,223	88,425	295	170	1,057	89,652
131		May	3,124	36,922	40,046	44,115	79,668	257	153	952	80,774
132		Jun	3,880	49,358	53,238	57,347	86,524	288	167	1,034	87,724
133		Jul	6,059	81,137	87,195	91,328	119,063	384	229	1,423	120,715
134		Aug	6,657	81,324	87,981	92,111	119,236	385	230	1,425	120,890
135		Sep	5,095	77,604	82,699	86,818	114,407	381	220	1,367	115,994
136		Oct	5,450	50,628	56,077	60,207	91,279	294	176	1,091	92,546
137		Nov	4,914	39,094	44,007	48,146	93,158	311	179	1,113	94,451
138		Dec	2,682	58,975	61,657	65,800	129,000	416	249	1,541	130,789
139											
140	2016	Jan	2,871	37,921	40,793	44,738	106,268	343	205	1,270	107,742
141		Feb	2,109	35,557	37,666	41,653	97,078	335	187	1,160	98,425
142		Mar	2,253	37,753	40,007	44,040	95,728	309	184	1,144	97,057
143		Apr	2,692	38,219	40,911	44,957	89,024	297	172	1,064	90,259
144		May	3,072	38,230	41,303	45,388	80,806	261	156	965	81,927
145		Jun	3,821	51,021	54,842	58,968	88,018	293	170	1,052	89,239
146		Jul	6,120	81,472	87,591	91,741	119,354	385	230	1,426	121,010
147		Aug	6,859	81,807	88,666	92,813	119,825	387	231	1,432	121,487
148		Sep	5,693	77,940	83,633	87,769	115,235	384	222	1,377	116,834
149		Oct	4,304	51,075	55,380	59,526	90,478	292	174	1,081	91,734
150		Nov	3,285	39,985	43,270	47,425	92,298	308	178	1,103	93,578
151		Dec	2,742	60,228	62,971	67,130	130,193	420	251	1,556	132,000

2013 TCAP: SDG&E Consolidated Gas Demand Forecast Summary (Mtherms)

Row	A	B	C	F	G	I	J	L	M	N
154					Nonresidential Core		Total		Noncore - C&I	
155				Residential	GN-3	G-NGV	Core	C&I (Dist.)	C&I (Trans.)	**C&I (Total)**
156	**Average Year Sales (Mth)**									
157	2010	Jan	31	41,211	16,818	246	**58,274**	0	0	**0**
158		Feb	28	35,403	16,611	257	**52,271**	0	0	**0**
159		Mar	31	34,089	14,512	250	**48,851**	0	0	**0**
160		Apr	30	27,186	13,875	263	**41,324**	0	0	**0**
161		May	31	20,144	12,617	296	**33,057**	0	0	**0**
162		Jun	30	15,227	11,350	253	**26,830**	0	0	**0**
163		Jul	31	14,371	10,873	232	**25,475**	0	0	**0**
164		Aug	31	14,299	10,392	234	**24,925**	0	0	**0**
165		Sep	30	13,961	11,030	272	**25,263**	0	0	**0**
166		Oct	31	17,160	11,284	264	**28,708**	0	0	**0**
167		Nov	30	27,659	14,191	274	**42,124**	0	0	**0**
168		Dec	31	42,868	16,610	265	**59,743**	0	0	**0**
169										
170	2011	Jan	31	42,340	16,663	253	**59,256**	0	0	**0**
171		Feb	28	36,373	16,459	265	**53,096**	0	0	**0**
172		Mar	31	35,023	14,380	257	**49,660**	0	0	**0**
173		Apr	30	27,931	13,749	271	**41,950**	0	0	**0**
174		May	31	20,696	12,502	305	**33,503**	0	0	**0**
175		Jun	30	15,644	11,247	260	**27,152**	0	0	**0**
176		Jul	31	14,764	10,774	239	**25,777**	0	0	**0**
177		Aug	31	14,690	10,298	241	**25,230**	0	0	**0**
178		Sep	30	14,344	10,930	280	**25,553**	0	0	**0**
179		Oct	31	17,630	11,181	272	**29,083**	0	0	**0**
180		Nov	30	28,417	14,060	283	**42,760**	0	0	**0**
181		Dec	31	44,042	16,456	273	**60,772**	0	0	**0**
182										
183	2012	Jan	31	42,307	16,418	261	**58,985**	0	0	**0**
184		Feb	29	36,344	16,216	272	**52,833**	0	0	**0**
185		Mar	31	34,996	14,168	265	**49,429**	0	0	**0**
186		Apr	30	27,909	13,547	279	**41,735**	0	0	**0**
187		May	31	20,680	12,319	314	**33,313**	0	0	**0**
188		Jun	30	15,632	11,083	268	**26,983**	0	0	**0**
189		Jul	31	14,753	10,617	246	**25,615**	0	0	**0**
190		Aug	31	14,679	10,148	249	**25,075**	0	0	**0**
191		Sep	30	14,332	10,770	288	**25,391**	0	0	**0**
192		Oct	31	17,616	11,017	280	**28,913**	0	0	**0**
193		Nov	30	28,395	13,853	291	**42,539**	0	0	**0**
194		Dec	31	44,008	16,213	282	**60,503**	0	0	**0**
195										
196	2013	Jan	31	41,660	16,214	268	**58,143**	0	0	**0**
197		Feb	28	35,789	16,015	281	**52,085**	0	0	**0**
198		Mar	31	34,461	13,993	273	**48,727**	0	0	**0**
199		Apr	30	27,482	13,380	288	**41,150**	0	0	**0**
200		May	31	20,364	12,168	323	**32,855**	0	0	**0**
201		Jun	30	15,393	10,947	276	**26,617**	0	0	**0**
202		Jul	31	14,527	10,486	253	**25,267**	0	0	**0**
203		Aug	31	14,455	10,024	256	**24,735**	0	0	**0**
204		Sep	30	14,113	10,638	297	**25,048**	0	0	**0**
205		Oct	31	17,347	10,881	289	**28,516**	0	0	**0**
206		Nov	30	27,961	13,682	300	**41,942**	0	0	**0**
207		Dec	31	43,335	16,010	290	**59,636**	0	0	**0**

2013 TCAP: SDG&E Consolidated Gas Demand Forecast Summary (Mtherms)

	A	B	C	F	G	I	J	L	M	N
154					Nonresidential Core		Total		Noncore - C&I	
155				Residential	GN-3	G-NGV	Core	C&I (Dist.)	C&I (Trans.)	C&I (Total)
156	**Average Year Sales (Mth)**									
208										
209	2014	Jan	31	41,708	15,993	276	**57,978**	0	0	**0**
210		Feb	28	35,830	15,797	289	**51,917**	0	0	**0**
211		Mar	31	34,501	13,804	281	**48,585**	0	0	**0**
212		Apr	30	27,514	13,198	296	**41,009**	0	0	**0**
213		May	31	20,387	12,004	333	**32,724**	0	0	**0**
214		Jun	30	15,411	10,799	285	**26,495**	0	0	**0**
215		Jul	31	14,544	10,345	261	**25,150**	0	0	**0**
216		Aug	31	14,471	9,889	264	**24,624**	0	0	**0**
217		Sep	30	14,130	10,494	306	**24,930**	0	0	**0**
218		Oct	31	17,367	10,733	297	**28,397**	0	0	**0**
219		Nov	30	27,993	13,496	309	**41,798**	0	0	**0**
220		Dec	31	43,385	15,792	299	**59,476**	0	0	**0**
221										
222	2015	Jan	31	41,792	15,687	285	**57,763**	0	0	**0**
223		Feb	28	35,902	15,495	298	**51,694**	0	0	**0**
224		Mar	31	34,570	13,539	289	**48,398**	0	0	**0**
225		Apr	30	27,569	12,946	305	**40,820**	0	0	**0**
226		May	31	20,428	11,774	343	**32,545**	0	0	**0**
227		Jun	30	15,442	10,593	293	**26,328**	0	0	**0**
228		Jul	31	14,573	10,147	269	**24,989**	0	0	**0**
229		Aug	31	14,500	9,700	272	**24,472**	0	0	**0**
230		Sep	30	14,158	10,294	315	**24,767**	0	0	**0**
231		Oct	31	17,402	10,528	306	**28,236**	0	0	**0**
232		Nov	30	28,049	13,237	318	**41,604**	0	0	**0**
233		Dec	31	43,472	15,489	308	**59,269**	0	0	**0**
234										
235	2016	Jan	31	41,918	15,435	293	**57,646**	0	0	**0**
236		Feb	29	36,010	15,246	307	**51,563**	0	0	**0**
237		Mar	31	34,674	13,322	298	**48,295**	0	0	**0**
238		Apr	30	27,652	12,739	314	**40,705**	0	0	**0**
239		May	31	20,490	11,586	353	**32,429**	0	0	**0**
240		Jun	30	15,488	10,424	302	**26,214**	0	0	**0**
241		Jul	31	14,617	9,985	277	**24,879**	0	0	**0**
242		Aug	31	14,544	9,546	280	**24,369**	0	0	**0**
243		Sep	30	14,201	10,129	324	**24,654**	0	0	**0**
244		Oct	31	17,454	10,359	316	**28,129**	0	0	**0**
245		Nov	30	28,134	13,025	328	**41,486**	0	0	**0**
246		Dec	31	43,603	15,239	317	**59,159**	0	0	**0**

2013 TCAP: SDG&E Consolidated Gas Demand Forecast Summary (Mtherms)

Row				Noncore - Electric Generatiion							Noncore	System-Wide	System Total
155				EG-Dist. (<3MMThms)	EG-Trans. (<3MMThms)	EG-Dist. (>=3MMThms)	EG-Trans. (>=3MMThms)	**EG (<3MMThms)**	**EG (>=3MMThms)**	**EG (Total)**	**Total**	**Total End-Use Dmd**	**(Mdth/d)**
156	**Average Year Sales (Mth)**												
157	2010	Jan	31	0	0	0	0	**0**	**0**	**0**	**0**	**58,274**	**188**
158		Feb	28	0	0	0	0	**0**	**0**	**0**	**0**	**52,271**	**187**
159		Mar	31	0	0	0	0	**0**	**0**	**0**	**0**	**48,851**	**158**
160		Apr	30	0	0	0	0	**0**	**0**	**0**	**0**	**41,324**	**138**
161		May	31	0	0	0	0	**0**	**0**	**0**	**0**	**33,057**	**107**
162		Jun	30	0	0	0	0	**0**	**0**	**0**	**0**	**26,830**	**89**
163		Jul	31	0	0	0	0	**0**	**0**	**0**	**0**	**25,475**	**82**
164		Aug	31	0	0	0	0	**0**	**0**	**0**	**0**	**24,925**	**80**
165		Sep	30	0	0	0	0	**0**	**0**	**0**	**0**	**25,263**	**84**
166		Oct	31	0	0	0	0	**0**	**0**	**0**	**0**	**28,708**	**93**
167		Nov	30	0	0	0	0	**0**	**0**	**0**	**0**	**42,124**	**140**
168		Dec	31	0	0	0	0	**0**	**0**	**0**	**0**	**59,743**	**193**
169													
170	2011	Jan	31	0	0	0	0	**0**	**0**	**0**	**0**	**59,256**	**191**
171		Feb	28	0	0	0	0	**0**	**0**	**0**	**0**	**53,096**	**190**
172		Mar	31	0	0	0	0	**0**	**0**	**0**	**0**	**49,660**	**160**
173		Apr	30	0	0	0	0	**0**	**0**	**0**	**0**	**41,950**	**140**
174		May	31	0	0	0	0	**0**	**0**	**0**	**0**	**33,503**	**108**
175		Jun	30	0	0	0	0	**0**	**0**	**0**	**0**	**27,152**	**91**
176		Jul	31	0	0	0	0	**0**	**0**	**0**	**0**	**25,777**	**83**
177		Aug	31	0	0	0	0	**0**	**0**	**0**	**0**	**25,230**	**81**
178		Sep	30	0	0	0	0	**0**	**0**	**0**	**0**	**25,553**	**85**
179		Oct	31	0	0	0	0	**0**	**0**	**0**	**0**	**29,083**	**94**
180		Nov	30	0	0	0	0	**0**	**0**	**0**	**0**	**42,760**	**143**
181		Dec	31	0	0	0	0	**0**	**0**	**0**	**0**	**60,772**	**196**
182													
183	2012	Jan	31	0	0	0	0	**0**	**0**	**0**	**0**	**58,985**	**190**
184		Feb	29	0	0	0	0	**0**	**0**	**0**	**0**	**52,833**	**182**
185		Mar	31	0	0	0	0	**0**	**0**	**0**	**0**	**49,429**	**159**
186		Apr	30	0	0	0	0	**0**	**0**	**0**	**0**	**41,735**	**139**
187		May	31	0	0	0	0	**0**	**0**	**0**	**0**	**33,313**	**107**
188		Jun	30	0	0	0	0	**0**	**0**	**0**	**0**	**26,983**	**90**
189		Jul	31	0	0	0	0	**0**	**0**	**0**	**0**	**25,615**	**83**
190		Aug	31	0	0	0	0	**0**	**0**	**0**	**0**	**25,075**	**81**
191		Sep	30	0	0	0	0	**0**	**0**	**0**	**0**	**25,391**	**85**
192		Oct	31	0	0	0	0	**0**	**0**	**0**	**0**	**28,913**	**93**
193		Nov	30	0	0	0	0	**0**	**0**	**0**	**0**	**42,539**	**142**
194		Dec	31	0	0	0	0	**0**	**0**	**0**	**0**	**60,503**	**195**
195													
196	2013	Jan	31	0	0	0	0	**0**	**0**	**0**	**0**	**58,143**	**188**
197		Feb	28	0	0	0	0	**0**	**0**	**0**	**0**	**52,085**	**186**
198		Mar	31	0	0	0	0	**0**	**0**	**0**	**0**	**48,727**	**157**
199		Apr	30	0	0	0	0	**0**	**0**	**0**	**0**	**41,150**	**137**
200		May	31	0	0	0	0	**0**	**0**	**0**	**0**	**32,855**	**106**
201		Jun	30	0	0	0	0	**0**	**0**	**0**	**0**	**26,617**	**89**
202		Jul	31	0	0	0	0	**0**	**0**	**0**	**0**	**25,267**	**82**
203		Aug	31	0	0	0	0	**0**	**0**	**0**	**0**	**24,735**	**80**
204		Sep	30	0	0	0	0	**0**	**0**	**0**	**0**	**25,048**	**83**
205		Oct	31	0	0	0	0	**0**	**0**	**0**	**0**	**28,516**	**92**
206		Nov	30	0	0	0	0	**0**	**0**	**0**	**0**	**41,942**	**140**
207		Dec	31	0	0	0	0	**0**	**0**	**0**	**0**	**59,636**	**192**

2013 TCAP: SDG&E Consolidated Gas Demand Forecast Summary (Mtherms)

	A	B	C	D	E	O	P	Q	R	S	T	U	V	W	X	Y
154						Noncore - Electric Generatiion							Noncore	System-Wide		**System Total**
155						EG-Dist. (<3MMThms)	EG-Trans. (<3MMThms)	EG-Dist. (>=3MMThms)	EG-Trans. (>=3MMThms)	**EG (<3MMThms)**	**EG (>=3MMThms)**	**EG (Total)**	**Total**	**Total End-Use Dmd**		**(Mdth/d)**
156	**Average Year Sales (Mth)**															
208																
209	2014	Jan	31			0	0	0	0	**0**	**0**	**0**	**0**	**57,978**		**187**
210		Feb	28			0	0	0	0	**0**	**0**	**0**	**0**	**51,917**		**185**
211		Mar	31			0	0	0	0	**0**	**0**	**0**	**0**	**48,585**		**157**
212		Apr	30			0	0	0	0	**0**	**0**	**0**	**0**	**41,009**		**137**
213		May	31			0	0	0	0	**0**	**0**	**0**	**0**	**32,724**		**106**
214		Jun	30			0	0	0	0	**0**	**0**	**0**	**0**	**26,495**		**88**
215		Jul	31			0	0	0	0	**0**	**0**	**0**	**0**	**25,150**		**81**
216		Aug	31			0	0	0	0	**0**	**0**	**0**	**0**	**24,624**		**79**
217		Sep	30			0	0	0	0	**0**	**0**	**0**	**0**	**24,930**		**83**
218		Oct	31			0	0	0	0	**0**	**0**	**0**	**0**	**28,397**		**92**
219		Nov	30			0	0	0	0	**0**	**0**	**0**	**0**	**41,798**		**139**
220		Dec	31			0	0	0	0	**0**	**0**	**0**	**0**	**59,476**		**192**
221																
222	2015	Jan	31			0	0	0	0	**0**	**0**	**0**	**0**	**57,763**		**186**
223		Feb	28			0	0	0	0	**0**	**0**	**0**	**0**	**51,694**		**185**
224		Mar	31			0	0	0	0	**0**	**0**	**0**	**0**	**48,398**		**156**
225		Apr	30			0	0	0	0	**0**	**0**	**0**	**0**	**40,820**		**136**
226		May	31			0	0	0	0	**0**	**0**	**0**	**0**	**32,545**		**105**
227		Jun	30			0	0	0	0	**0**	**0**	**0**	**0**	**26,328**		**88**
228		Jul	31			0	0	0	0	**0**	**0**	**0**	**0**	**24,989**		**81**
229		Aug	31			0	0	0	0	**0**	**0**	**0**	**0**	**24,472**		**79**
230		Sep	30			0	0	0	0	**0**	**0**	**0**	**0**	**24,767**		**83**
231		Oct	31			0	0	0	0	**0**	**0**	**0**	**0**	**28,236**		**91**
232		Nov	30			0	0	0	0	**0**	**0**	**0**	**0**	**41,604**		**139**
233		Dec	31			0	0	0	0	**0**	**0**	**0**	**0**	**59,269**		**191**
234																
235	2016	Jan	31			0	0	0	0	**0**	**0**	**0**	**0**	**57,646**		**186**
236		Feb	29			0	0	0	0	**0**	**0**	**0**	**0**	**51,563**		**184**
237		Mar	31			0	0	0	0	**0**	**0**	**0**	**0**	**48,295**		**156**
238		Apr	30			0	0	0	0	**0**	**0**	**0**	**0**	**40,705**		**136**
239		May	31			0	0	0	0	**0**	**0**	**0**	**0**	**32,429**		**105**
240		Jun	30			0	0	0	0	**0**	**0**	**0**	**0**	**26,214**		**87**
241		Jul	31			0	0	0	0	**0**	**0**	**0**	**0**	**24,879**		**80**
242		Aug	31			0	0	0	0	**0**	**0**	**0**	**0**	**24,369**		**79**
243		Sep	30			0	0	0	0	**0**	**0**	**0**	**0**	**24,654**		**82**
244		Oct	31			0	0	0	0	**0**	**0**	**0**	**0**	**28,129**		**91**
245		Nov	30			0	0	0	0	**0**	**0**	**0**	**0**	**41,486**		**138**
246		Dec	31			0	0	0	0	**0**	**0**	**0**	**0**	**59,159**		**191**

2013 TCAP: SDG&E
Consolidated Gas Demand
Forecast Summary (Mtherms)

MONTHLY FORECAST DATA

Row			Residential	Nonresidential Core: GN-3	Nonresidential Core: G-NGV	Total Core	Noncore - C&I: C&I (Dist.)	Noncore - C&I: C&I (Trans.)	Noncore - C&I: C&I (Total)	Noncore - Electric Gene: EG-Dist. (<3MMThms)	EG-Trans. (<3MMThms)	EG-Dist. (>=3MMThms)	EG-Trans. (>=3MMThms)
251	**Cold Year Throughput (Mth)**												
252	2010	Jan	48,231	21,862	845	**70,939**	2,532	1,137	**3,670**	1,733	358	6,404	61,317
253		Feb	41,245	21,547	879	**63,671**	2,477	1,112	**3,589**	1,579	247	6,413	52,240
254		Mar	39,160	18,341	804	**58,304**	2,308	1,036	**3,344**	1,460	109	5,913	50,565
255		Apr	30,505	17,369	899	**48,773**	2,512	1,128	**3,640**	1,646	106	6,900	53,008
256		May	21,388	15,445	822	**37,655**	2,382	1,069	**3,451**	1,494	274	5,931	45,366
257		Jun	15,258	13,511	854	**29,623**	2,693	1,209	**3,902**	1,401	201	5,376	41,592
258		Jul	14,027	12,805	823	**27,654**	2,641	1,186	**3,827**	1,778	639	5,479	27,949
259		Aug	13,934	14,110	822	**28,866**	2,661	1,195	**3,855**	2,074	795	5,779	43,057
260		Sep	13,640	13,057	904	**27,601**	2,657	1,193	**3,851**	2,092	543	6,073	48,251
261		Oct	17,584	13,410	863	**31,856**	2,593	1,165	**3,758**	1,769	695	5,459	41,310
262		Nov	31,092	17,847	882	**49,821**	2,794	1,255	**4,048**	2,070	468	5,649	42,295
263		Dec	50,345	21,545	912	**72,802**	2,608	1,171	**3,780**	1,687	552	5,534	47,360
264													
265	2011	Jan	49,553	21,662	871	**72,085**	2,497	1,121	**3,618**	1,327	1,528	5,479	25,259
266		Feb	42,375	21,349	905	**64,630**	2,536	1,139	**3,675**	1,343	416	5,704	22,180
267		Mar	40,232	18,173	828	**59,234**	2,576	1,157	**3,733**	1,380	733	5,862	23,884
268		Apr	31,341	17,210	926	**49,477**	2,593	1,164	**3,757**	1,434	1,718	5,935	25,184
269		May	21,973	15,305	847	**38,126**	2,627	1,180	**3,807**	1,487	2,919	6,042	27,347
270		Jun	15,676	13,389	879	**29,944**	2,661	1,195	**3,856**	1,554	2,386	6,136	38,596
271		Jul	14,411	12,689	847	**27,947**	2,685	1,206	**3,890**	1,762	4,970	6,174	70,104
272		Aug	14,316	13,980	847	**29,144**	2,692	1,209	**3,900**	1,780	5,806	6,192	72,390
273		Sep	14,014	12,939	931	**27,883**	2,692	1,209	**3,901**	1,635	4,399	6,188	67,901
274		Oct	18,065	13,287	889	**32,241**	2,709	1,216	**3,925**	1,504	4,071	6,207	41,036
275		Nov	31,944	17,684	908	**50,536**	2,720	1,221	**3,941**	1,512	4,125	6,238	32,761
276		Dec	51,724	21,345	940	**74,009**	2,727	1,225	**3,952**	1,502	1,641	6,258	49,258
277													
278	2012	Jan	49,514	21,342	897	**71,753**	2,604	1,169	**3,773**	1,406	1,159	5,935	28,490
279		Feb	42,342	21,035	933	**64,309**	2,634	1,183	**3,817**	1,425	336	6,029	25,656
280		Mar	40,201	17,907	853	**58,960**	2,668	1,198	**3,866**	1,438	1,565	6,119	28,178
281		Apr	31,316	16,958	954	**49,228**	2,678	1,202	**3,880**	1,452	2,577	6,158	28,957
282		May	21,956	15,082	872	**37,910**	2,708	1,216	**3,924**	1,502	2,535	6,248	27,973
283		Jun	15,664	13,193	906	**29,763**	2,739	1,230	**3,969**	1,587	2,817	6,334	41,141
284		Jul	14,400	12,503	873	**27,776**	2,760	1,239	**4,000**	1,748	5,410	6,365	72,593
285		Aug	14,305	13,775	872	**28,953**	2,763	1,241	**4,004**	1,794	5,946	6,380	71,998
286		Sep	14,003	12,750	959	**27,711**	2,761	1,240	**4,001**	1,676	4,343	6,374	68,363
287		Oct	18,051	13,092	916	**32,059**	2,773	1,245	**4,018**	1,587	4,978	6,390	41,398
288		Nov	31,919	17,424	935	**50,278**	2,783	1,250	**4,033**	1,622	5,361	6,422	33,591
289		Dec	51,683	21,030	968	**73,682**	2,791	1,253	**4,044**	1,541	1,368	6,445	49,638
290													
291	2013	Jan	48,757	21,077	924	**70,758**	2,667	1,197	**3,864**	1,452	819	6,121	30,730
292		Feb	41,695	20,774	961	**63,429**	2,697	1,211	**3,907**	1,465	587	6,214	28,361
293		Mar	39,587	17,686	878	**58,151**	2,730	1,226	**3,956**	1,484	786	6,305	30,449
294		Apr	30,837	16,749	982	**48,569**	2,741	1,231	**3,972**	1,502	1,863	6,344	31,910
295		May	21,621	14,897	898	**37,417**	2,769	1,243	**4,012**	1,528	1,354	6,431	32,003
296		Jun	15,425	13,032	933	**29,390**	2,797	1,256	**4,053**	1,574	1,321	6,514	45,962
297		Jul	14,180	12,351	899	**27,430**	2,816	1,264	**4,080**	1,661	2,630	6,542	74,680
298		Aug	14,086	13,605	899	**28,590**	2,816	1,264	**4,080**	1,682	3,468	6,552	74,340
299		Sep	13,789	12,594	988	**27,370**	2,810	1,262	**4,072**	1,643	2,700	6,539	70,834
300		Oct	17,775	12,930	943	**31,649**	2,819	1,266	**4,085**	1,538	691	6,549	45,013
301		Nov	31,431	17,207	963	**49,602**	2,826	1,269	**4,096**	1,545	298	6,575	33,267
302		Dec	50,894	20,767	997	**72,657**	2,830	1,271	**4,101**	1,549	275	6,592	51,417

2013 TCAP: SDG&E Consolidated Gas Demand Forecast Summary (Mtherms)

Row	*MONTHLY FORECAST DATA*			Nonresidential Core		Total	Noncore - C&I			Noncore - Electric Gene			
60			Residential	GN-3	G-NGV	**Core**	C&I (Dist.)	C&I (Trans.)	**C&I (Total)**	EG-Dist. (<3MMThms)	EG-Trans. (<3MMThms)	EG-Dist. (>=3MMThms)	EG-Trans. (>=3MMThms)
303													
304	2014	Jan	48,814	20,790	951	**70,555**	2,698	1,212	**3,910**	1,469	305	6,253	31,319
305		Feb	41,743	20,491	989	**63,223**	2,727	1,224	**3,951**	1,490	163	6,345	28,753
306		Mar	39,632	17,446	905	**57,983**	2,759	1,239	**3,998**	1,512	45	6,435	31,197
307		Apr	30,873	16,522	1,012	**48,407**	2,769	1,243	**4,012**	1,549	827	6,473	32,353
308		May	21,646	14,696	925	**37,268**	2,796	1,255	**4,051**	1,552	746	6,559	31,719
309		Jun	15,443	12,857	961	**29,260**	2,823	1,268	**4,091**	1,581	1,254	6,641	44,424
310		Jul	14,196	12,184	926	**27,307**	2,840	1,275	**4,115**	1,619	3,733	6,666	73,930
311		Aug	14,103	13,420	926	**28,449**	2,838	1,274	**4,113**	1,655	4,563	6,673	74,608
312		Sep	13,805	12,424	1,017	**27,246**	2,831	1,271	**4,102**	1,618	2,693	6,657	70,786
313		Oct	17,796	12,755	971	**31,522**	2,839	1,275	**4,114**	1,565	1,321	6,663	44,882
314		Nov	31,468	16,974	992	**49,434**	2,845	1,277	**4,122**	1,571	898	6,687	34,213
315		Dec	50,952	20,483	1,027	**72,462**	2,847	1,278	**4,126**	1,577	719	6,701	52,472
316													
317	2015	Jan	48,911	20,392	980	**70,283**	2,712	1,218	**3,929**	1,492	1,236	6,353	31,241
318		Feb	41,826	20,098	1,019	**62,944**	2,740	1,230	**3,970**	1,517	812	6,445	28,380
319		Mar	39,712	17,112	932	**57,756**	2,772	1,245	**4,017**	1,535	1,169	6,535	30,560
320		Apr	30,935	16,206	1,042	**48,183**	2,781	1,249	**4,030**	1,549	1,773	6,572	30,300
321		May	21,689	14,416	953	**37,058**	2,808	1,261	**4,069**	1,567	1,558	6,658	30,265
322		Jun	15,473	12,611	990	**29,074**	2,835	1,273	**4,109**	1,618	2,262	6,740	42,618
323		Jul	14,225	11,952	954	**27,130**	2,852	1,281	**4,133**	1,653	4,406	6,764	74,373
324		Aug	14,131	13,164	953	**28,248**	2,850	1,280	**4,130**	1,678	4,979	6,770	74,554
325		Sep	13,832	12,187	1,048	**27,067**	2,843	1,276	**4,119**	1,673	3,421	6,752	70,852
326		Oct	17,832	12,511	1,001	**31,343**	2,850	1,280	**4,130**	1,610	3,840	6,756	43,872
327		Nov	31,531	16,648	1,022	**49,201**	2,856	1,282	**4,139**	1,596	3,318	6,781	32,313
328		Dec	51,054	20,090	1,058	**72,202**	2,859	1,284	**4,143**	1,599	1,083	6,795	52,180
329													
330	2016	Jan	49,059	20,064	1,009	**70,132**	2,723	1,223	**3,945**	1,522	1,350	6,442	31,480
331		Feb	41,953	19,776	1,050	**62,778**	2,751	1,235	**3,987**	1,538	571	6,535	29,022
332		Mar	39,831	16,838	960	**57,629**	2,784	1,250	**4,034**	1,557	697	6,627	31,126
333		Apr	31,028	15,947	1,073	**48,049**	2,793	1,254	**4,046**	1,571	1,121	6,665	31,554
334		May	21,754	14,186	982	**36,922**	2,820	1,266	**4,086**	1,589	1,483	6,752	31,478
335		Jun	15,520	12,410	1,019	**28,950**	2,847	1,278	**4,126**	1,630	2,192	6,836	44,184
336		Jul	14,268	11,761	982	**27,011**	2,864	1,286	**4,149**	1,682	4,437	6,862	74,610
337		Aug	14,173	12,953	982	**28,108**	2,862	1,285	**4,147**	1,718	5,140	6,868	74,939
338		Sep	13,874	11,993	1,079	**26,946**	2,854	1,282	**4,136**	1,719	3,974	6,851	71,089
339		Oct	17,885	12,311	1,031	**31,227**	2,862	1,285	**4,147**	1,610	2,694	6,856	44,220
340		Nov	31,626	16,381	1,053	**49,060**	2,868	1,288	**4,155**	1,625	1,660	6,880	33,105
341		Dec	51,208	19,766	1,089	**72,063**	2,870	1,289	**4,159**	1,622	1,120	6,894	53,334
342													
343													

Row		Nonresidential Core			Total	Noncore - C&I			Noncore - Electric Gene			
345	**Peak Day Thrughput (Mth/Day)**	Residential	GN-3	G-NGV	**Core**	C&I (Dist.)	C&I (Trans.)	**C&I (Total)**	EG-Dist. (<3MMThms)	EG-Trans. (<3MMThms)	EG-Dist. (>=3MMThms)	EG-Trans. (>=3MMThms)
346	2,010	2,769	930	29.4	**3,728**	84	38	**122**	79	59	179	1,512
347	2,011	2,844	922	30.3	**3,796**	88	40	**127**	51	174	202	1,572
348	2,012	2,842	908	31.2	**3,781**	90	40	**130**	52	88	208	1,814
349	2,013	2,799	896	32.2	**3,727**	91	41	**132**	50	26	213	1,824
350	2,014	2,802	884	33.1	**3,719**	92	41	**133**	51	14	216	1,851
351	2,015	2,808	867	34.1	**3,709**	92	41	**134**	51	98	219	1,363
352	2,016	2,816	853	35.1	**3,704**	93	42	**134**	52	108	222	1,650

2013 TCAP: SDG&E Consolidated Gas Demand Forecast Summary (Mtherms)

Row	A	B	S	T	U	V	W	Y	AA	AB	AC
59	***MONTHLY FORECAST DATA***		ratiion			Noncore	System-Wide	System Total			Total
60			EG (<3MMThms)	EG (>=3MMThms)	EG (Total)	Total	Total End-Use Dmd	(Mdth/d)	Co-Use-Fuel	"Un-Acnt'd-For" (UAF)	System Throughput
251	**Cold Year Throughput (Mth)**										
252	2010	Jan	2,091	67,721	69,812	73,481	144,420	466	278	1,726	146,424
253		Feb	1,827	58,653	60,479	64,068	127,739	456	246	1,526	129,512
254		Mar	1,569	56,478	58,047	61,391	119,696	386	231	1,430	121,356
255		Apr	1,752	59,907	61,659	65,300	114,072	380	220	1,363	115,655
256		May	1,769	51,297	53,066	56,517	94,172	304	181	1,125	95,478
257		Jun	1,602	46,968	48,569	52,471	82,094	274	158	981	83,233
258		Jul	2,417	33,427	35,844	39,672	67,326	217	130	804	68,260
259		Aug	2,869	48,836	51,705	55,560	84,427	272	163	1,009	85,598
260		Sep	2,635	54,324	56,959	60,810	88,411	295	170	1,056	89,637
261		Oct	2,464	46,769	49,234	52,992	84,848	274	163	1,014	86,025
262		Nov	2,538	47,944	50,482	54,531	104,352	348	201	1,247	105,800
263		Dec	2,239	52,894	55,133	58,912	131,714	425	254	1,574	133,542
264											
265	2011	Jan	2,856	30,738	33,594	37,212	109,297	353	211	1,306	110,813
266		Feb	1,759	27,883	29,642	33,317	97,947	350	189	1,170	99,306
267		Mar	2,113	29,746	31,858	35,591	94,825	306	183	1,133	96,141
268		Apr	3,152	31,119	34,271	38,028	87,505	292	169	1,046	88,719
269		May	4,406	33,389	37,795	41,602	79,727	257	154	953	80,833
270		Jun	3,940	44,732	48,672	52,529	82,473	275	159	985	83,617
271		Jul	6,732	76,279	83,011	86,901	114,849	370	221	1,372	116,442
272		Aug	7,586	78,581	86,167	90,067	119,211	385	230	1,424	120,865
273		Sep	6,034	74,089	80,123	84,024	111,908	373	216	1,337	113,460
274		Oct	5,576	47,243	52,819	56,744	88,986	287	171	1,063	90,220
275		Nov	5,636	38,999	44,635	48,576	99,112	330	191	1,184	100,487
276		Dec	3,144	55,516	58,660	62,611	136,620	441	263	1,632	138,516
277											
278	2012	Jan	2,565	34,425	36,989	40,762	112,515	363	217	1,344	114,076
279		Feb	1,760	31,684	33,444	37,261	101,571	350	196	1,214	102,980
280		Mar	3,002	34,297	37,300	41,165	100,126	323	193	1,196	101,515
281		Apr	4,029	35,116	39,145	43,025	92,253	308	178	1,102	93,533
282		May	4,037	34,222	38,259	42,183	80,093	258	154	957	81,205
283		Jun	4,404	47,475	51,879	55,849	85,612	285	165	1,023	86,799
284		Jul	7,157	78,958	86,115	90,114	117,891	380	227	1,409	119,526
285		Aug	7,741	78,379	86,119	90,124	119,076	384	229	1,423	120,728
286		Sep	6,019	74,737	80,756	84,757	112,468	375	217	1,344	114,028
287		Oct	6,565	47,788	54,353	58,371	90,430	292	174	1,080	91,685
288		Nov	6,983	40,013	46,996	51,029	101,307	338	195	1,210	102,713
289		Dec	2,909	56,083	58,992	63,036	136,717	441	263	1,634	138,614
290											
291	2013	Jan	2,272	36,851	39,122	42,987	113,745	367	219	1,359	115,323
292		Feb	2,052	34,575	36,627	40,534	103,963	371	200	1,242	105,406
293		Mar	2,269	36,753	39,023	42,978	101,129	326	195	1,208	102,532
294		Apr	3,365	38,254	41,619	45,591	94,160	314	181	1,125	95,466
295		May	2,882	38,435	41,317	45,329	82,746	267	159	989	83,894
296		Jun	2,895	52,476	55,371	59,425	88,814	296	171	1,061	90,047
297		Jul	4,291	81,222	85,513	89,593	117,023	377	225	1,398	118,646
298		Aug	5,150	80,892	86,042	90,122	118,712	383	229	1,418	120,359
299		Sep	4,343	77,373	81,716	85,787	113,158	377	218	1,352	114,728
300		Oct	2,229	51,561	53,790	57,875	89,525	289	172	1,070	90,767
301		Nov	1,842	39,842	41,684	45,780	95,382	318	184	1,140	96,706
302		Dec	1,824	58,009	59,833	63,934	136,591	441	263	1,632	138,486

2013 TCAP: SDG&E Consolidated Gas Demand Forecast Summary (Mtherms)

Row	***MONTHLY FORECAST DATA***		ratiion EG (<3MMThms)	EG (>=3MMThms)	EG (Total)	Noncore Total	System-Wide Total End-Use Dmd	System Total (Mdth/d)	Co-Use-Fuel	"Un-Acnt'd-For" (UAF)	Total System Throughput
303											
304	2014	Jan	1,774	37,572	39,347	43,257	113,812	367	219	1,360	115,391
305		Feb	1,653	35,098	36,751	40,702	103,926	371	200	1,242	105,367
306		Mar	1,557	37,632	39,189	43,187	101,170	326	195	1,209	102,573
307		Apr	2,376	38,826	41,202	45,214	93,622	312	180	1,119	94,920
308		May	2,298	38,277	40,575	44,626	81,894	264	158	978	83,030
309		Jun	2,835	51,065	53,900	57,990	87,250	291	168	1,042	88,461
310		Jul	5,351	80,596	85,947	90,062	117,368	379	226	1,402	118,997
311		Aug	6,218	81,281	87,499	91,612	120,061	387	231	1,435	121,726
312		Sep	4,311	77,443	81,754	85,856	113,102	377	218	1,351	114,671
313		Oct	2,886	51,544	54,431	58,544	90,067	291	174	1,076	91,316
314		Nov	2,469	40,900	43,370	47,492	96,925	323	187	1,158	98,270
315		Dec	2,296	59,174	61,470	65,596	138,058	445	266	1,650	139,973
316											
317	2015	Jan	2,728	37,593	40,322	44,251	114,534	369	221	1,368	116,123
318		Feb	2,328	34,825	37,153	41,124	104,068	372	200	1,243	105,511
319		Mar	2,704	37,095	39,798	43,815	101,571	328	196	1,214	102,980
320		Apr	3,322	36,872	40,194	44,223	92,407	308	178	1,104	93,689
321		May	3,124	36,922	40,046	44,115	81,173	262	156	970	82,299
322		Jun	3,880	49,358	53,238	57,347	86,421	288	166	1,033	87,620
323		Jul	6,059	81,137	87,195	91,328	118,458	382	228	1,415	120,102
324		Aug	6,657	81,324	87,981	92,111	120,359	388	232	1,438	122,029
325		Sep	5,095	77,604	82,699	86,818	113,885	380	219	1,361	115,465
326		Oct	5,450	50,628	56,077	60,207	91,550	295	176	1,094	92,821
327		Nov	4,914	39,094	44,007	48,146	97,347	324	188	1,163	98,698
328		Dec	2,682	58,975	61,657	65,800	138,001	445	266	1,649	139,916
329											
330	2016	Jan	2,871	37,921	40,793	44,738	114,870	371	221	1,372	116,464
331		Feb	2,109	35,557	37,666	41,653	104,430	373	201	1,248	105,879
332		Mar	2,253	37,753	40,007	44,040	101,670	328	196	1,215	103,080
333		Apr	2,692	38,219	40,911	44,957	93,006	310	179	1,111	94,296
334		May	3,072	38,230	41,303	45,388	82,310	266	159	983	83,452
335		Jun	3,821	51,021	54,842	58,968	87,918	293	169	1,050	89,138
336		Jul	6,120	81,472	87,591	91,741	118,752	383	229	1,419	120,399
337		Aug	6,859	81,807	88,666	92,813	120,921	390	233	1,445	122,599
338		Sep	5,693	77,940	83,633	87,769	114,715	382	221	1,371	116,306
339		Oct	4,304	51,075	55,380	59,526	90,753	293	175	1,084	92,012
340		Nov	3,285	39,985	43,270	47,425	96,485	322	186	1,153	97,824
341		Dec	2,742	60,228	62,971	67,130	139,193	449	268	1,663	141,125

Row	**Peak Day Thrughput (Mth/Day)**	ratiion EG (<3MMThms)	EG (>=3MMThms)	EG (Total)	Noncore Total	System-Wide Total End-Use Dmd
346	2,010	138	1,690	1,828	1,950	5,678
347	2,011	225	1,774	1,999	2,126	5,923
348	2,012	140	2,022	2,162	2,293	6,074
349	2,013	76	2,037	2,113	2,245	5,972
350	2,014	65	2,067	2,132	2,265	5,984
351	2,015	150	1,583	1,732	1,866	5,575
352	2,016	160	1,872	2,033	2,167	5,871

2013 TCAP: SDG&E Consolidated Gas Demand Forecast Summary (Mtherms)

MONTHLY FORECAST DATA

Row	A	B	Residential	Nonresidential Core GN-3	Nonresidential Core G-NGV	Total Core	Noncore - C&I C&I (Dist.)	Noncore - C&I C&I (Trans.)	Noncore - C&I C&I (Total)
357	**Forecast Number of Customers**								
358	2010	Jan	815,021	30,087	28	**845,136**	54	9	**63**
359		Feb	815,223	30,075	28	**845,326**	54	9	**63**
360		Mar	815,631	30,071	28	**845,730**	54	9	**63**
361		Apr	816,120	30,082	28	**846,230**	54	9	**63**
362		May	816,638	30,176	28	**846,842**	54	9	**63**
363		Jun	816,655	30,192	28	**846,875**	54	9	**63**
364		Jul	817,087	30,216	28	**847,331**	54	9	**63**
365		Aug	817,674	30,219	28	**847,921**	54	9	**63**
366		Sep	817,821	30,200	28	**848,049**	54	9	**63**
367		Oct	818,451	30,154	28	**848,633**	54	9	**63**
368		Nov	818,828	30,171	28	**849,027**	54	9	**63**
369		Dec	818,928	30,152	28	**849,108**	54	9	**63**
370									
371	2011	Jan	819,616	30,184	30	**849,830**	54	9	**63**
372		Feb	820,304	30,216	30	**850,550**	54	9	**63**
373		Mar	820,992	30,247	30	**851,270**	54	9	**63**
374		Apr	821,349	30,279	30	**851,658**	54	9	**63**
375		May	821,705	30,311	30	**852,046**	54	9	**63**
376		Jun	822,061	30,342	30	**852,434**	54	9	**63**
377		Jul	822,540	30,293	30	**852,863**	54	9	**63**
378		Aug	823,019	30,245	30	**853,293**	54	9	**63**
379		Sep	823,497	30,196	30	**853,723**	54	9	**63**
380		Oct	824,152	30,193	30	**854,375**	54	9	**63**
381		Nov	824,807	30,191	30	**855,028**	54	9	**63**
382		Dec	825,462	30,188	30	**855,680**	54	9	**63**
383									
384	2012	Jan	826,181	30,232	30	**856,443**	54	9	**63**
385		Feb	826,900	30,276	30	**857,206**	54	9	**63**
386		Mar	827,620	30,320	30	**857,970**	54	9	**63**
387		Apr	828,129	30,348	30	**858,507**	54	9	**63**
388		May	828,638	30,376	30	**859,044**	54	9	**63**
389		Jun	829,147	30,404	30	**859,581**	54	9	**63**
390		Jul	829,786	30,354	30	**860,170**	54	9	**63**
391		Aug	830,426	30,303	30	**860,758**	54	9	**63**
392		Sep	831,065	30,252	30	**861,347**	54	9	**63**
393		Oct	831,883	30,249	30	**862,162**	54	9	**63**
394		Nov	832,701	30,246	30	**862,978**	54	9	**63**
395		Dec	833,520	30,243	30	**863,793**	54	9	**63**
396									
397	2013	Jan	834,406	30,288	31	**864,725**	54	9	**63**
398		Feb	835,293	30,333	31	**865,657**	54	9	**63**
399		Mar	836,180	30,377	31	**866,588**	54	9	**63**
400		Apr	836,861	30,406	31	**867,298**	54	9	**63**
401		May	837,541	30,435	31	**868,008**	54	9	**63**
402		Jun	838,222	30,464	31	**868,717**	54	9	**63**
403		Jul	839,039	30,413	31	**869,482**	54	9	**63**
404		Aug	839,855	30,362	31	**870,247**	54	9	**63**
405		Sep	840,671	30,310	31	**871,012**	54	9	**63**
406		Oct	841,666	30,307	31	**872,004**	54	9	**63**
407		Nov	842,660	30,304	31	**872,995**	54	9	**63**
408		Dec	843,654	30,301	31	**873,986**	54	9	**63**

2013 TCAP: SDG&E Consolidated Gas Demand Forecast Summary (Mtherms)

MONTHLY FORECAST DATA

Row	Year	Month	Residential	Nonresidential Core: GN-3	Nonresidential Core: G-NGV	**Total Core**	Noncore - C&I: C&I (Dist.)	Noncore - C&I: C&I (Trans.)	Noncore - C&I: **C&I (Total)**
409									
410	2014	Jan	844,708	30,345	32	**875,085**	54	9	**63**
411		Feb	845,761	30,390	32	**876,183**	54	9	**63**
412		Mar	846,815	30,434	32	**877,281**	54	9	**63**
413		Apr	847,644	30,465	32	**878,140**	54	9	**63**
414		May	848,472	30,495	32	**878,999**	54	9	**63**
415		Jun	849,301	30,525	32	**879,858**	54	9	**63**
416		Jul	850,242	30,475	32	**880,749**	54	9	**63**
417		Aug	851,183	30,424	32	**881,639**	54	9	**63**
418		Sep	852,124	30,374	32	**882,530**	54	9	**63**
419		Oct	853,223	30,371	32	**883,627**	54	9	**63**
420		Nov	854,323	30,369	32	**884,723**	54	9	**63**
421		Dec	855,422	30,366	32	**885,820**	54	9	**63**
422									
423	2015	Jan	856,569	30,411	32	**887,012**	54	9	**63**
424		Feb	857,716	30,457	32	**888,205**	54	9	**63**
425		Mar	858,863	30,502	32	**889,397**	54	9	**63**
426		Apr	859,777	30,534	32	**890,343**	54	9	**63**
427		May	860,691	30,566	32	**891,289**	54	9	**63**
428		Jun	861,605	30,598	32	**892,234**	54	9	**63**
429		Jul	862,625	30,549	32	**893,206**	54	9	**63**
430		Aug	863,645	30,499	32	**894,177**	54	9	**63**
431		Sep	864,666	30,450	32	**895,148**	54	9	**63**
432		Oct	865,828	30,449	32	**896,309**	54	9	**63**
433		Nov	866,991	30,448	32	**897,470**	54	9	**63**
434		Dec	868,153	30,447	32	**898,632**	54	9	**63**
435									
436	2016	Jan	869,348	30,494	32	**899,874**	54	9	**63**
437		Feb	870,543	30,542	32	**901,117**	54	9	**63**
438		Mar	871,738	30,589	32	**902,359**	54	9	**63**
439		Apr	872,685	30,621	32	**903,338**	54	9	**63**
440		May	873,632	30,654	32	**904,317**	54	9	**63**
441		Jun	874,579	30,686	32	**905,297**	54	9	**63**
442		Jul	875,616	30,636	32	**906,284**	54	9	**63**
443		Aug	876,653	30,586	32	**907,272**	54	9	**63**
444		Sep	877,691	30,537	32	**908,260**	54	9	**63**
445		Oct	878,857	30,535	32	**909,424**	54	9	**63**
446		Nov	880,023	30,533	32	**910,588**	54	9	**63**
447		Dec	881,189	30,532	32	**911,752**	54	9	**63**

2013 TCAP: SDG&E Consolidated Gas Demand Forecast Summary (Mtherms)

MONTHLY FORECAST DATA

Row	A	B	Noncore - Electric Generatiion EG-Dist. (<3MMThms)	EG-Trans. (<3MMThms)	EG-Dist. (>=3MMThms)	EG-Trans. (>=3MMThms)	**EG (<3MMThms)**	**EG (>=3MMThms)**	**EG (Total)**	Noncore **Total**	System-Wide **Total End-Use Dmd**
357	**Forecast Number of Customers**										
358	2010	Jan	41	4	6	12	**45**	**18**	**63**	**126**	**845,262**
359		Feb	41	4	6	12	**45**	**18**	**63**	**126**	**845,452**
360		Mar	41	4	6	12	**45**	**18**	**63**	**126**	**845,856**
361		Apr	41	4	6	12	**45**	**18**	**63**	**126**	**846,356**
362		May	41	4	6	12	**45**	**18**	**63**	**126**	**846,968**
363		Jun	41	4	6	12	**45**	**18**	**63**	**126**	**847,001**
364		Jul	41	4	6	12	**45**	**18**	**63**	**126**	**847,457**
365		Aug	41	4	6	12	**45**	**18**	**63**	**126**	**848,047**
366		Sep	41	4	6	12	**45**	**18**	**63**	**126**	**848,175**
367		Oct	41	4	6	12	**45**	**18**	**63**	**126**	**848,759**
368		Nov	41	4	6	12	**45**	**18**	**63**	**126**	**849,153**
369		Dec	41	4	6	12	**45**	**18**	**63**	**126**	**849,234**
370											
371	2011	Jan	40	10	6	8	**50**	**14**	**64**	**127**	**849,957**
372		Feb	40	10	6	8	**50**	**14**	**64**	**127**	**850,677**
373		Mar	40	10	6	8	**50**	**14**	**64**	**127**	**851,397**
374		Apr	40	10	6	8	**50**	**14**	**64**	**127**	**851,785**
375		May	40	11	6	8	**51**	**14**	**65**	**128**	**852,174**
376		Jun	40	11	6	8	**51**	**14**	**65**	**128**	**852,562**
377		Jul	40	11	6	8	**51**	**14**	**65**	**128**	**852,991**
378		Aug	40	11	6	8	**51**	**14**	**65**	**128**	**853,421**
379		Sep	40	11	6	8	**51**	**14**	**65**	**128**	**853,851**
380		Oct	40	11	6	8	**51**	**14**	**65**	**128**	**854,503**
381		Nov	40	11	6	8	**51**	**14**	**65**	**128**	**855,156**
382		Dec	40	11	6	8	**51**	**14**	**65**	**128**	**855,808**
383											
384	2012	Jan	40	11	6	8	**51**	**14**	**65**	**128**	**856,571**
385		Feb	40	11	6	8	**51**	**14**	**65**	**128**	**857,334**
386		Mar	40	11	6	8	**51**	**14**	**65**	**128**	**858,098**
387		Apr	40	11	6	8	**51**	**14**	**65**	**128**	**858,635**
388		May	40	11	6	8	**51**	**14**	**65**	**128**	**859,172**
389		Jun	40	11	6	8	**51**	**14**	**65**	**128**	**859,709**
390		Jul	40	11	6	8	**51**	**14**	**65**	**128**	**860,298**
391		Aug	40	11	6	8	**51**	**14**	**65**	**128**	**860,886**
392		Sep	40	11	6	8	**51**	**14**	**65**	**128**	**861,475**
393		Oct	40	11	6	8	**51**	**14**	**65**	**128**	**862,290**
394		Nov	40	11	6	8	**51**	**14**	**65**	**128**	**863,106**
395		Dec	40	11	6	8	**51**	**14**	**65**	**128**	**863,921**
396											
397	2013	Jan	40	11	6	8	**51**	**14**	**65**	**128**	**864,853**
398		Feb	40	11	6	8	**51**	**14**	**65**	**128**	**865,785**
399		Mar	40	11	6	8	**51**	**14**	**65**	**128**	**866,716**
400		Apr	40	11	6	8	**51**	**14**	**65**	**128**	**867,426**
401		May	40	11	6	8	**51**	**14**	**65**	**128**	**868,136**
402		Jun	40	11	6	8	**51**	**14**	**65**	**128**	**868,845**
403		Jul	40	11	6	8	**51**	**14**	**65**	**128**	**869,610**
404		Aug	40	11	6	8	**51**	**14**	**65**	**128**	**870,375**
405		Sep	40	11	6	8	**51**	**14**	**65**	**128**	**871,140**
406		Oct	40	11	6	8	**51**	**14**	**65**	**128**	**872,132**
407		Nov	40	11	6	8	**51**	**14**	**65**	**128**	**873,123**
408		Dec	40	11	6	8	**51**	**14**	**65**	**128**	**874,114**

2013 TCAP: SDG&E Consolidated Gas Demand Forecast Summary (Mtherms)

MONTHLY FORECAST DATA

			Noncore - Electric Generatiion							Noncore	System-Wide
Row			EG-Dist. (<3MMThms)	EG-Trans. (<3MMThms)	EG-Dist. (>=3MMThms)	EG-Trans. (>=3MMThms)	**EG (<3MMThms)**	**EG (>=3MMThms)**	**EG (Total)**	**Total**	**Total End-Use Dmd**
409											
410	2014	Jan	40	11	6	8	**51**	**14**	**65**	**128**	**875,213**
411		Feb	40	11	6	8	**51**	**14**	**65**	**128**	**876,311**
412		Mar	40	11	6	8	**51**	**14**	**65**	**128**	**877,409**
413		Apr	40	11	6	8	**51**	**14**	**65**	**128**	**878,268**
414		May	40	11	6	8	**51**	**14**	**65**	**128**	**879,127**
415		Jun	40	13	6	8	**53**	**14**	**67**	**130**	**879,988**
416		Jul	40	13	6	8	**53**	**14**	**67**	**130**	**880,879**
417		Aug	40	13	6	8	**53**	**14**	**67**	**130**	**881,769**
418		Sep	40	13	6	8	**53**	**14**	**67**	**130**	**882,660**
419		Oct	40	13	6	8	**53**	**14**	**67**	**130**	**883,757**
420		Nov	40	13	6	8	**53**	**14**	**67**	**130**	**884,853**
421		Dec	40	13	6	8	**53**	**14**	**67**	**130**	**885,950**
422											
423	2015	Jan	40	13	6	8	**53**	**14**	**67**	**130**	**887,142**
424		Feb	40	13	6	8	**53**	**14**	**67**	**130**	**888,335**
425		Mar	40	13	6	8	**53**	**14**	**67**	**130**	**889,527**
426		Apr	40	13	6	8	**53**	**14**	**67**	**130**	**890,473**
427		May	40	13	6	8	**53**	**14**	**67**	**130**	**891,419**
428		Jun	40	13	6	8	**53**	**14**	**67**	**130**	**892,364**
429		Jul	40	13	6	8	**53**	**14**	**67**	**130**	**893,336**
430		Aug	40	13	6	8	**53**	**14**	**67**	**130**	**894,307**
431		Sep	40	13	6	8	**53**	**14**	**67**	**130**	**895,278**
432		Oct	40	13	6	8	**53**	**14**	**67**	**130**	**896,439**
433		Nov	40	13	6	8	**53**	**14**	**67**	**130**	**897,600**
434		Dec	40	13	6	8	**53**	**14**	**67**	**130**	**898,762**
435											
436	2016	Jan	40	13	6	8	**53**	**14**	**67**	**130**	**900,004**
437		Feb	40	13	6	8	**53**	**14**	**67**	**130**	**901,247**
438		Mar	40	13	6	8	**53**	**14**	**67**	**130**	**902,489**
439		Apr	40	13	6	8	**53**	**14**	**67**	**130**	**903,468**
440		May	40	13	6	8	**53**	**14**	**67**	**130**	**904,447**
441		Jun	40	13	6	8	**53**	**14**	**67**	**130**	**905,427**
442		Jul	40	13	6	8	**53**	**14**	**67**	**130**	**906,414**
443		Aug	40	13	6	8	**53**	**14**	**67**	**130**	**907,402**
444		Sep	40	13	6	8	**53**	**14**	**67**	**130**	**908,390**
445		Oct	40	13	6	8	**53**	**14**	**67**	**130**	**909,554**
446		Nov	40	13	6	8	**53**	**14**	**67**	**130**	**910,718**
447		Dec	40	13	6	8	**53**	**14**	**67**	**130**	**911,882**

SoCalGas Noncore Retail Gas Demand

Noncore Commercial and Industrial Forecasts: End Use Model Forecasts Combined with Econometric And Other Forecasts

INTRODUCTION

The purpose of these workpapers is to describe how the results from the EUForecaster end-use models for the noncore commercial and industrial (non-refinery) market segments were obtained and used to produce the forecasts of demand for SoCalGas' noncore commercial and industrial.

The EUForecaster model's market segmentation and end-use modeling framework was used by SoCalGas to assess the impacts of equipment replacement and market scenarios on gas demand and market share. The model segments the noncore commercial and industrial markets into 14 sectors and 11 sectors by type of business activity, respectively. Business activity is determined by the NAICS (North American Industrial Classification System) code on the billing record. The final demand forecast for the noncore commercial and industrial market is taken primarily from output from the EUForecaster and reduced by CPUC-authorized energy efficiency goals. Additionally, there are some additional adjustments due to special noncore C&I programs (i.e., "Rule-38") authorized by the CPUC but whose gas demand is excluded from the gas cost allocation and rate design calculations for the 2013 TCAP. Finally, there are some small "out-of-model" adjustments that are applied due to EOR customers whose "steaming" and "cogeneration" load are billed at an approved special rate for EOR service but whose meter is also used to measure consumption of these customers that is billed at a G-30 rate.

The last two subsections under "DATA SOURCES" provide sets of key data input items for each of the Noncore Commercial and Noncore Industrial end-use models.

DATA SOURCES

A. Historical Billing Data

Monthly historical gas usage for the commercial and industrial markets were obtained from SoCalGas' billing records for 2010. The recorded usage was then further disaggregated into the 14 commercial or 11 industrial business sectors.

B. Natural Gas Price

The natural gas prices used to forecast demand were based on the price of gas at the burner-tip in each market segment, which is composed of the gas commodity cost, transportation rate (G-30 tariff rate) and Public Purpose Program surcharge. The cost of gas delivered to the SoCalGas "city gate" was used for the gas commodity cost.

Since the G-30 tariff rate is priced according to tier, calculations were made to arrive at the overall average and marginal transportation rates from historical usage in 2010. The average rate is calculated from the weighted average rate at each tier for each customer; whereas the marginal rate is calculated as the rate that applies to the last unit of gas consumed for each customer.

C. Electricity Price Data

Both average prices (cents/kWh) and marginal prices (cents/kWh) were developed as electricity price inputs. Forecasts for the SCE industrial customer class were developed by SDG&E's electric rate design group through our forecast time horizon. These were the average electricity prices for the noncore commercial & industrial market, overall.

The marginal prices were calculated by multiplying each year's respective average price by a ratio. This ratio, 0.705, was estimated from an analysis of the SCE TOU-8 rate schedule, for non-self-generation customers, posted on their web-site in March 2006.

The same set of average and marginal prices were used for each of the noncore Commercial and Industrial markets.

D. Employment

Employment, as a measure of economic activity, is used to drive the noncore commercial and industrial end-use demand forecast models. The employment forecast through our forecast time horizon is based on Global Insight's March 2011 Regional forecast. Global Insight prepares regular regional employment forecast for California and the aggregated six largest counties' Metropolitan Statistical Area (MSA) in SoCalGas' service area. (The six counties – Kern, Los Angeles, Orange, Riverside, San Bernardino, and Ventura – account for 85% of the service area's total population and employment). The historical employment data used was derived from the California Employment Development Department (EDD) for the 12 counties served by SoCalGas. The monthly employment used in the model was generally by summing the weighted employment data over the commercial and industrial NAICS codes.

E. Post-Model Adjustment

Once the EUForecaster end-use model forecast was generated, post-model adjustments were made to account for effects the model is not designed to simulate. Energy savings goals that were authorized by the CPUC in decision D.04-09-060 and expected load leaving for service by the City of Vernon were subtracted from the model forecast to arrive at final demand forecast for the commercial and industrial markets. Based on monthly data (June 2010 through April 2011) for *net* movement of customers from core (G-10) to noncore (G-30) service, we expect some accumulated load growth from *net* customer migration from core to noncore through 2015.

F. EUForecaster Key Input data for Noncore Commercial and Noncore Industrial End-Use Models

1. Energy Price Data for both Models: The first set of input data are for energy prices. Retail prices for natural gas, electricity and alternative fuels (i.e., propane) are provided. These prices are in nominal ("current year") monetary units ($/Therm for natural gas and propane, and $/Kwh for electricity). The prices for natural gas and electricity are retail prices (at the "burner-tip") for the end-user. The remaining set of pages in this section provide data on how the natural gas prices were calculated from the commodity price projections and the forecasts for the relevant C&I rate tiers for the G-30 rate structure or the "Class Average" price for C&I customers billed under the TLS (Transmission Level Service) rate structure.

2. Input Data for the Noncore Commercial Model: This data consist of various tables of data specific to the noncore commercial EUForecaster end-use model: Employment forecasts; Equipment Saturations; Average Year of Installation for Equipment; Use per meter data; and a set of Base Year data.

3. Input Data for the Noncore Industrial Model: This data consist of various tables of data specific to the noncore industrial EUForecaster end-use model: Employment forecasts; Use per meter data; Equipment Saturations; Gas vs. Electric use shares; Electric UECs and Relative Efficiencies; "Equipement Age" per meter installation dates; and a set of Base Year data.

EUForecaster Energy Price Data for Noncore Commercial & Industrial Models

Noncore C and I Retail Natural Gas Prices ($/Therm)

Year	Com Price Deflator	Ind Price Deflator	C Non Core Average Price	C Non Core Marginal Price	I Non Core Average Price	I Non Core Marginal Price	
2009	**98.82**	**98.82**	4.7807	4.4883	4.5501	4.3198	
2010	**100.00**	**100.00**	5.6258	5.2795	5.3516	5.0755	
2011	**101.74**	**101.74**	5.4477	5.1288	5.1975	4.9443	
2012	**103.73**	**103.73**	6.0665	5.7475	5.8162	5.5630	
2013	**106.10**	**106.10**	6.4082	6.0844	6.1513	5.8928	
2014	**108.61**	**108.61**	6.7361	6.4050	6.4728	6.2082	
2015	**111.12**	**111.12**	7.8108	7.4725	7.5412	7.2705	
2016	**113.71**	**113.71**	8.1731	7.8275	7.8971	7.6202	
	2.16%	**2.16%**	**6.42%**	**6.78%**	**6.70%**	**7.01%**	**Avg-Ann Growth Rate (2010 through 2016)**

Noncore C and I Retail Electric Prices ($/Kwh)

Year	C Non Core Average Price	C Non Core Marginal Price	I Non Core Average Price	I Non Core Marginal Price
2009	**12.12**	8.54	12.12	8.54
2010	**12.41**	8.75	12.41	8.75
2011	**12.37**	8.72	12.37	8.72
2012	**13.23**	9.33	13.23	9.33
2013	**13.85**	9.76	13.85	9.76
2014	**14.25**	10.05	14.25	10.05
2015	**14.55**	10.26	14.55	10.26
2016	**14.91**	10.51	14.91	10.51

Noncore C and I Alternative Fuel (Propane) Prices ($/Therm)

Year	C Non Core Average Price	C Non Core Marginal Price	I Non Core Average Price	I Non Core Marginal Price
2009	**1.2770**	1.2770	**1.2770**	1.2770
2010	1.2770	1.2770	1.2770	1.2770
2011	1.5860	1.5860	1.5860	1.5860
2012	1.4948	1.4948	1.4948	1.4948
2013	1.5300	1.5300	1.5300	1.5300
2014	1.5373	1.5373	1.5373	1.5373
2015	1.5406	1.5406	1.5406	1.5406
2016	1.5449	1.5449	1.5449	1.5449

Noncore C and I Rate Components

Annual G30 Noncore C&I Gas Rates						Nominal Dollars					Constant 2010 Dollars			
Year	Com Trsp Average ¢/Therm	Com Trsp Marginal ¢/Therm	Ind Trsp Average ¢/Therm	Ind Trsp Marginal ¢/Therm	CBSP ¢/Therm	Com B/T Average $/Dth	Com B/T Marginal $/Dth	Ind B/T Average $/Dth	Ind B/T Marginal $/Dth	CPI (Yr-2010 = 1.0000)	Com B/T Average 2010-$ /Dth	Com B/T Marginal 2010-$ /Dth	Ind B/T Average 2010-$ /Dth	Ind B/T Marginal 2010-$ /Dth
2010	**13.400**	**9.938**	**10.659**	**7.898**	42.857	5.626	5.280	5.352	5.076	1.0000	5.626	5.280	5.352	5.076
2011	13.245	10.056	10.743	8.211	41.232	5.448	5.129	5.198	4.944	1.0174	5.354	5.041	5.108	4.860
2012	13.288	10.098	10.785	8.253	47.377	6.066	5.748	5.816	5.563	1.0373	5.848	5.541	5.607	5.363
2013	13.040	9.802	10.472	7.887	51.041	6.408	6.084	6.151	5.893	1.0610	6.040	5.735	5.798	5.554
2014	13.319	10.007	10.686	8.040	54.042	6.736	6.405	6.473	6.208	1.0861	6.202	5.897	5.960	5.716
2015	13.639	10.255	10.943	8.236	64.469	7.811	7.472	7.541	7.271	1.1112	7.029	6.725	6.787	6.543
2016	13.967	10.510	11.207	8.438	67.764	8.173	7.827	7.897	7.620	1.1371	7.188	6.884	6.945	6.701
						Avg-Ann Growth Rate (2010 through 2016):					**4.2%**	**5.3%**	**5.0%**	**6.0%**

Noncore C and I Weights for Tiers in Weighted Rate Calculations

2010 G30 C&I Weight of Usage by Tier, BMW

	Service	Tier	Both	Com	Ind
Average	D	1	D1	29.00%	16.74%
Average	D	2	D2	43.21%	29.15%
Average	D	3	D3	15.28%	16.78%
Average	D	4	D4	12.51%	37.33%
Average	T	1	T1	58.81%	41.80%
Average	T	2	T2	41.19%	58.20%
Marginal	D	1	D1	3.11%	1.40%
Marginal	D	2	D2	42.26%	19.93%
Marginal	D	3	D3	23.19%	19.75%
Marginal	D	4	D4	31.45%	58.92%
Marginal	T	1	T1	51.98%	21.17%
Marginal	T	2	T2	48.02%	78.83%

2010 Volume (Therms)			Percent
Com&Ind	D&T	682,209,688	100.00%
Com&Ind	D	644,125,383	94.42%
Com&Ind	T	38,084,305	5.58%
Com	D&T	193,133,992	28.31%
Ind	D&T	489,075,696	71.69%
Com	D	176,052,501	91.16%
Com	T	17,081,491	8.84%
Ind	D	468,072,882	95.71%
Ind	T	21,002,814	4.29%

("Cust Cnt") G-30 C&I (Non-Refinery)

Obs	seg	service	_TYPE_	_FREQ_	Therms	Prop/Pct.
1			0	618	682,209,688	100.0%
2		D	1	593	644,125,383	94.4%
3		T	1	25	38,084,305	5.6%
4	COM		2	247	193,133,992	28.3%
5	IND		2	371	489,075,696	71.7%
6	COM	D	3	232	176,052,501	91.2%
7	COM	T	3	15	17,081,491	8.8%
8	IND	D	3	361	468,072,882	95.7%
9	IND	T	3	10	21,002,814	4.3%

Noncore Gas Transportation Rates and Commodity Prices

	Gas Transp. Forecast from Rate Design (Nominal Cents per Therm)						Trans Option: "Class Averge"			Trans Option: "Reservation"				
Year	PPP (¢/Thm)	Dcharge ($/mo /mtr)	D1 (¢/Thm)	D2 (¢/Thm)	D3 (¢/Thm)	D4 (¢/Thm)	Tcharge ($/mo /mtr)	T1 (¢/Thm)	T2 (¢/Thm)	Tcharge (¢/Thm/day per Mtr)	T1 (¢/Thm)	T2 (¢/Thm)	CPI	CBSP $/Dth
2010	3.022	$350	18.555	12.204	8.072	5.700	$0	5.226	5.226	1.417	3.326	3.326	1.000	4.29
2011	3.476	$350	17.89	12.11	8.34	6.23	$0	5.06	5.06	0.96	3.78	3.78	1.017	4.12
2012	3.52	$350	17.93	12.15	8.38	6.27	$0	5.11	5.11	0.84	3.82	3.82	1.037	4.74
2013	3.53	$350	17.61	12.19	7.51	5.92	$0	4.82	4.82	0.69	3.81	3.81	1.061	5.10
2014	3.57	$350	18.03	12.45	7.67	6.01	$0	4.90	4.90	0.70	3.86	3.86	1.086	5.40
2015	3.65	$350	18.49	12.75	7.88	6.15	$0	5.01	5.01	0.72	3.95	3.95	1.111	6.45
2016	3.74	$350	18.95	13.07	8.09	6.29	$0	5.13	5.13	0.74	4.04	4.04	1.137	6.78

Example Calculation for 2015 Noncore Industrial

Example of Calculations: 2015 Noncore Industrial *Average* Gas Price:

Transportation Charge (¢/Thm):	**10.943**	**=**	**+ (95.7% Ind Dist of total Ind) * { [(100 ¢/$ *12 Mo/Yr)*($350.00 /mo/mtr)/(1,296,601 Thm/Mtr Ind Dist)]** **+ (16.74%* 18.49 ¢/Thm + 29.15%* 12.75 ¢/Thm + 16.78%* 7.88 ¢/Thm + 37.33%* 6.15 ¢/Thm) }** **+ (4.3% Ind Trans of total Ind) * { [(100 ¢/$ *12 Mo/Yr)*($0.00 /mo/mtr)/(2,100,281 Thm/Mtr Ind Trans)]** **+ (41.80%* 5.01 ¢/Thm+58.20%* 5.01¢/Thm) }**
Gas Commodity Price (¢/Thm):	**64.469**	**=**	**("CBPS", market price of gas at the SoCalGas City Gate)**
Customer's "Burner-Tip" Price:	**75.412**	**=**	**(64.469 + 10.943) ¢/Thm**

Example of Calculations: 2015 Noncore Industrial *Marginal* Gas Price:

Transportation Charge (¢/Thm):	**8.236**	**=**	**+ (95.7% Ind Dist of total Ind) * { + (1.40%* 18.49 ¢/Thm + 19.93%* 12.75 ¢/Thm + 19.75%* 7.88 ¢/Thm + 58.92%* 6.15 ¢/Thm) }** **+ (4.3% Ind Trans of total Ind) * { (21.17%* 5.01 ¢/Thm + 78.83%* 5.01¢/Thm) }**
Gas Commodity Price (¢/Thm):	**64.469**	**=**	**("CBPS", market price of gas at the SoCalGas City Gate)**
Customer's "Burner-Tip" Price:	**72.705**	**=**	**(64.469 + 8.236) ¢/Thm**

EUForecaster Noncore Commercial Data

Noncore Commercial: Annual Employment (millions) by Business Types

YEAR	Office	Restaurant	Retail	Laundry	Warehouse	School	College	Health	Lodging
2010	1.41214	0.55070	0.90186	0.07994	0.40926	0.60690	0.20230	0.77286	0.12273
2011	1.43910	0.55081	0.90206	0.08063	0.41260	0.59274	0.19758	0.78668	0.12470
2012	1.47284	0.56062	0.91814	0.08098	0.42209	0.58854	0.19618	0.80272	0.12603
2013	1.52772	0.56772	0.92977	0.08123	0.43139	0.59369	0.19790	0.81621	0.12695
2014	1.58559	0.57261	0.93778	0.08136	0.44087	0.60233	0.20078	0.83039	0.12751
2015	1.62153	0.57623	0.94371	0.08123	0.45042	0.60808	0.20269	0.84565	0.12758
2016	1.64619	0.57914	0.94847	0.08128	0.45975	0.61508	0.20503	0.86726	0.12763
AvgAnn Gwth (2010-2016)	16.6%	5.2%	5.2%	1.7%	12.3%	1.3%	1.3%	12.2%	4.0%

Noncore Commercial: Annual Employment (millions) by Business Types

YEAR	Misc	Governmen	TCU	Constructic	Agriculture	EMPLTOT
2010	0.22108	0.63354	0.52404	0.28366	0.21991	6.94093
2011	0.22299	0.61751	0.53804	0.28656	0.22063	6.97263
2012	0.22396	0.61062	0.56205	0.29524	0.21994	7.07993
2013	0.22467	0.61154	0.57479	0.32578	0.21853	7.22788
2014	0.22502	0.61582	0.58365	0.35219	0.21845	7.37435
2015	0.22466	0.61839	0.60071	0.38131	0.21890	7.50109
2016	0.22481	0.62280	0.61306	0.40280	0.21838	7.61169
AvgAnn Gwth (2010-2016)	1.7%	-1.7%	17.0%	42.0%	-0.7%	9.7%

Noncore Commercial: EUForecaster Equipment Saturations for End-Uses by Business Types

zname	bname	nname	SAT	SOURCE
Commercial	Agriculture	Drying	1.0000	Assumed
Commercial	Agriculture	Engine	0.5000	Assumed
Commercial	Agriculture	Other	1.0000	DEFAULT
Commercial	Agriculture	Space_Heat	0.7200	CI_1996_STUDY
Commercial	Agriculture	Water_Heat	0.6900	CI_1996_STUDY
Commercial	College	AC_Compressor	0.8850	CBECS
Commercial	College	Cook_top	0.1470	CBECS
Commercial	College	Fryer	0.1470	CBECS
Commercial	College	Griddle	0.1470	CBECS
Commercial	College	Other	1.0000	DEFAULT
Commercial	College	Other_Cooking	0.1470	CBECS
Commercial	College	Space_Heat	0.7630	SDGE_EUI_STUDY
Commercial	College	Water_Heat	0.9550	SDGE_EUI_STUDY
Commercial	Construction	Other	1.0000	DEFAULT
Commercial	Construction	Space_Heat	0.7200	CI_1996_STUDY
Commercial	Construction	Water_Heat	0.6900	CI_1996_STUDY
Commercial	Government	AC_Compressor	0.8880	CBECS
Commercial	Government	Cook_top	0.1960	CBECS
Commercial	Government	Fryer	0.1960	CBECS
Commercial	Government	Griddle	0.1960	CBECS
Commercial	Government	Other	1.0000	DEFAULT
Commercial	Government	Other_Cooking	0.1960	CBECS
Commercial	Government	Space_Heat	0.8720	SDGE_EUI_STUDY
Commercial	Government	Water_Heat	0.7000	CI_1996_STUDY
Commercial	Grocery	AC_Compressor	0.8560	CBECS
Commercial	Grocery	Cook_top	0.2450	CBECS
Commercial	Grocery	Fryer	0.2450	CBECS
Commercial	Grocery	Griddle	0.2450	CBECS
Commercial	Grocery	Other	1.0000	DEFAULT
Commercial	Grocery	Other_Cooking	0.2450	CBECS
Commercial	Grocery	Space_Heat	0.6470	SDGE_EUI_STUDY
Commercial	Grocery	Water_Heat	0.9300	CI_1996_STUDY
Commercial	Health	AC_Compressor	0.7920	CBECS
Commercial	Health	Cook_top	0.1020	CBECS
Commercial	Health	Drying	0.8200	CI_1996_STUDY
Commercial	Health	Fryer	0.1020	CBECS
Commercial	Health	Griddle	0.1020	CBECS
Commercial	Health	Other	1.0000	DEFAULT
Commercial	Health	Other_Cooking	0.1020	CBECS
Commercial	Health	Space_Heat	0.9360	SDGE_EUI_STUDY
Commercial	Health	Water_Heat	1.0000	CI_1996_STUDY
Commercial	Laundry	Drying	1.0000	CI_1996_STUDY
Commercial	Laundry	Other	1.0000	CI_1996_STUDY
Commercial	Laundry	Space_Heat	0.7200	CI_1996_STUDY
Commercial	Laundry	Water_Heat	1.0000	CI_1996_STUDY
Commercial	Lodging	AC_Compressor	0.7950	CBECS
Commercial	Lodging	Cook_top	0.0840	CBECS
Commercial	Lodging	Drying	0.8200	CI_1996_STUDY

Noncore Commercial: EUForecaster Equipment Saturations for End-Uses by Business Types

zname	bname	nname	SAT	SOURCE
Commercial	Lodging	Fryer	0.0840	CBECS
Commercial	Lodging	Griddle	0.0840	CBECS
Commercial	Lodging	Other	1.0000	CI_1996_STUDY
Commercial	Lodging	Other_Cooking	0.0840	CBECS
Commercial	Lodging	Space_Heat	0.8950	SDGE_EUI_STUDY
Commercial	Lodging	Water_Heat	1.0000	CI_1996_STUDY
Commercial	Misc	AC_Compressor	0.7310	CBECS
Commercial	Misc	Cook_top	0.0210	CBECS
Commercial	Misc	Fryer	0.0210	CBECS
Commercial	Misc	Griddle	0.0210	CBECS
Commercial	Misc	Other	1.0000	CI_1996_STUDY
Commercial	Misc	Other_Cooking	0.0210	CBECS
Commercial	Misc	Space_Heat	0.6950	SDGE_EUI_STUDY
Commercial	Misc	Water_Heat	0.6900	CI_1996_STUDY
Commercial	Office	AC_Compressor	0.9310	CBECS
Commercial	Office	Cooking	0.0820	CBECS
Commercial	Office	Other	1.0000	CI_1996_STUDY
Commercial	Office	Space_Heat	0.8720	SDGE_EUI_STUDY
Commercial	Office	Water_Heat	0.7000	CI_1996_STUDY
Commercial	Restaurant	AC_Compressor	0.8710	CBECS
Commercial	Restaurant	Cook_top	0.7500	SCG_COOKING_STUDY
Commercial	Restaurant	Fryer	0.7290	SCG_COOKING_STUDY
Commercial	Restaurant	Griddle	0.5740	SCG_COOKING_STUDY
Commercial	Restaurant	Other	1.0000	CI_1996_STUDY
Commercial	Restaurant	Other_Cooking	0.9000	CI_1996_STUDY
Commercial	Restaurant	Space_Heat	0.8180	SDGE_EUI_STUDY
Commercial	Restaurant	Water_Heat	0.9600	CI_1996_STUDY
Commercial	Retail	Cooking	0.2450	CBECS
Commercial	Retail	Other	1.0000	CI_1996_STUDY
Commercial	Retail	Space_Heat	0.7710	SDGE_EUI_STUDY
Commercial	Retail	Water_Heat	0.6200	CI_1996_STUDY
Commercial	School	AC_Compressor	0.8850	CBECS
Commercial	School	Cook_top	0.1470	CBECS
Commercial	School	Fryer	0.1470	CBECS
Commercial	School	Griddle	0.1470	CBECS
Commercial	School	Other	1.0000	CI_1996_STUDY
Commercial	School	Other_Cooking	0.1470	CBECS
Commercial	School	Space_Heat	0.9670	SDGE_EUI_STUDY
Commercial	School	Water_Heat	0.9000	CI_1996_STUDY
Commercial	TCU	Engine	0.5000	Assumed
Commercial	TCU	Other	1.0000	CI_1996_STUDY
Commercial	TCU	Space_Heat	0.7200	CI_1996_STUDY
Commercial	TCU	Water_Heat	0.6900	CI_1996_STUDY
Commercial	Warehouse	Engine	0.2500	Assumed
Commercial	Warehouse	Other	1.0000	DEFAULT
Commercial	Warehouse	Space_Heat	0.2310	SDGE_EUI_STUDY
Commercial	Warehouse	Water_Heat	0.8800	SDGE_EUI_STUDY

Noncore Commercial: EUForecaster Average Equipment Age for End-Uses by Business Types

Sector	Space Heater	Water Heater	Cooktop	Griddle	Fryer	Other Cooking Equipment	Kitchen Equipment	AC	Dryer	Engine	Other
Office	.	.	.	.	.	.	.	.	.	.	1966
Restaurant	1972	.	.	.	.	.	.	.	.	.	1974
Retail											
Laundry	1965	1980	.	.	.	.	.	2001	1983	.	1984
Warehouse	.	.	.	.	.	.	.	.	.	.	.
School	.	.	.	.	.	.	.	.	.	.	.
College	1974	1975	.	.	.	.	1988	1981	.	.	1968
Health	1975	1973	1973	1979	1983	1980	1975	1985	1972	.	1974
Lodging	1985	1978	1990	1986	1986	1990	1990	1953	1989	.	1991
Misc	.	1996	.	.	.	.	.	.	.	.	1991
Government	1979	1980	1976	1982	1979	1979	1982	1987	1980	1965	1976
TCU	1976	1969	.	.	.	.	.	.	.	1975	1977
Construction	.	.	.	.	.	.	.	.	.	.	.
Agriculture	1992	1991	.	.	.	.	1998	.	1970	1975	1992

Year Equipment Installed

Noncore Commercial: EUForecaster Use per Meter Data for End-Uses by Business Types

Sector	Space Heater	Water Heater	Cooktop	Griddle	Fryer	Other Cooking Equipment	Kitchen Equipment	AC	Dryer	Engine	Other	Total Building
Office	263187	109270	13327	4431	3380	13785	2957	4511	13119	3748	262417	694134
Restaurant	21791	42178	70396	28960	55615	61534	14984	868	388	0	13828	310541
Retail	95198	57822	21053	3506	23450	40424	24999	5547	10660	852	131912	415423
Laundry	1918	30487	250	39	62	362	2	57	306256	0	285170	624603
Warehouse	550926	160049	22770	6346	54876	63098	80669	62688	183210	54424	1772741	3011798
School	0	0	0	0	0	0	0	0	0	0	0	0
College	517721	255724	24982	7370	12812	30751	7108	32360	7848	10998	352110	1259783
Health	262275	164342	26340	5102	7155	20256	11457	4747	36079	2690	277305	817747
Lodging	85984	175627	24241	5917	7576	29520	14529	1421	45755	29	198502	589102
Misc	288684	176312	35697	7127	11748	29342	9377	29725	11413	2190	194838	796452
Government	331413	192669	16933	8344	4953	13938	7560	8847	4469	48949	129866	767942
TCU	106822	38402	3382	841	1595	2962	2023	5218	329	167600	177185	506359
Construction	0	0	0	0	0	0	0	0	0	0	0	0
Agriculture	117726	28523	4844	808	10075	22404	20368	276	29691	194667	393068	822451

Noncore Commercial: EUForecaster Historical Base Year Data .

Segment	2010 Therm Sales	2010 Meter Count	2010 Meter Count, Existing/Old customers	2010 Meter Count New Customers	Avg Use Per Meter Existing Customers	Avg Use Per Meter New Customers	Price Elasticity	Employment Elasticities	MAS SQFT ADJ
Office	694134	1	1	0	694134	0	-0.046000	0.474000	3786510
Restaurant	310541	1	1	0	310541	0	-0.046000	0.474000	373813
Retail	1246270	3	3	0	415423	0	-0.046000	0.474000	2667893
Laundry	10618257	17	17	0	624603	0	-0.046000	0.474000	53150
Warehouse	9035393	3	3	0	3011798	0	-0.046000	0.474000	5697150
School	0	0	0	0	0	0	-0.046000	0.474000	0
College	20156526	16	16	0	1259783	0	-0.046000	0.474000	4367776
Health	67872975	83	83	0	817747	0	-0.046000	0.474000	1707720
Lodging	10603835	18	18	0	589102	0	-0.046000	0.474000	447289
Misc	**2389357**	**3**	3	0	796452	0	-0.046000	0.474000	8338418
Government	26877985	35	35	0	767942	0	-0.046000	0.474000	3248578
TCU	23292536	46	46	0	506359	0	-0.046000	0.474000	2697060
Construction	26825	1	1	0	0	0	-0.046000	0.474000	0
Agriculture	18916382	23	23	0	822451	0	-0.046000	0.474000	1625346
Total	192041015	250							

Adjustment for Normal Year Year

Normal Year HDD	**1,375**	HDD
Actual **2010** HDD	**1,449**	HDD
HDD Difference	-74	HDD
Load per HDD	14,773	Therm/HDD
Temperature Adj.	-1,093,223	Therms

	Actual 2010	Ratio
Office	698,085	0.36%
Restaurant	312,309	0.16%
Retail	1,253,365	0.65%
Laundry	10,678,703	5.53%
Warehouse	9,086,828	4.70%
School	0	0.00%
College	20,271,270	10.50%
Health	68,259,352	35.34%
Lodging	10,664,199	5.52%
Misc	**2,402,959**	1.24%
Government	27,030,992	14.00%
TCU	23,425,132	12.13%
Construction	26,978	0.01%
Agriculture	19,024,066	9.85%
G30 Commercial	193,134,238	192,041,015

EUForecaster Noncore Industrial Data

Noncore Industrial: Annual Employment (thousands) by Business Types

YEAR	Mining	Food	Textile	Wood_Pap	Chemical	Petroleum	Stone	Prim_Metal	Fab_Metal	Transport	Misc	EMPLTOT
2010	18.56808	111.80392	39.44867	19.12725	34.37642	5.94500	16.48783	7.50125	75.56550	69.67417	332.95358	731.45167
2011	19.52333	113.14600	38.93692	19.21400	34.72533	5.86642	16.55058	7.76092	77.34992	72.69417	342.10417	747.87175
2012	20.67642	113.96958	40.31975	21.20092	35.53217	5.75333	17.56717	7.93292	79.13600	76.25617	350.34183	768.68625
2013	20.75917	114.77358	41.29433	22.93475	36.00867	5.66942	18.84592	7.93150	83.87483	77.88042	359.04008	789.01267
2014	20.64875	115.03683	41.18892	23.53950	36.36958	5.55067	19.40783	8.15458	89.23433	79.04892	358.84500	797.02492
2015	20.21242	114.99042	40.37150	23.91683	37.01700	5.39100	19.58550	8.36383	93.21892	79.48033	361.19533	803.74308
2016	19.43167	114.75025	39.45375	24.07008	37.61550	5.25342	19.66492	8.42200	95.86625	78.49458	361.47067	804.49308
AvgAnn Gwth (2010-2016)	4.7%	2.6%	0.0%	25.8%	9.4%	-11.6%	19.3%	12.3%	26.9%	12.7%	8.6%	10.0%

Noncore Industrial: EUForecaster Use per Meter for End-Uses by Business Types

Segment	Fire_Tube_Boil	Wat_Tube_Boil	Space_Heat	Water_Heat	Dryer	Furnace_Oven_ Kiln	AC	Engine	Misc_Other	Total
Mining	130760	517633	6728	4007	347469	910622	0	37766	18153	1973138
Food	879689	238082	9519	12401	327015	80205	905	2641	62989	1613447
Textile	631863	86956	5217	16596	288964	91553	0	9571	38986	1169705
Wood_Paper	215521	541215	92	377	80472	46246	0	0	33657	917579
Chemical	615846	192739	4325	3007	0	29804	9904	0	359403	1215030
Petroleum	41554	0	18650	1438	157430	501007	0	0	51859	771938
Stone	60165	0	9326	1688	37884	1568375	0	0	75645	1753083
Prim_Metal	48539	174208	5470	629	57497	2148386	196	0	207395	2642320
Fab_Metal	116722	12261	15875	1648	2580	696657	53	970	138053	984820
Transport	93421	140084	28451	2979	1661	782429	220	0	137201	1186448
Misc	216839	71865	8798	9201	16118	149407	3	0	138283	610514

Noncore Industrial: EUForecaster Equipment Saturations for End-Uses by Business Types

Segment	Fire_Tube_Boil	Wat_Tube_Boil	Space_Heat	Water_Heat	Dryer	Furnace_Oven_ Kiln	AC	Engine	Misc_Other
Mining	0.01	0.01	0.73	0.73	0.03	0.06	0.64	0.87	1.00
Food	0.45	0.45	0.60	0.85	0.12	0.33	0.73	0.70	1.00
Textile	0.26	0.26	0.70	0.71	0.14	0.09	0.72	0.46	1.00
Wood_Paper	0.01	0.01	0.62	0.77	0.09	0.07	0.71	0.50	1.00
Chemical	0.14	0.14	0.73	0.73	0.12	0.10	0.74	0.70	1.00
Petroleum	0.14	0.14	0.73	0.73	0.12	0.10	0.74	0.70	1.00
Stone	0.01	0.01	0.73	0.73	0.03	0.06	0.64	0.87	1.00
Prim_Metal	0.07	0.07	0.73	0.76	0.15	0.10	0.68	0.86	1.00
Fab_Metal	0.07	0.07	0.73	0.76	0.15	0.10	0.68	0.86	1.00
Transport	0.14	0.14	0.73	0.73	0.12	0.10	0.74	0.70	1.00
Misc	0.14	0.14	0.73	0.73	0.12	0.10	0.74	0.70	1.00

Noncore Industrial: EUForecaster Shares of Gas and Electric for End-Uses by Business Types

Segment	Fire_Tube_Boil	Wat_Tube_Boil	Space_Heat	Water_Heat	Dryer	Furnace_Oven_ Kiln	AC	Engine	Misc_Other	Source
Mining	0.75	0.75	0.61	0.59	0.32	0.62	0.11	0.01	1.00	
Food	0.79	0.79	0.61	0.59	0.32	0.62	0.11	0.01	1.00	CI 1996
Textile	0.79	0.79	0.61	0.59	0.32	0.62	0.11	0.01	1.00	
Wood_Paper	0.75	0.75	0.61	0.59	0.32	0.62	0.11	0.01	1.00	
Chemical	0.79	0.79	0.61	0.59	0.32	0.62	0.11	0.01	1.00	
Petroleum	0.79	0.79	0.61	0.59	0.32	0.62	0.11	0.01	1.00	
Stone	0.79	0.79	0.61	0.59	0.32	0.62	0.11	0.01	1.00	
Prim_Metal	0.79	0.79	0.61	0.59	0.32	0.62	0.11	0.01	1.00	
Fab_Metal	0.79	0.79	0.61	0.59	0.32	0.62	0.11	0.01	1.00	
Transport	0.75	0.75	0.61	0.59	0.32	0.62	0.11	0.01	1.00	
Misc	0.79	0.79	0.61	0.59	0.32	0.62	0.11	0.01	1.00	

Gas share unadjusted	Fire_Tube_Boil	Wat_Tube_Boil	Space_Heat	Water_Heat	Dryer	Furnace_Oven_ Kiln	AC	Engine	Misc_Other	Source
Mining	75%	75%	65%	60%	33%	65%	11%	1%	100%	
Food	75%	75%	65%	60%	33%	65%	11%	1%	100%	CI 1996
Textile	75%	75%	65%	60%	33%	65%	11%	1%	100%	
Wood_Paper	75%	75%	65%	60%	33%	65%	11%	1%	100%	
Chemical	75%	75%	65%	60%	33%	65%	11%	1%	100%	
Petroleum	75%	75%	65%	60%	33%	65%	11%	1%	100%	
Stone	75%	75%	65%	60%	33%	65%	11%	1%	100%	
Prim_Metal	75%	75%	65%	60%	33%	65%	11%	1%	100%	
Fab_Metal	75%	75%	65%	60%	33%	65%	11%	1%	100%	
Transport	75%	75%	65%	60%	33%	65%	11%	1%	100%	
Misc	75%	75%	65%	60%	33%	65%	11%	1%	100%	

electric share unadjusted	Fire_Tube_Boil	Wat_Tube_Boil	Space_Heat	Water_Heat	Dryer	Furnace_Oven_ Kiln	AC	Engine	Misc_Other	Source
Mining	25%	25%	41%	41%	71%	40%	91%	99%	100%	
Food	20%	20%	41%	41%	71%	40%	91%	99%	100%	CI 1996
Textile	20%	20%	41%	41%	71%	40%	91%	99%	100%	
Wood_Paper	25%	25%	41%	41%	71%	40%	91%	99%	100%	
Chemical	20%	20%	41%	41%	71%	40%	91%	99%	100%	
Petroleum	20%	20%	41%	41%	71%	40%	91%	99%	100%	
Stone	20%	20%	41%	41%	71%	40%	91%	99%	100%	
Prim_Metal	20%	20%	41%	41%	71%	40%	91%	99%	100%	
Fab_Metal	20%	20%	41%	41%	71%	40%	91%	99%	100%	
Transport	25%	25%	41%	41%	71%	40%	91%	99%	100%	
Misc	20%	20%	41%	41%	71%	40%	91%	99%	100%	

Noncore Industrial: EUForecaster Electric UECs and Relative Efficiencies for End-Uses by Business Types

Segment	Fire_Tube_Boil	Wat_Tube_Boil	Space_Heat	Water_Heat	Dryer	Furnace_Oven_ Kiln	AC	Engine
Mining	311700114	1233912930	266299	116921	647124219	711126534	0	76883217
Food	41425664	11211568	407510	276223	135353440	10123645	180794	5940873
Textile	63761817	8774796	237011	547934	126927638	52461093	0	40558119
Wood_Paper	799504539	2007713563	6645	16232	77743050	48173085	0	0
Chemical	70902822	22190185	115757	59317	0	9442740	1484152	0
Petroleum	21161884	0	2207800	125491	219234462	702122971	0	0
Stone	284092939	0	731195	97568	139757861	2426118904	0	0
Prim_Metal	6940624	24909971	90900	7398	8992590	422681228	19874	0
Fab_Metal	39062748	4103358	617510	45371	944518	320793120	12490	1963343
Transport	16679997	25011535	1180812	91137	810979	384433232	51172	0
Misc	57873838	19180472	545807	420788	11763220	109733850	1046	0

Relative Efficiency Gas to Electric	Fire_Tube_Boil	Wat_Tube_Boil	Space_Heat	Water_Heat	Dryer	Furnace_Oven_ Kiln	AC	Engine
Mining	70%	70%	70%	50%	70%	70%	70%	70%
Food	70%	70%	70%	50%	70%	70%	70%	70%
Textile	70%	70%	70%	50%	70%	70%	70%	70%
Wood_Paper	70%	70%	70%	50%	70%	70%	70%	70%
Chemical	70%	70%	70%	50%	70%	70%	70%	70%
Petroleum	70%	70%	70%	50%	70%	70%	70%	70%
Stone	70%	70%	70%	50%	70%	70%	70%	70%
Prim_Metal	70%	70%	70%	50%	70%	70%	70%	70%
Fab_Metal	70%	70%	70%	50%	70%	70%	70%	70%
Transport	70%	70%	70%	50%	70%	70%	70%	70%
Misc	70%	70%	70%	50%	70%	70%	70%	70%

Noncore Industrial: EUForecaster Average Equipment Age for End-Uses by Business Types

Segment	Fire_Tube_Boil	Wat_Tube_Boil	Space_Heat	Water_Heat	Dryer	Furnace_Oven_ Kiln	AC	Engine	Misc_Other
Mining	1978.50	1976.00	1971.00	1989.00	1972.60	1971.75	.	1984.50	1971.50
Food	1981.14	1979.00	1978.44	1979.54	1983.50	1977.64	1998.50	1988.50	1976.33
Textile	1977.00	1975.25	.	1980.00	1988.00	1975.00	1990.00	.	1971.00
Wood_Paper	1979.60	1974.64	1975.00	1975.00	1981.40	1977.00	.	1968.00	1980.80
Chemical	1985.20	1976.00	1978.14	1985.00	1986.00	1979.00	1996.00	.	1983.21
Petroleum	1970.00	.	1980.25	1981.50	1967.87	1988.00	.	.	1967.86
Stone	1976.00	.	1984.33	1982.00	1978.25	1975.50	.	.	1966.50
Prim_Metal	1989.50	1974.83	1974.20	1982.88	1988.50	1982.13	1975.00	.	1978.73
Fab_Metal	1973.50	1972.00	1975.50	1981.33	1976.00	1980.05	1998.00	.	1978.05
Transport	1976.50	1989.00	1970.33	1976.00	.	1981.20	1976.00	.	1982.00
Misc	1979.92	1978.00	1978.31	1981.80	1984.33	1979.77	.	.	1983.71

Noncore Industrial: EUForecaster Historical Base Year Data

Segment	2010 Therm Sales	2010 Meter Count	2010 Meter Count, Existing/Old customers	2010 Meter Count New Customers	Avg Use Per Meter Existing Customers	Avg Use Per Meter New Customers	Price Elasticity	Emp Elasticity	MAS SQFT ADJ	Initial SQFT Calibration
Mining	21704523	11	11	0	1973138	.	-0.071000	0.474000	13.2900	177.2025
Food	177201831	109	109	0	1613447	.	-0.071000	0.474000	12.7700	116.3474
Textile	24563799	21	21	0	1169705	.	-0.071000	0.474000	13.0200	271.4589
Wood_Paper	33950435	37	37	0	917579	.	-0.071000	0.474000	8.3700	11.8754
Chemical	35235857	29	29	0	1215030	.	-0.071000	0.474000	17.2700	728.2737
Petroleum	28561708	37	37	0	771938	.	-0.071000	0.474000	3.7300	0.3081
Stone	28049326	16	16	0	1753083	.	-0.071000	0.474000	6.2300	40.1230
Prim_Metal	60773360	23	23	0	2642320	.	-0.071000	0.474000	20.0200	184.5367
Fab_Metal	42347239	43	43	0	984820	.	-0.071000	0.474000	9.0100	16.8171
Transport	18983162	16	16	0	1186448	.	-0.071000	0.474000	7.9900	966.3551
Misc	17704917	29	29	0	610514	.	-0.071000	0.474000	9.4800	226.5333
Total	489,076,157	371								

No temperature adjustment since the weather coefficient is "small" and statistically not significant (i.e., Coeff=1,500 Therms/HDD & ABS(T-Stat) = 1.89 and < 2.00).
(Soruce: See tab "g30Ind-Reg#2(w_HDD)" of file: "S:\End_Use_Model\BMW\2010Cgr\SoCalGas-g30-g50\g30-g50_LoadWeatherSensitivity.xls")

Segment	Actual 2010 Therm Sales
Mining	21,704,523
Food	177,201,831
Textile	24,563,799
Wood_Paper	33,950,435
Chemical	35,235,857
Petroleum	28,561,708
Stone	28,049,326
Prim_Metal	60,773,360
Fab_Metal	42,347,239
Transport	18,983,162
Misc	17,704,917
	489,076,157

FORECAST RESULTS

A. Noncore Commercial

The annual results from the EUForecaster end-use model are shown below for this segment of the noncore market.

Forecast of

Scenario 10 - Base Case

(These are *subtractions* to EUF Dmd)

(These are ***additions*** to EUF Dmd)

Sector	Fuel Type	Year (Base = 2010)	Therms/Yr Forecast for Scenario 10	Noncore **Com**/NonRefinery MDth/Yr	Accum. Migr. to COV MDth/Yr	Accum. EE/DSM Scg Pgm Savings MDth/Yr	Accum. Migr. from g10 **Com** to g30 **Com** MDth/Yr
ComNonCore	Natural_Gas	2010	**192,014,191**	19,201.4	0.0	**0.0**	0.0
		2011	**192,716,125**	19,271.6	0.0	713.8	229.1
		2012	**192,771,169**	19,277.1	7.6	1,479.4	450.8
		2013	**193,242,062**	19,324.2	15.2	2,244.9	671.1
		2014	**193,860,429**	19,386.0	22.8	3,010.5	890.2
		2015	**193,462,417**	19,346.2	30.3	3,776.1	1,107.9
		2016	**194,371,979**	19,437.2	30.3	4,541.6	1,107.9

These respective annual values were proportioned into monthly values using the following set of "weather-adjusted" proportions from the second column of percentages:

Monthly Proportions of Annual Total Load

Month	**Use 2009 "Fitted"**	**Wea-Adj Prop.**
1	**9.53%**	**10.1250%**
2	**9.14%**	**8.9049%**
3	**9.13%**	**9.0187%**
4	**8.25%**	**8.1137%**
5	**7.43%**	**7.5824%**
6	**6.90%**	**6.8563%**
7	**7.08%**	**7.0401%**
8	**7.54%**	**7.5092%**
9	**8.54%**	**8.5165%**
10	**8.20%**	**8.1126%**
11	**8.12%**	**8.2563%**
12	**10.13%**	**9.9643%**
	100.00%	**100.00%**

The value for August 2014 would be:

1,294.8 MDth = (19,386.0 – 22.8 – 3,010.5 + 890.2) x (0.075092)
= (17,242.9) x (0.075092).

A final adjustment to the noncore commercial load forecast was done to account for "Rule-38" gas load. A constant monthly amount of 20 MDth/mo was calculated from 2010 Rule-38 eligible G-30 customer load, of this total about 73% was commercial NAICS business type.

Using the August 2014 data example, the resulting G-30 commercial forecast of demand would be:

1,280.1 MDth = (1,294.8) – (20 x 0.73).

B. Noncore Industrial (Non-Refinery)

The annual results from the EUForecaster end-use model are shown below for this segment of the noncore market.

Forecast of

Scenario 10 - Base Case

Sector	Fuel Type	Year (Base = 2010)	Therms/Yr Forecast for Scenario 10	Noncore **Ind**/NonRefinery MDth/Yr	Accum. Migr. to COV MDth/Yr (These are *subtractions* to EUF Dmd)	Accum. EE/DSM Scg Pgm Savings MDth/Yr (These are *subtractions* to EUF Dmd)	Accum. Migr. from g10 **Ind** to g30 **Ind** MDth/Yr (These are ***additions*** to EUF Dmd)
IndNonCore	Natural_Gas	2010	**489,076,157**	48,907.6	0.0	**0.0**	0.0
		2011	**493,561,193**	49,356.1	0.0	280.7	407.3
		2012	**495,516,412**	49,551.6	145.1	581.6	801.4
		2013	**498,690,312**	49,869.0	290.2	882.5	1,193.1
		2014	**500,384,051**	50,038.4	435.3	1,183.4	1,582.5
		2015	**495,931,855**	49,593.2	580.4	1,484.3	1,969.5
		2016	**494,511,075**	49,451.1	580.4	1,785.2	1,969.5

These respective annual values were proportioned into monthly values using the following set of percentages:

Month	Monthly Proportions of Annual Total Load
1	**8.5782%**
2	**7.7938%**
3	**8.7547%**
4	**8.3289%**
5	**8.4988%**
6	**7.9901%**
7	**8.8529%**
8	**9.8298%**
9	**9.1284%**
10	**8.4519%**
11	**7.1729%**
12	**6.6195%**
	100.00%

The value for August 2014 would be:

4,915.1 MDth = (50,038.4 – 435.3 - 1,183.4 + 1,582.5) x (0.091284)
= (50,002.2) x (0.091284).

A final adjustment to the noncore commercial load forecast was done to account for “Rule-38” gas load. A constant monthly amount of 20 MDth/mo was calculated from

2010 Rule-38 eligible G-30 customer load, of this total about 27% was industriial NAICS business type.

Using the August 2014 data example, the resulting G-30 industrial forecast of demand would be:

4,909.7 MDth = (4,915.1) – (20 x 0.27).

C. Noncore Industrial (Refinery)

The noncore industrial refinery gas demand receives G-30 rate treatment. It is basically the non-cogeneration gas load at refinery facilities served by SoCalGas. The details of how the gas demand forecast for total gas demand at refineries is provided in a separate document below. In this part of the noncore C&I only the refinery load billed at G-30 rates is discussed.

Continuing with the August 2014 month as an example and using the data from the following two tables, the G-30 industrial refinery demand was projected to be:

6,968 MDth = (7,238) – (158) – (112).

The reduction of 112 MDth is the accumulated EE/DSM program impact for refineries while the 158 MDth is reduction expected due to implementation of "greenhouse" gas emission regulation per CA-AB32 together with regulations to implement Low Carbon Fuel Standards (LCFS), both assumed to begin in 2013. The AB32/LCFS impact was calculated as a 1.1%/yr decrease from the base (un-adjusted) refinery G-30 load forecast starting in 2013.

Industrial Refinery G-30 Gas Demand (2010-2012)

		Total	Cal. Days per Month			Ref **G30**, Base Econ. Fcst	Adj for AB32/LCFS implement-ation; beginning Jan-2013	Accum. EE/DSM Scg Pgm Savings for **Refinery G-30**
			(#Days)			MDth	MDth	MDth
2010	Jan	7,377	31			7,377	0	0
2010	Feb	6,914	28			6,914	0	0
2010	Mar	6,948	31			6,948	0	0
2010	Apr	6,637	30			6,637	0	0
2010	May	7,059	31			7,059	0	0
2010	Jun	6,912	30			6,912	0	0
2010	Jul	7,210	31			7,210	0	0
2010	Aug	7,259	31			7,259	0	0
2010	Sep	7,552	30			7,552	0	0
2010	Oct	7,911	31			7,911	0	0
2010	Nov	7,178	30			7,178	0	0
2010	Dec	7,278	31			7,278	0	0
2011	Jan	7,610	31			7,637	0	-26
2011	Feb	6,648	28			6,672	0	-24
2011	Mar	7,077	31			7,103	0	-26
2011	Apr	6,957	30			6,983	0	-26
2011	May	7,242	31			7,268	0	-26
2011	Jun	6,970	30			6,996	0	-26
2011	Jul	7,228	31			7,254	0	-26
2011	Aug	7,339	31			7,365	0	-26
2011	Sep	7,090	30			7,115	0	-26
2011	Oct	7,233	31			7,259	0	-26
2011	Nov	7,111	30			7,137	0	-26
2011	Dec	7,449	31			7,475	0	-26
2012	Jan	7,527	31			7,582	0	-55
2012	Feb	6,703	29			6,754	0	-51
2012	Mar	6,890	31			6,945	0	-55
2012	Apr	6,771	30			6,823	0	-53
2012	May	7,048	31			7,103	0	-55
2012	Jun	6,784	30			6,836	0	-53
2012	Jul	7,034	31			7,089	0	-55
2012	Aug	7,143	31			7,198	0	-55
2012	Sep	6,900	30			6,953	0	-53
2012	Oct	7,039	31			7,094	0	-55
2012	Nov	6,921	30			6,974	0	-53
2012	Dec	7,250	31			7,305	0	-55

Industrial Refinery G-30 Gas Demand (2013-2016)

		Total	Cal. Days per Month			Ref **G30**, Base Econ. Fcst	Adj for AB32/LCFS implement-ation; beginning Jan-2013	Accum. EE/DSM Scg Pgm Savings for **Refinery G-30**
			(#Days)			MDth	MDth	MDth
2013	Jan	7,335	31			7,500	-83	-83
2013	Feb	6,388	28			6,535	-72	-75
2013	Mar	6,793	31			6,953	-76	-83
2013	Apr	6,676	30			6,831	-75	-81
2013	May	6,950	31			7,111	-78	-83
2013	Jun	6,689	30			6,845	-75	-81
2013	Jul	6,936	31			7,097	-78	-83
2013	Aug	7,044	31			7,206	-79	-83
2013	Sep	6,804	30			6,962	-77	-81
2013	Oct	6,941	31			7,102	-78	-83
2013	Nov	6,825	30			6,982	-77	-81
2013	Dec	7,150	31			7,313	-80	-83
2014	Jan	7,245	31			7,521	-165	-112
2014	Feb	6,319	28			6,564	-144	-101
2014	Mar	6,719	31			6,984	-153	-112
2014	Apr	6,604	30			6,862	-150	-108
2014	May	6,875	31			7,143	-156	-112
2014	Jun	6,617	30			6,875	-150	-108
2014	Jul	6,861	31			7,129	-156	-112
2014	Aug	6,968	31			7,238	-158	-112
2014	Sep	6,732	30			6,993	-153	-108
2014	Oct	6,866	31			7,134	-156	-112
2014	Nov	6,752	30			7,013	-153	-108
2014	Dec	7,073	31			7,346	-161	-112
2015	Jan	7,178	31			7,565	-247	-140
2015	Feb	6,254	28			6,595	-215	-126
2015	Mar	6,632	31			7,000	-228	-140
2015	Apr	6,518	30			6,878	-224	-135
2015	May	6,786	31			7,160	-234	-140
2015	Jun	6,531	30			6,892	-225	-135
2015	Jul	6,773	31			7,146	-233	-140
2015	Aug	6,879	31			7,256	-237	-140
2015	Sep	6,645	30			7,009	-229	-135
2015	Oct	6,778	31			7,151	-233	-140
2015	Nov	6,665	30			7,030	-229	-135
2015	Dec	6,983	31			7,363	-240	-140
2016	Jan	7,068	31			7,564	-327	-168
2016	Feb	6,350	29			6,802	-294	-157
2016	Mar	6,494	31			6,963	-301	-168
2016	Apr	6,383	30			6,842	-296	-162
2016	May	6,646	31			7,122	-308	-168
2016	Jun	6,396	30			6,855	-297	-162
2016	Jul	6,633	31			7,108	-308	-168
2016	Aug	6,737	31			7,217	-312	-168
2016	Sep	6,508	30			6,972	-302	-162
2016	Oct	6,637	31			7,113	-308	-168
2016	Nov	6,527	30			6,993	-303	-162
2016	Dec	6,839	31			7,324	-317	-168

D. “Out-of-Model” Gas Demand Forecasts

This final category of gas demand for the G-30 load is associated with EOR customers whose meters area used to calculate charges for gas under more than a single rate—G-30 rates rather than the EOR rates charged for most of their consumption.

The following table shows the monthly load for year 2010. These values were used as the profile for these customers for each year of 2011 through.

Year	Date	(MDth)
2010	Jan	228
2010	Feb	271
2010	Mar	287
2010	Apr	219
2010	May	197
2010	Jun	198
2010	Jul	215
2010	Aug	180
2010	Sep	163
2010	Oct	287
2010	Nov	213
2010	Dec	212

For example, the projected G-30 “out-of-model” gas demand for August 2014 would simply be: 180 MDth.

E. Combined G-30 Gas Demand Forecast

The resulting gas demand for SoCalGas’ G-30 C&I load is the sum of the above market segment forecasts. Using the August 2014 example we have:

13,337.8 MDth = 1,280.1 MDth (G-30 Com)
+ 4,909.7 MDth (G-30 Ind-NonRefinery
+ 6,968 MDth (G-30 Ind-Refinery)
+ 180 MDth (G-30 “Out-of-Model”)

This value checks with the value (133,380 MTh) shown in the SoCalGas consolidated gas demand forecast work papers for August 2014.

Refinery Non-Cogeneration and Cogeneration Gas Demand

INTRODUCTION

Gas demand for refineries is developed from a base econometric forecast for both non-cogeneration (rate class G-30) load and cogeneration (rate class G-50) load. The separation into G-30 and G-50 categories is based on the historical 2010 monthly proportions of each rate class.

From the base forecast, adjustments are made for implementation of new emission regulations per AB32 and Low Carbon Fuel Standards (LCFS) beginning in 2013. Also, for the cogeneration load component, there is an "out-of-model" adjustment to reflect additional cogeneration load for an existing customer.

BASE FORECAST EQUATION

The base econometric forecast is generated from an equation that uses the natural logarithm of average daily monthly refinery gas consumption as the dependent variable. The key explanatory variable is the natural logarithm of the monthly ratio of 2-month average burner-tip natural gas rates (e.g., transportation rate + commodity price) relative to the 2-month average of butane prices. The second component of the forecast equation is a constant term.

The base forecast equation is shown below:

LN(Ref_MDth/d) = 5.61257 + LN(G/B) x (-0.11806), where

G = Average of current month's and prior month's burner-tip gas price, and
B = Average of current month's and prior month's butane price.

The refinery gas demand in a particular month is calculated as:

Ref_MDth/mo = (#days in month) x EXP[LN(Ref_MDth/d)].

For example, the calculation of total refinery gas demand for August 2014 are as follows:

LN[Ref_MDth/d] = 5.61257 + LN[(7.402+7.340)/2)] x (-0.11806)
LN[Ref_MDth/d] = 5.66082

(8,908.9 MDth) = (31) x (EXP[5.66082]) = (31) x (287.384 MDth/d)

This total refinery gas demand was "split" between G-30 and G-50 load using the 2010 monthly proportions that the G-30 load represented relative to the total refinery load. The table below provides these proportions.

Date	2010 Mon.% for G-30 of Total Ref.
Jan-10	**83.155%**
Feb-10	**81.081%**
Mar-10	**78.761%**
Apr-10	**80.339%**
May-10	**80.646%**
Jun-10	**79.984%**
Jul-10	**80.109%**
Aug-10	**81.247%**
Sep-10	**80.899%**
Oct-10	**79.377%**
Nov-10	**79.884%**
Dec-10	**80.527%**

Based on the August 2014 example above, the total refinery gas demand is split into G-30 and G-50 values:

Ref_G-30 = (7,238.2 MDth) = (8,908.9 MDth) x (0.81247), and
Reg_G-50 = (1,670.7 MDth) = (8,908.9 MDth) x (0.18753).

The table below show the entire base refinery gas demand forecast and the split into G-30 and G-50 rate class component loads.

Base Forecast of Refinery Gas Demand

Date	Ref g-30 Mdth	Ref g-50 (CoGen) Mdth	#Days per Month	Total Ref Mdth	Total Ref Mdth/Day	ln(mdtd)	ln(G/B)	Total Ref Burner tip Burner tip Gas $/dth	Butane $/dth
Jan-10	7,377	1,494	31	8,871	286	5.65661	-0.8690	6.492	12.5900
Feb-10	6,914	1,613	28	8,528	305	5.71885	-0.6415	6.232	11.5780
Mar-10	6,948	1,874	31	8,822	285	5.65098	-0.5729	5.984	10.0879
Apr-10	6,637	1,624	30	8,262	275	5.61820	-0.4984	5.961	9.5753
May-10	7,059	1,694	31	8,753	282	5.64312	-0.4804	5.995	9.7556
Jun-10	6,912	1,730	30	8,642	288	5.66319	-0.4903	6.136	10.0525
Jul-10	7,210	1,790	31	9,000	290	5.67101	-0.4896	6.313	10.2612
Aug-10	7,259	1,676	31	8,935	288	5.66374	-0.4878	6.394	10.4349
Sep-10	7,552	1,783	30	9,335	311	5.74028	-0.5147	6.335	10.8634
Oct-10	7,911	2,055	31	9,966	321	5.77298	-0.5831	6.328	11.8225
Nov-10	7,178	1,808	30	8,986	300	5.70219	-0.6649	6.596	13.3055
Dec-10	7,278	1,760	31	9,038	292	5.67518	-0.6996	6.930	13.9215
Jan-11	7636.9	1547.0	31	9183.9	296.255	5.69122	-0.6662	7.288	13.7594
Feb-11	6671.6	1556.7	28	8228.3	293.869	5.68313	-0.5977	7.241	12.6534
Mar-11	7102.9	1915.4	31	9018.4	290.915	5.67303	-0.5121	6.948	11.0249
Apr-11	6982.5	1708.8	30	8691.4	289.712	5.66889	-0.4770	6.389	10.4647
May-11	7268.0	1744.2	31	9012.2	290.717	5.67235	-0.5064	6.343	10.6618
Jun-11	6995.7	1750.7	30	8746.4	291.545	5.67520	-0.5305	6.393	10.9862
Jul-11	7254.0	1801.1	31	9055.2	292.102	5.67710	-0.5466	6.459	11.2143
Aug-11	7365.2	1700.0	31	9065.2	292.425	5.67821	-0.5560	6.513	11.4042
Sep-11	7115.3	1680.0	30	8795.3	293.177	5.68078	-0.5777	6.549	11.8725
Oct-11	7259.1	1886.0	31	9145.1	295.005	5.68699	-0.6304	6.650	12.9206
Nov-11	7136.6	1797.1	30	8933.7	297.791	5.69639	-0.7100	6.851	14.5414
Dec-11	7475.3	1807.7	31	9283.0	299.452	5.70195	-0.7571	7.105	15.2146
Jan-12	7582.0	1535.9	31	9117.9	294.126	5.68401	-0.6051	7.656	11.8209
Feb-12	6753.9	1575.9	29	8329.8	287.236	5.66030	-0.4043	7.489	10.8706
Mar-12	6945.1	1872.8	31	8818.0	284.450	5.65056	-0.3218	7.256	9.4716
Apr-12	6823.5	1669.9	30	8493.4	283.113	5.64585	-0.2819	6.671	8.9903
May-12	7102.6	1704.5	31	8807.1	284.101	5.64933	-0.3114	6.623	9.1596
Jun-12	6836.5	1710.9	30	8547.3	284.911	5.65218	-0.3355	6.675	9.4383
Jul-12	7088.9	1760.1	31	8849.1	285.453	5.65408	-0.3516	6.744	9.6343
Aug-12	7197.5	1661.3	31	8858.8	285.768	5.65518	-0.3609	6.800	9.7974
Sep-12	6953.3	1641.8	30	8595.1	286.502	5.65775	-0.3827	6.838	10.1997
Oct-12	7093.8	1843.1	31	8936.9	288.286	5.66395	-0.4352	6.945	11.1002
Nov-12	6974.0	1756.1	30	8730.2	291.006	5.67335	-0.5148	7.155	12.4926
Dec-12	7304.9	1766.5	31	9071.4	292.625	5.67889	-0.5618	7.421	13.0710
Jan-13	7500.3	1519.3	31	9019.6	290.956	5.67317	-0.5133	7.841	12.4299
Feb-13	6534.9	1524.8	28	8059.7	287.846	5.66243	-0.4223	7.800	11.4307
Mar-13	6952.9	1875.0	31	8827.9	284.771	5.65168	-0.3313	7.557	9.9596
Apr-13	6831.4	1671.9	30	8503.3	283.443	5.64701	-0.2917	6.943	9.4535
May-13	7111.2	1706.6	31	8817.8	284.444	5.65054	-0.3216	6.893	9.6315
Jun-13	6844.7	1712.9	30	8557.6	285.254	5.65338	-0.3457	6.948	9.9246
Jul-13	7097.4	1762.3	31	8859.7	285.796	5.65528	-0.3617	7.020	10.1307
Aug-13	7206.1	1663.3	31	8869.4	286.109	5.65637	-0.3710	7.079	10.3022
Sep-13	6961.5	1643.7	30	8605.3	286.843	5.65893	-0.3927	7.119	10.7252
Oct-13	7102.2	1845.2	31	8947.4	288.626	5.66513	-0.4452	7.231	11.6721
Nov-13	6982.1	1758.2	30	8740.3	291.344	5.67450	-0.5246	7.451	13.1363
Dec-13	7313.2	1768.5	31	9081.7	292.957	5.68003	-0.5714	7.730	13.7444
Jan-14	7520.9	1523.5	31	9044.3	291.753	5.67591	-0.5365	8.200	13.4956
Feb-14	6563.9	1531.6	28	8095.4	289.123	5.66685	-0.4598	8.158	12.4108
Mar-14	6983.8	1883.3	31	8867.0	286.033	5.65611	-0.3688	7.903	10.8135
Apr-14	6861.8	1679.3	30	8541.1	284.704	5.65145	-0.3293	7.260	10.2640
May-14	7142.9	1714.2	31	8857.1	285.714	5.65499	-0.3593	7.207	10.4574
Jun-14	6875.2	1720.6	30	8595.8	286.527	5.65783	-0.3834	7.264	10.7756
Jul-14	7129.1	1770.1	31	8899.2	287.070	5.65973	-0.3994	7.340	10.9993
Aug-14	7238.2	1670.7	31	8908.9	287.384	5.66082	-0.4087	7.402	11.1855
Sep-14	6992.6	1651.1	30	8643.6	288.121	5.66338	-0.4304	7.444	11.6448
Oct-14	7133.8	1853.5	31	8987.2	289.911	5.66957	-0.4828	7.561	12.6729
Nov-14	7013.2	1766.0	30	8779.2	292.639	5.67894	-0.5622	7.792	14.2626
Dec-14	7345.6	1776.4	31	9122.0	294.257	5.68446	-0.6089	8.084	14.9229
Jan-15	7565.1	1532.4	31	9097.5	293.468	5.68177	-0.5861	8.239	14.4091
Feb-15	6595.2	1538.9	28	8134.1	290.504	5.67162	-0.5002	8.535	13.2508
Mar-15	7000.5	1887.8	31	8888.3	286.718	5.65850	-0.3890	8.269	11.5455
Apr-15	6878.3	1683.3	30	8561.7	285.389	5.65385	-0.3497	7.594	10.9588
May-15	7160.2	1718.4	31	8878.5	286.404	5.65740	-0.3798	7.539	11.1652
Jun-15	6891.9	1724.7	30	8616.6	287.219	5.66025	-0.4038	7.599	11.5049
Jul-15	7146.3	1774.4	31	8920.7	287.763	5.66214	-0.4199	7.679	11.7439
Aug-15	7255.7	1674.7	31	8930.4	288.078	5.66323	-0.4291	7.743	11.9427
Sep-15	7009.4	1655.0	30	8664.5	288.816	5.66579	-0.4508	7.787	12.4331
Oct-15	7151.0	1857.9	31	9008.9	290.609	5.67198	-0.5032	7.910	13.5307
Nov-15	7030.0	1770.2	30	8800.3	293.342	5.68134	-0.5825	8.152	15.2280
Dec-15	7363.2	1780.6	31	9143.8	294.963	5.68685	-0.6292	8.458	15.9330
Jan-16	7563.6	1532.1	31	9095.7	293.409	5.68157	-0.5844	8.455	14.4091
Feb-16	6801.9	1587.1	29	8389.0	289.278	5.66739	-0.4643	8.931	13.2508
Mar-16	6963.2	1877.7	31	8840.9	285.189	5.65315	-0.3438	8.652	11.5455
Apr-16	6841.7	1674.4	30	8516.1	283.870	5.64852	-0.3045	7.945	10.9588
May-16	7122.1	1709.2	31	8831.4	284.883	5.65208	-0.3347	7.887	11.1652
Jun-16	6855.3	1715.6	30	8570.8	285.694	5.65492	-0.3587	7.950	11.5049
Jul-16	7108.3	1765.0	31	8873.3	286.234	5.65681	-0.3747	8.033	11.7439
Aug-16	7217.1	1665.8	31	8883.0	286.547	5.65790	-0.3840	8.101	11.9427
Sep-16	6972.2	1646.2	30	8618.4	287.281	5.66046	-0.4057	8.147	12.4331
Oct-16	7112.9	1848.0	31	8961.0	289.063	5.66665	-0.4580	8.276	13.5307
Nov-16	6992.6	1760.8	30	8753.4	291.780	5.67600	-0.5373	8.529	15.2280
Dec-16	7324.0	1771.1	31	9095.1	293.391	5.68151	-0.5839	8.850	15.9330

ADJUSTMENTS TO THE BASE FORECAST

A. Energy Efficiency/DSM Program Savings

Adjustments for energy efficiency/DSM (EE/DSM) programs for refinery customers are applied to the G-30 load portion of the refinery gas demand. The cogeneration (G-50) load is exempt from participating in these programs. The values applied to the refinery G-30 load have been noted in the earlier discussion of the overall G-30 load forecast.

B. New Regulation of Air Quality

The reduction expected due to implementation of "greenhouse" gas emission regulation per CA-AB32 together with regulations to implement Low Carbon Fuel Standards (LCFS), both assumed to begin in 2013. The AB32/LCFS impact was calculated as an accumulated 1.1%/yr decrease from the base (un-adjusted) refinery load forecast starting in 2013.

C. Out-of-Model Adjustments for Refinery Cogeneration

For the G-50 refinery load, we have made an adjustment to account for anticipated increased gas demand from and existing customer beginning in October 2012. The amount of additional cogeneration load is about 12.8 MDth/d through the forecast time horizon.

D. Refinery Industrial G-30 Gas Demand

For the discussion of how the G-30 refinery gas demand is calculated see the discussion under the work papers for the Noncore C&I, section Noncore Industrial (Refinery).

E. Refinery Cogeneration Gas Demand by EG Rate Tiers

Cogeneration (G-50) refinery gas demand is billed according to the two-tiered EG rate structure. The projected refinery cogeneration gas demand by tier assigns 98.3924% of the base refinery cogeneration demand adjusted for AB32/LCFS regulations, to tier 2 plus the out-of-model cogeneration load of 12.8 MDth beginning with October 2012. The cogeneration gas demand to tier 1 is 1.6076% of the base refinery cogeneration demand, adjusted for AB32/LCFS regulations.

Using August 2014 as an example:

Tier 2: (2,004.5 MDth) = (1,671 MDth – 37 MDth) x (0.9839243)
+ (12.8 MDth/d) x (31 days/mo, for Aug-2014)

= (1,607.7) + (396.8)

Tier 1: (26.3 MDth) = (1,670.7 MDth – 37 MDth) x (0.016076)

Refinery Cogeneration Tier 1 (< 3,000,000 Thm/Yr) Gas Demand (2010-2012)

		Total	Cal. Days per Month	Out-of-Model Adj Existing Cust-New CoGen		Ref **G50**, Base Econ. Fcst	Adj for AB32/LCFS implement-ation; beginning Jan-2013
		1.6076%	(#Days)	MDth/d		MDth	MDth
2010	Jan	24	31	0		1,494	0
2010	Feb	26	28	0		1,613	0
2010	Mar	30	31	0		1,874	0
2010	Apr	26	30	0		1,624	0
2010	May	27	31	0		1,694	0
2010	Jun	28	30	0		1,730	0
2010	Jul	29	31	0		1,790	0
2010	Aug	27	31	0		1,676	0
2010	Sep	29	30	0		1,783	0
2010	Oct	33	31	0		2,055	0
2010	Nov	29	30	0		1,808	0
2010	Dec	28	31	0		1,760	0
2011	Jan	25	31	0		1,547	0
2011	Feb	25	28	0		1,557	0
2011	Mar	31	31	0		1,915	0
2011	Apr	27	30	0		1,709	0
2011	May	28	31	0		1,744	0
2011	Jun	28	30	0		1,751	0
2011	Jul	29	31	0		1,801	0
2011	Aug	27	31	0		1,700	0
2011	Sep	27	30	0		1,680	0
2011	Oct	30	31	0		1,886	0
2011	Nov	29	30	0		1,797	0
2011	Dec	29	31	0		1,808	0
2012	Jan	25	31	0		1,536	0
2012	Feb	25	29	0		1,576	0
2012	Mar	30	31	0		1,873	0
2012	Apr	27	30	0		1,670	0
2012	May	27	31	0		1,705	0
2012	Jun	28	30	0		1,711	0
2012	Jul	28	31	0		1,760	0
2012	Aug	27	31	0		1,661	0
2012	Sep	26	30	0		1,642	0
2012	Oct	30	31	0		1,843	0
2012	Nov	28	30	0		1,756	0
2012	Dec	28	31	0		1,767	0

Refinery Cogeneration Tier 1 (≤ 3,000,000 Thm/Yr) Gas Demand (2013-2016)

		Total	Cal. Days per Month	Out-of-Model Adj Existing Cust-New CoGen		Ref **G50**, Base Econ. Fcst	Adj for AB32/LCFS implement-ation; beginning Jan-2013
		1.6076%	(#Days)	MDth/d		MDth	MDth
2013	Jan	24	31	0		1,519	-17
2013	Feb	24	28	0		1,525	-17
2013	Mar	30	31	0		1,875	-21
2013	Apr	27	30	0		1,672	-18
2013	May	27	31	0		1,707	-19
2013	Jun	27	30	0		1,713	-19
2013	Jul	28	31	0		1,762	-19
2013	Aug	26	31	0		1,663	-18
2013	Sep	26	30	0		1,644	-18
2013	Oct	29	31	0		1,845	-20
2013	Nov	28	30	0		1,758	-19
2013	Dec	28	31	0		1,769	-19
2014	Jan	24	31	0		1,523	-33
2014	Feb	24	28	0		1,532	-34
2014	Mar	30	31	0		1,883	-41
2014	Apr	26	30	0		1,679	-37
2014	May	27	31	0		1,714	-38
2014	Jun	27	30	0		1,721	-38
2014	Jul	28	31	0		1,770	-39
2014	Aug	26	31	0		1,671	-37
2014	Sep	26	30	0		1,651	-36
2014	Oct	29	31	0		1,853	-41
2014	Nov	28	30	0		1,766	-39
2014	Dec	28	31	0		1,776	-39
2015	Jan	24	31	0		1,532	-50
2015	Feb	24	28	0		1,539	-50
2015	Mar	29	31	0		1,888	-62
2015	Apr	26	30	0		1,683	-55
2015	May	27	31	0		1,718	-56
2015	Jun	27	30	0		1,725	-56
2015	Jul	28	31	0		1,774	-58
2015	Aug	26	31	0		1,675	-55
2015	Sep	26	30	0		1,655	-54
2015	Oct	29	31	0		1,858	-61
2015	Nov	28	30	0		1,770	-58
2015	Dec	28	31	0		1,781	-58
2016	Jan	24	31	0		1,532	-66
2016	Feb	24	29	0		1,587	-69
2016	Mar	29	31	0		1,878	-81
2016	Apr	26	30	0		1,674	-72
2016	May	26	31	0		1,709	-74
2016	Jun	26	30	0		1,716	-74
2016	Jul	27	31	0		1,765	-76
2016	Aug	26	31	0		1,666	-72
2016	Sep	25	30	0		1,646	-71
2016	Oct	28	31	0		1,848	-80
2016	Nov	27	30	0		1,761	-76
2016	Dec	27	31	0		1,771	-77

Refinery Cogeneration Tier 2 (> 3,000,000 Thm/Yr) Gas Demand (2010-2012)

		Total	Cal. Days per Month	Out-of-Model Adj Existing Cust-New CoGen		Ref **G50**, Base Econ. Fcst	Adj for AB32/LCFS implement-ation; beginning Jan-2013
		98.39243%	(#Days)	MDth/d		MDth	MDth
2010	Jan	1,470	31	0		1,494	0
2010	Feb	1,587	28	0		1,613	0
2010	Mar	1,844	31	0		1,874	0
2010	Apr	1,598	30	0		1,624	0
2010	May	1,667	31	0		1,694	0
2010	Jun	1,702	30	0		1,730	0
2010	Jul	1,761	31	0		1,790	0
2010	Aug	1,649	31	0		1,676	0
2010	Sep	1,754	30	0		1,783	0
2010	Oct	2,022	31	0		2,055	0
2010	Nov	1,778	30	0		1,808	0
2010	Dec	1,732	31	0		1,760	0
2011	Jan	1,522	31	0		1,547	0
2011	Feb	1,532	28	0		1,557	0
2011	Mar	1,885	31	0		1,915	0
2011	Apr	1,681	30	0		1,709	0
2011	May	1,716	31	0		1,744	0
2011	Jun	1,723	30	0		1,751	0
2011	Jul	1,772	31	0		1,801	0
2011	Aug	1,673	31	0		1,700	0
2011	Sep	1,653	30	0		1,680	0
2011	Oct	1,856	31	0		1,886	0
2011	Nov	1,768	30	0		1,797	0
2011	Dec	1,779	31	0		1,808	0
2012	Jan	1,511	31	0		1,536	0
2012	Feb	1,551	29	0		1,576	0
2012	Mar	1,843	31	0		1,873	0
2012	Apr	1,643	30	0		1,670	0
2012	May	1,677	31	0		1,705	0
2012	Jun	1,683	30	0		1,711	0
2012	Jul	1,732	31	0		1,760	0
2012	Aug	1,635	31	0		1,661	0
2012	Sep	1,615	30	0		1,642	0
2012	Oct	2,210	31	12.794		1,843	0
2012	Nov	1,741	30	12.794		1,756	0
2012	Dec	1,751	31	12.794		1,767	0

Refinery Cogeneration Tier 2 (> 3,000,000 Thm/Yr) Gas Demand (2013-2016)

		Total	Cal. Days per Month	Out-of-Model Adj Existing Cust-New CoGen		Ref **G50**, Base Econ. Fcst	Adj for AB32/LCFS implement-ation; beginning Jan-2013
		98.39243%	(#Days)	MDth/d		MDth	MDth
2013	Jan	1,491	31	12.794		1,519	-17
2013	Feb	1,497	28	12.794		1,525	-17
2013	Mar	1,837	31	12.794		1,875	-21
2013	Apr	1,640	30	12.794		1,672	-18
2013	May	1,673	31	12.794		1,707	-19
2013	Jun	1,680	30	12.794		1,713	-19
2013	Jul	1,728	31	12.794		1,762	-19
2013	Aug	1,631	31	12.794		1,663	-18
2013	Sep	1,612	30	12.794		1,644	-18
2013	Oct	1,808	31	12.79		1,845	-20
2013	Nov	1,724	30	12.79		1,758	-19
2013	Dec	1,734	31	12.79		1,769	-19
2014	Jan	1,479	31	12.79		1,523	-33
2014	Feb	1,487	28	12.79		1,532	-34
2014	Mar	1,825	31	12.79		1,883	-41
2014	Apr	1,629	30	12.79		1,679	-37
2014	May	1,663	31	12.79		1,714	-38
2014	Jun	1,669	30	12.79		1,721	-38
2014	Jul	1,716	31	12.79		1,770	-39
2014	Aug	1,621	31	12.79		1,671	-37
2014	Sep	1,602	30	12.79		1,651	-36
2014	Oct	1,797	31	12.79		1,853	-41
2014	Nov	1,712	30	12.79		1,766	-39
2014	Dec	1,722	31	12.79		1,776	-39
2015	Jan	1,471	31	12.79		1,532	-50
2015	Feb	1,478	28	12.79		1,539	-50
2015	Mar	1,810	31	12.79		1,888	-62
2015	Apr	1,615	30	12.79		1,683	-55
2015	May	1,648	31	12.79		1,718	-56
2015	Jun	1,654	30	12.79		1,725	-56
2015	Jul	1,702	31	12.79		1,774	-58
2015	Aug	1,607	31	12.79		1,675	-55
2015	Sep	1,588	30	12.79		1,655	-54
2015	Oct	1,781	31	12.79		1,858	-61
2015	Nov	1,698	30	12.79		1,770	-58
2015	Dec	1,708	31	12.79		1,781	-58
2016	Jan	1,455	31	12.79		1,532	-66
2016	Feb	1,507	29	12.79		1,587	-69
2016	Mar	1,780	31	12.79		1,878	-81
2016	Apr	1,589	30	12.79		1,674	-72
2016	May	1,622	31	12.79		1,709	-74
2016	Jun	1,628	30	12.79		1,716	-74
2016	Jul	1,674	31	12.79		1,765	-76
2016	Aug	1,581	31	12.79		1,666	-72
2016	Sep	1,562	30	12.79		1,646	-71
2016	Oct	1,752	31	12.79		1,848	-80
2016	Nov	1,670	30	12.79		1,761	-76
2016	Dec	1,680	31	12.79		1,771	-77

Refinery Cogeneration Tier 1 (< 3,000,000 Thm/Yr) Gas Demand (2010-2012)

		Total	Cal. Days per Month	Out-of-Model Adj Existing Cust-New CoGen		Ref **G50**, Base Econ. Fcst	Adj for AB32/LCFS implement-ation; beginning Jan-2013
		1.6076%	(#Days)	MDth/d		MDth	MDth
2010	Jan	24	31	0		1,494	0
2010	Feb	26	28	0		1,613	0
2010	Mar	30	31	0		1,874	0
2010	Apr	26	30	0		1,624	0
2010	May	27	31	0		1,694	0
2010	Jun	28	30	0		1,730	0
2010	Jul	29	31	0		1,790	0
2010	Aug	27	31	0		1,676	0
2010	Sep	29	30	0		1,783	0
2010	Oct	33	31	0		2,055	0
2010	Nov	29	30	0		1,808	0
2010	Dec	28	31	0		1,760	0
2011	Jan	25	31	0		1,547	0
2011	Feb	25	28	0		1,557	0
2011	Mar	31	31	0		1,915	0
2011	Apr	27	30	0		1,709	0
2011	May	28	31	0		1,744	0
2011	Jun	28	30	0		1,751	0
2011	Jul	29	31	0		1,801	0
2011	Aug	27	31	0		1,700	0
2011	Sep	27	30	0		1,680	0
2011	Oct	30	31	0		1,886	0
2011	Nov	29	30	0		1,797	0
2011	Dec	29	31	0		1,808	0
2012	Jan	25	31	0		1,536	0
2012	Feb	25	29	0		1,576	0
2012	Mar	30	31	0		1,873	0
2012	Apr	27	30	0		1,670	0
2012	May	27	31	0		1,705	0
2012	Jun	28	30	0		1,711	0
2012	Jul	28	31	0		1,760	0
2012	Aug	27	31	0		1,661	0
2012	Sep	26	30	0		1,642	0
2012	Oct	30	31	0		1,843	0
2012	Nov	28	30	0		1,756	0
2012	Dec	28	31	0		1,767	0

Refinery Cogeneration Tier 1 (≤ 3,000,000 Thm/Yr) Gas Demand (2013-2016)

		Total	Cal. Days per Month	Out-of-Model Adj Existing Cust-New CoGen		Ref **G50**, Base Econ. Fcst	Adj for AB32/LCFS implement-ation; beginning Jan-2013
		1.6076%	(#Days)	MDth/d		MDth	MDth
2013	Jan	24	31	0		1,519	-17
2013	Feb	24	28	0		1,525	-17
2013	Mar	30	31	0		1,875	-21
2013	Apr	27	30	0		1,672	-18
2013	May	27	31	0		1,707	-19
2013	Jun	27	30	0		1,713	-19
2013	Jul	28	31	0		1,762	-19
2013	Aug	26	31	0		1,663	-18
2013	Sep	26	30	0		1,644	-18
2013	Oct	29	31	0		1,845	-20
2013	Nov	28	30	0		1,758	-19
2013	Dec	28	31	0		1,769	-19
2014	Jan	24	31	0		1,523	-33
2014	Feb	24	28	0		1,532	-34
2014	Mar	30	31	0		1,883	-41
2014	Apr	26	30	0		1,679	-37
2014	May	27	31	0		1,714	-38
2014	Jun	27	30	0		1,721	-38
2014	Jul	28	31	0		1,770	-39
2014	Aug	26	31	0		1,671	-37
2014	Sep	26	30	0		1,651	-36
2014	Oct	29	31	0		1,853	-41
2014	Nov	28	30	0		1,766	-39
2014	Dec	28	31	0		1,776	-39
2015	Jan	24	31	0		1,532	-50
2015	Feb	24	28	0		1,539	-50
2015	Mar	29	31	0		1,888	-62
2015	Apr	26	30	0		1,683	-55
2015	May	27	31	0		1,718	-56
2015	Jun	27	30	0		1,725	-56
2015	Jul	28	31	0		1,774	-58
2015	Aug	26	31	0		1,675	-55
2015	Sep	26	30	0		1,655	-54
2015	Oct	29	31	0		1,858	-61
2015	Nov	28	30	0		1,770	-58
2015	Dec	28	31	0		1,781	-58
2016	Jan	24	31	0		1,532	-66
2016	Feb	24	29	0		1,587	-69
2016	Mar	29	31	0		1,878	-81
2016	Apr	26	30	0		1,674	-72
2016	May	26	31	0		1,709	-74
2016	Jun	26	30	0		1,716	-74
2016	Jul	27	31	0		1,765	-76
2016	Aug	26	31	0		1,666	-72
2016	Sep	25	30	0		1,646	-71
2016	Oct	28	31	0		1,848	-80
2016	Nov	27	30	0		1,761	-76
2016	Dec	27	31	0		1,771	-77

Refinery Cogeneration Tier 2 (> 3,000,000 Thm/Yr) Gas Demand (2010-2012)

		Total	Cal. Days per Month	Out-of-Model Adj Existing Cust-New CoGen		Ref **G50**, Base Econ. Fcst	Adj for AB32/LCFS implement-ation; beginning Jan-2013
		98.39243%	(#Days)	MDth/d		MDth	MDth
2010	Jan	1,470	31	0		1,494	0
2010	Feb	1,587	28	0		1,613	0
2010	Mar	1,844	31	0		1,874	0
2010	Apr	1,598	30	0		1,624	0
2010	May	1,667	31	0		1,694	0
2010	Jun	1,702	30	0		1,730	0
2010	Jul	1,761	31	0		1,790	0
2010	Aug	1,649	31	0		1,676	0
2010	Sep	1,754	30	0		1,783	0
2010	Oct	2,022	31	0		2,055	0
2010	Nov	1,778	30	0		1,808	0
2010	Dec	1,732	31	0		1,760	0
2011	Jan	1,522	31	0		1,547	0
2011	Feb	1,532	28	0		1,557	0
2011	Mar	1,885	31	0		1,915	0
2011	Apr	1,681	30	0		1,709	0
2011	May	1,716	31	0		1,744	0
2011	Jun	1,723	30	0		1,751	0
2011	Jul	1,772	31	0		1,801	0
2011	Aug	1,673	31	0		1,700	0
2011	Sep	1,653	30	0		1,680	0
2011	Oct	1,856	31	0		1,886	0
2011	Nov	1,768	30	0		1,797	0
2011	Dec	1,779	31	0		1,808	0
2012	Jan	1,511	31	0		1,536	0
2012	Feb	1,551	29	0		1,576	0
2012	Mar	1,843	31	0		1,873	0
2012	Apr	1,643	30	0		1,670	0
2012	May	1,677	31	0		1,705	0
2012	Jun	1,683	30	0		1,711	0
2012	Jul	1,732	31	0		1,760	0
2012	Aug	1,635	31	0		1,661	0
2012	Sep	1,615	30	0		1,642	0
2012	Oct	2,210	31	12.794		1,843	0
2012	Nov	1,741	30	12.794		1,756	0
2012	Dec	1,751	31	12.794		1,767	0

Refinery Cogeneration Tier 2 (> 3,000,000 Thm/Yr) Gas Demand (2013-2016)

		Total	Cal. Days per Month	Out-of-Model Adj Existing Cust-New CoGen		Ref **G50**, Base Econ. Fcst	Adj for AB32/LCFS implement-ation; beginning Jan-2013
		98.39243%	(#Days)	MDth/d		MDth	MDth
2013	Jan	1,491	31	12.794		1,519	-17
2013	Feb	1,497	28	12.794		1,525	-17
2013	Mar	1,837	31	12.794		1,875	-21
2013	Apr	1,640	30	12.794		1,672	-18
2013	May	1,673	31	12.794		1,707	-19
2013	Jun	1,680	30	12.794		1,713	-19
2013	Jul	1,728	31	12.794		1,762	-19
2013	Aug	1,631	31	12.794		1,663	-18
2013	Sep	1,612	30	12.794		1,644	-18
2013	Oct	1,808	31	12.79		1,845	-20
2013	Nov	1,724	30	12.79		1,758	-19
2013	Dec	1,734	31	12.79		1,769	-19
2014	Jan	1,479	31	12.79		1,523	-33
2014	Feb	1,487	28	12.79		1,532	-34
2014	Mar	1,825	31	12.79		1,883	-41
2014	Apr	1,629	30	12.79		1,679	-37
2014	May	1,663	31	12.79		1,714	-38
2014	Jun	1,669	30	12.79		1,721	-38
2014	Jul	1,716	31	12.79		1,770	-39
2014	Aug	1,621	31	12.79		1,671	-37
2014	Sep	1,602	30	12.79		1,651	-36
2014	Oct	1,797	31	12.79		1,853	-41
2014	Nov	1,712	30	12.79		1,766	-39
2014	Dec	1,722	31	12.79		1,776	-39
2015	Jan	1,471	31	12.79		1,532	-50
2015	Feb	1,478	28	12.79		1,539	-50
2015	Mar	1,810	31	12.79		1,888	-62
2015	Apr	1,615	30	12.79		1,683	-55
2015	May	1,648	31	12.79		1,718	-56
2015	Jun	1,654	30	12.79		1,725	-56
2015	Jul	1,702	31	12.79		1,774	-58
2015	Aug	1,607	31	12.79		1,675	-55
2015	Sep	1,588	30	12.79		1,655	-54
2015	Oct	1,781	31	12.79		1,858	-61
2015	Nov	1,698	30	12.79		1,770	-58
2015	Dec	1,708	31	12.79		1,781	-58
2016	Jan	1,455	31	12.79		1,532	-66
2016	Feb	1,507	29	12.79		1,587	-69
2016	Mar	1,780	31	12.79		1,878	-81
2016	Apr	1,589	30	12.79		1,674	-72
2016	May	1,622	31	12.79		1,709	-74
2016	Jun	1,628	30	12.79		1,716	-74
2016	Jul	1,674	31	12.79		1,765	-76
2016	Aug	1,581	31	12.79		1,666	-72
2016	Sep	1,562	30	12.79		1,646	-71
2016	Oct	1,752	31	12.79		1,848	-80
2016	Nov	1,670	30	12.79		1,761	-76
2016	Dec	1,680	31	12.79		1,771	-77

Small Cogeneration (Capacity < 20 Mw)
Gas Demand

INTRODUCTION

The gas demand forecast for small cogeneration (capacity < 20 Mw) is based on an econometric relationship from analysis of annual historical data together with a monthly profile of how the annual consumption is split over the months of a year.

Although these customers are associated with G-50 transportation rates their gas demand in total is split into two tiers based on a coustomers' annual consumption (tier 1 for ≤ 3,000,000 Thm/yr; and tier 2 for > 3,000,000 Thm/yr). As electric generation customers their consumption is billed at the EG rate structure.

BASE EQUATION TO FORECAST ANNUAL DEMAND

The base forecast equation for annual demand is shown below:

LN(SmCoGen_MDth/yr) = 9.04504 + LN(#Cust) x (0.17282)
+ LN(G/E) x (-0.20147), where

#Cust = Number of active meters/customers,
G =SCG's "EG tier1" Burner-Tip Price cnv. to ¢/Kwh
at 87.60 Thm/Yr per Kw, and
E = SCE-Retail Ind Elec. Price. ¢/Kwh

The small cogeneration gas demand in a particular year is calculated as:

SmCoGen_MDth/yr = EXP[LN(SmCoGen_MDth/yr)].

For example, the calculation of total refinery gas demand for 2014 are as follows:

LN[SmCoGen_MDth/yr] = 9.04504 + LN(151) x (0.17282)
+ LN[(15.426 ¢/Kwh)/(14.252 ¢/Kwh)] x (-0.20147)
LN[SmCoGen_MDth/yr] = 9.8959

(19,848 MDth/yr) = (EXP[9.8959])

The table below shows the entire annual small cogeneration gas demand forecast.

Base Annual Forecast of Small Cogeneration Gas Demand

Year (YYYY)	Annual (Cal Yr) Load (MDth)	Cust (cnt)	Avg. Annual Monthly Load per Cust (Therms/ cust)	LN(Ann.MDTh /Yr)	LN(Cust) (cnt)	LN (G/E)	Gas/Elec. (G/E) Price Ratio	SCE-Retail Ind Elec. Price (Nom ¢/Kwh)	SCG's "EG tier1" Burner-Tip Price cnv. to ¢/Kwh at 87.60 Thm/Yr per Kw (Nom ¢/Kwh-Equiv.)	SCG's "EG tier1" Burner-Tip Price (Nom ¢/Thm)
2010	21,077	143	122,825	9.96	4.96	-0.056	0.95	12.41	11.73	48.890
2011	20,409	151	112,971	9.9238	5.01	-0.060	0.94	12.370	11.647	48.528
2012	20,330	151	112,414	9.9199	5.02	-0.040	0.96	13.234	12.715	52.980
2013	19,941	151	110,214	9.9005	5.02	0.056	1.06	13.850	14.653	61.055
2014	19,848	151	109,740	9.8959	5.02	0.079	1.08	14.252	15.426	64.276
2015	19,323	151	106,927	9.8691	5.01	0.211	1.24	14.554	17.981	74.920
2016	19,236	150	106,523	9.8646	5.01	0.233	1.26	14.909	18.825	78.437

This total annual small cogeneration gas demand was “split” into monthly load using the monthly proportions in the table below.

Month (mm)	Date (mmm)	*Smoothed* Monthly Load as % of Annual (2004-2010) (% of Ann. Tot.)
1	Jan	8.0420%
2	Feb	7.1519%
3	Mar	7.9145%
4	Apr	7.7413%
5	May	8.1792%
6	Jun	8.5850%
7	Jul	9.0338%
8	Aug	9.2560%
9	Sep	8.7704%
10	Oct	8.8709%
11	Nov	8.1829%
12	Dec	8.2721%
	Check-Sum Total:	100.0000%

FORECAST RESULTS

Based on the year 2014 example above, the August 2014 small cogeneration (G-50) gas demand is calculated as:

SmCoGen_G-50 = (1,837.1 MDth) = (19,848 MDth/yr) x (0.0.092560)

Small cogeneration (G-50) gas demand is billed according to the two-tiered EG rate structure. The projected gas demand by tier assigns 79.2388% of the total cogeneration demand to tier 2; the remaining 20.7612% is assigned to tier 1.

Using August 2014 as an example:

Tier 2: (1,455.7MDth) = (1,837.1 MDth) x (0.792388)

Tier 1: (381.4 MDth) = (1,837.1 MDth) x (0.207612)

The tables below show the small cogeneration gas demand forecast, monthly, through 2016 by total and by EG rate tiers.

Small Cogeneration Gas Demand (2010-2012)

	SmCoGen (Total) (MDth)	SmCoGen (Tier 1) (MDth)	SmCoGen (Tier 2) (MDth)
2010 Jan	1,695	352	1,343
2010 Feb	1,507	313	1,194
2010 Mar	1,668	346	1,322
2010 Apr	1,632	339	1,293
2010 May	1,724	358	1,366
2010 Jun	1,809	376	1,434
2010 Jul	1,904	395	1,509
2010 Aug	1,951	405	1,546
2010 Sep	1,849	384	1,465
2010 Oct	1,870	388	1,482
2010 Nov	1,725	358	1,367
2010 Dec	1,743	362	1,382
2011 Jan	1,641	341	1,301
2011 Feb	1,460	303	1,157
2011 Mar	1,615	335	1,280
2011 Apr	1,580	328	1,252
2011 May	1,669	347	1,323
2011 Jun	1,752	364	1,388
2011 Jul	1,844	383	1,461
2011 Aug	1,889	392	1,497
2011 Sep	1,790	372	1,418
2011 Oct	1,810	376	1,435
2011 Nov	1,670	347	1,323
2011 Dec	1,688	351	1,338
2012 Jan	1,635	339	1,296
2012 Feb	1,454	302	1,152
2012 Mar	1,609	334	1,275
2012 Apr	1,574	327	1,247
2012 May	1,663	345	1,318
2012 Jun	1,745	362	1,383
2012 Jul	1,837	381	1,455
2012 Aug	1,882	391	1,491
2012 Sep	1,783	370	1,413
2012 Oct	1,803	374	1,429
2012 Nov	1,664	345	1,318
2012 Dec	1,682	349	1,333

Small Cogeneration Gas Demand (2013-2016)

	SmCoGen (Total) (MDth)	SmCoGen (Tier 1) (MDth)	SmCoGen (Tier 2) (MDth)
2013 Jan	1,604	333	1,271
2013 Feb	1,426	296	1,130
2013 Mar	1,578	328	1,251
2013 Apr	1,544	320	1,223
2013 May	1,631	339	1,292
2013 Jun	1,712	355	1,357
2013 Jul	1,801	374	1,427
2013 Aug	1,846	383	1,463
2013 Sep	1,749	363	1,386
2013 Oct	1,769	367	1,402
2013 Nov	1,632	339	1,293
2013 Dec	1,650	342	1,307
2014 Jan	1,596	331	1,265
2014 Feb	1,420	295	1,125
2014 Mar	1,571	326	1,245
2014 Apr	1,537	319	1,218
2014 May	1,623	337	1,286
2014 Jun	1,704	354	1,350
2014 Jul	1,793	372	1,421
2014 Aug	1,837	381	1,456
2014 Sep	1,741	361	1,379
2014 Oct	1,761	366	1,395
2014 Nov	1,624	337	1,287
2014 Dec	1,642	341	1,301
2015 Jan	1,554	323	1,231
2015 Feb	1,382	287	1,095
2015 Mar	1,529	318	1,212
2015 Apr	1,496	311	1,185
2015 May	1,581	328	1,252
2015 Jun	1,659	344	1,315
2015 Jul	1,746	362	1,383
2015 Aug	1,789	371	1,417
2015 Sep	1,695	352	1,343
2015 Oct	1,714	356	1,358
2015 Nov	1,581	328	1,253
2015 Dec	1,598	332	1,267
2016 Jan	1,547	321	1,226
2016 Feb	1,376	286	1,090
2016 Mar	1,522	316	1,206
2016 Apr	1,489	309	1,180
2016 May	1,573	327	1,247
2016 Jun	1,651	343	1,309
2016 Jul	1,738	361	1,377
2016 Aug	1,781	370	1,411
2016 Sep	1,687	350	1,337
2016 Oct	1,706	354	1,352
2016 Nov	1,574	327	1,247
2016 Dec	1,591	330	1,261

Large Cogeneration (Capacity > 20 Mw), Utility Electric Generation (UEG) and Exempt Wholesale Generation (EWG) Gas Demand

The gas demand forecasts for large cogeneration (capacity > 20 Mw), utility electric generation (UEG) and exempt wholesale generation (EWG) are provided by Mr. Huang based on the results of the model he uses. This model produces forecasts of natural gas demand based on an analysis of the operation of power plants in the Western U.S. electric market using a production costing model. This forecast uses Ventyx's Market Analytics model. Further details are discussed by Mr. Huang in his prepared testimony and his work papers.

The tables provided below summarize the gas demand forecasts provided by Mr. Huang for the large cogeneration market segment and the combined UEG/EWG segment. The tables are separated by EG rate tier.

Large Cogeneration, UEG/EWG Gas Demand (2010-2012) Tier 1

MONTHLY FORECAST DATA

Year	Month	Total (LgCoGen/ UEG/EWG) (MDth)	G-50 Large CoGen (MDth)	G-50 UEG/EWG (MDth)
2010	Jan	129	0	129
2010	Feb	69	0	69
2010	Mar	102	0	102
2010	Apr	73	0	73
2010	May	115	0	115
2010	Jun	154	0	154
2010	Jul	284	0	284
2010	Aug	286	0	286
2010	Sep	319	0	319
2010	Oct	146	0	146
2010	Nov	126	0	126
2010	Dec	37	0	37
2011	Jan	210	0	210
2011	Feb	111	0	111
2011	Mar	112	0	112
2011	Apr	223	0	223
2011	May	302	0	302
2011	Jun	335	0	335
2011	Jul	769	0	769
2011	Aug	852	0	852
2011	Sep	629	0	629
2011	Oct	474	0	474
2011	Nov	456	0	456
2011	Dec	220	0	220
2012	Jan	173	0	173
2012	Feb	111	0	111
2012	Mar	176	0	176
2012	Apr	316	0	316
2012	May	284	0	284
2012	Jun	399	0	399
2012	Jul	735	0	735
2012	Aug	802	0	802
2012	Sep	587	0	587
2012	Oct	542	0	542
2012	Nov	592	0	592
2012	Dec	200	0	200

Large Cogeneration, UEG/EWG Gas Demand (2013-2016) Tier 1

MONTHLY FORECAST DATA Year	Month	Total (LgCoGen/ UEG/EWG) (MDth)	G-50 Large CoGen (MDth)	G-50 UEG/EWG (MDth)
2013	Jan	139	0	139
2013	Feb	112	0	112
2013	Mar	110	0	110
2013	Apr	200	0	200
2013	May	208	0	208
2013	Jun	232	0	232
2013	Jul	420	0	420
2013	Aug	522	0	522
2013	Sep	404	0	404
2013	Oct	132	0	132
2013	Nov	107	0	107
2013	Dec	99	0	99
2014	Jan	100	0	100
2014	Feb	78	0	78
2014	Mar	88	0	88
2014	Apr	171	0	171
2014	May	175	0	175
2014	Jun	169	0	169
2014	Jul	327	0	327
2014	Aug	399	0	399
2014	Sep	317	0	317
2014	Oct	104	0	104
2014	Nov	116	0	116
2014	Dec	102	0	102
2015	Jan	98	0	98
2015	Feb	90	0	90
2015	Mar	93	0	93
2015	Apr	135	0	135
2015	May	136	0	136
2015	Jun	173	0	173
2015	Jul	381	0	381
2015	Aug	417	0	417
2015	Sep	333	0	333
2015	Oct	185	0	185
2015	Nov	148	0	148
2015	Dec	112	0	112
2016	Jan	111	0	111
2016	Feb	81	0	81
2016	Mar	84	0	84
2016	Apr	105	0	105
2016	May	157	0	157
2016	Jun	178	0	178
2016	Jul	377	0	377
2016	Aug	460	0	460
2016	Sep	380	0	380
2016	Oct	149	0	149
2016	Nov	110	0	110
2016	Dec	107	0	107

Large Cogeneration, UEG/EWG Gas Demand (2010-2012) Tier 2

MONTHLY FORECAST DATA Year	Month	Total (LgCoGen/ UEG/EWG) (MDth)	G-50 Large CoGen (MDth)	G-50 UEG/EWG (MDth)
2010	Jan	15,376	4,663	10,713
2010	Feb	14,600	4,209	10,392
2010	Mar	16,919	4,575	12,344
2010	Apr	16,113	4,235	11,878
2010	May	15,348	4,264	11,084
2010	Jun	16,894	4,728	12,166
2010	Jul	23,270	4,664	18,606
2010	Aug	29,053	4,431	24,622
2010	Sep	24,939	4,614	20,325
2010	Oct	26,300	4,243	22,057
2010	Nov	22,990	4,215	18,775
2010	Dec	19,580	4,701	14,879
2011	Jan	15,627	4,229	11,398
2011	Feb	13,943	3,762	10,181
2011	Mar	15,261	4,055	11,206
2011	Apr	15,874	3,972	11,902
2011	May	17,511	4,206	13,305
2011	Jun	20,005	4,240	15,765
2011	Jul	28,329	4,632	23,696
2011	Aug	29,748	4,721	25,027
2011	Sep	24,344	4,504	19,841
2011	Oct	19,118	4,490	14,628
2011	Nov	18,386	4,265	14,120
2011	Dec	17,136	4,403	12,733
2012	Jan	16,355	4,334	12,021
2012	Feb	14,380	3,924	10,457
2012	Mar	15,809	4,192	11,617
2012	Apr	16,609	4,090	12,518
2012	May	17,874	4,155	13,719
2012	Jun	20,650	4,268	16,382
2012	Jul	30,808	4,731	26,077
2012	Aug	30,065	4,737	25,328
2012	Sep	25,556	4,495	21,061
2012	Oct	19,967	4,509	15,458
2012	Nov	18,460	4,256	14,205
2012	Dec	17,297	4,411	12,886

Large Cogeneration, UEG/EWG Gas Demand (2013-2016) Tier 2

MONTHLY FORECAST DATA

Year	Month	Total (LgCoGen/ UEG/EWG) (MDth)	G-50 Large CoGen (MDth)	G-50 UEG/EWG (MDth)
2013	Jan	17,128	4,406	12,722
2013	Feb	14,898	3,870	11,027
2013	Mar	16,578	4,232	12,346
2013	Apr	17,187	4,121	13,066
2013	May	18,963	4,281	14,682
2013	Jun	21,975	4,325	17,649
2013	Jul	32,986	4,786	28,200
2013	Aug	33,603	4,775	28,828
2013	Sep	28,631	4,526	24,105
2013	Oct	21,712	4,573	17,138
2013	Nov	20,315	4,251	16,065
2013	Dec	19,499	4,445	15,054
2014	Jan	18,688	4,373	14,315
2014	Feb	16,433	3,899	12,534
2014	Mar	18,053	4,218	13,835
2014	Apr	19,523	4,143	15,381
2014	May	20,285	4,302	15,983
2014	Jun	21,097	4,334	16,763
2014	Jul	32,112	4,760	27,352
2014	Aug	31,539	4,816	26,722
2014	Sep	26,719	4,524	22,196
2014	Oct	21,628	4,583	17,045
2014	Nov	20,206	4,248	15,959
2014	Dec	19,812	4,450	15,363
2015	Jan	18,719	4,386	14,333
2015	Feb	16,565	3,852	12,712
2015	Mar	18,169	4,215	13,955
2015	Apr	18,872	4,068	14,804
2015	May	19,595	4,285	15,310
2015	Jun	20,953	4,313	16,640
2015	Jul	30,805	4,724	26,081
2015	Aug	31,255	4,768	26,487
2015	Sep	26,339	4,514	21,825
2015	Oct	22,042	4,530	17,512
2015	Nov	20,181	4,268	15,913
2015	Dec	19,648	4,421	15,227
2016	Jan	19,412	4,390	15,022
2016	Feb	16,714	3,998	12,716
2016	Mar	18,128	4,213	13,915
2016	Apr	18,579	4,103	14,476
2016	May	20,044	4,288	15,756
2016	Jun	21,462	4,279	17,183
2016	Jul	32,008	4,774	27,234
2016	Aug	31,761	4,775	26,985
2016	Sep	27,574	4,519	23,055
2016	Oct	21,894	4,557	17,337
2016	Nov	19,902	4,282	15,619
2016	Dec	20,064	4,438	15,626

Gas Demand Forecasts for the Combined,
Electric Generation Rate Group
By EG Rate Tier

The over-all gas demand forecasts for electric generation (under the EG rate category) are aggregated from the following previous individual market segment forecasts together with a final adjustment to this total to account for "Rule-38" eligible G-50 gas load. A constant monthly amount of 315 MDth/mo was calculated from 2010 Rule-38 eligible G-50 customer load. Of this total about 16.89% was identified as EG-tier1 consumption while 83.11% was associated with EG-tier2. These percentages were used to calculate the EG-tier1 value of 53 MDth/mo and tier2 value of 262 MDth/mo that were subtracted from the respective tier totals of gas demand forecasted for Refinery Cogeneration, Small Cogeneration and combined Large Cogeneration and UEG/EWG gas demand.

Using the August 2014 data as an example, the resulting EG-tier1 and EG-tier 2 forecasts of gas demand would be:

Tier 1:

EG-Tier1_MDth = (381.4 MDth for SmCoGen)
+ (26.3 MDth for RefCoGen)
+ (399 MDth for LgCoGen/UEG/EWG)
- (53 MDth for Rule-38 Elligible G-50 load)
EG-Tier1_MDth = (753.7 MDth).

Tier 2:

EG-Tier2_MDth = (1,456 MDth for SmCoGen)
+ (2,004.5 MDth for RefCoGen)
+ (31,539 MDth for LgCoGen/UEG/EWG)
- (262 MDth for Rule-38 Elligible G-50 load)
EG-Tier2_MDth = (34,737.5 MDth).

These results (noting that 1 MDth = 10 MTherms) check with the values 7,538 MTherms and data 347,373 MTherms, respectively, for tier1 and tier2 gas demand shown in the SoCalGas consolidated gas demand forecast work papers for August 2014.

ENHANCED OIL RECOVERY
GAS DEMAND FORECAST AND METHODOLOGY

Southern California Gas' ("SoCalGas") forecasts of enhanced oil recovery ("EOR") steaming and cogeneration gas requirements as filed in its 2013 Triennial Cost Allocation Proceeding ("TCAP") Application are based on customer-specific historical data and market analysis. The major steps in developing these forecasts are outlined below and described in detail in the following pages.

- Analyze Historical Gas Demand
- Evaluate Market Potential
- Consider the Effect of Bypass
- Allocate Gas Requirements to Type of Service Line

A. <u>Analyze Historical Gas Demand</u>

Historical customer gas demand data for the period 2008 through 2010 was analyzed in order to determine typical throughput volumes over the past few years. FERC reports from the Kern River and Mojave Interstate Pipeline ("Kern/Mojave"), Format NO. FERC 567, from the same time period were studied in order to determine bypass trends.

B. Evaluate Market Potential

Potential EOR gas demand was determined by considering market information given the following assumptions:

1. Oil prices are forecast to be high enough for EOR production to be economically desirable.
2. SoCalGas has no capacity or supply constraints.
3. Air quality regulations will either require or encourage the use of gas, rather than oil, in all areas.

Since the BCAP oil price scenario is favorable for EOR production, the historical gas demand was combined with potential gas demand to become the base load for the EOR forecast. The EOR steaming forecast includes some additional load expected to come on line as a result of the expansion of oil production operations in existing fields that are not already interconnected with other gas pipelines. No new EOR cogeneration projects have been scheduled to start up during the BCAP period.

C. <u>Consider the Effect of Bypass</u>

Kern/Mojave began operating in February, 1992. At that time, many of SoCalGas' customers began taking service directly from the pipeline, thereby bypassing SoCalGas' distribution system.

Several factors were taken into consideration in order to forecast future bypass volumes. These factors were: the customer's geographical location, the amount of natural gas a customer has contracted to move on Kern/Mojave; the amount of Kern/Mojave gas available from marketers who have no designated end-users; and the amount of gas currently bypassing SoCalGas' distribution system.

Based on these considerations, the following assumptions were made:

1. EOR demand for customers located in the Los Angeles Basin and Santa Barbara and Ventura areas will not bypass SoCalGas' distribution system.
2. Customers who have already bypassed SoCalGas' system will continue to bypass at their historical levels.
3. No new bypass will occur during the TCAP period.

The load that is forecast to stay on SoCalGas' system is shown in Table I .

D. <u>Allocate Gas Requirements to Type of Service Line</u>

The forecasted load for the EOR market was split into load directly connected to transmission service lines and load connected to distribution service lines.

The final forecasts for EOR steaming and EOR cogeneration are shown in Table II and Table III, respectively. Table IV shows the Total EOR load split by type of service line connection.

TABLE I

2013 TCAP--GAS REQUIREMENTS SERVED BY SOCALGAS TO EOR CUSTOMERS

CUSTOMER	GAS REQUIREMENTS (2013 - 2015)		% OF LOAD CONNECTED TO SERVICE LINE TYPE*			
	Cogen	Steaming	Cogen		Steaming	
	Load	Load	T	D	T	D
	(MMcfd)	(MMcfd)	(%)	(%)	(%)	(%)
1	0.000		100.0			
2	0.100	1.400	100.0		30.8	69.2
3	10.000	3.170	100.0		100.0	0.0
4		0.030			0.0	100.0
5		0.003			0.0	100.0
6		0.400			0.0	100.0
7		1.650			0.0	100.0
8		0.000			0.0	100.0
9		0.450			0.0	100.0
10		0.100			0.0	100.0
11		3.800			100.0	0.0
12	1.300	4.500		100.0	0.0	100.0
13		0.040			100.0	0.0
14		0.300			0.0	100.0
15		0.002			0.0	100.0
16		0.000			0.0	100.0
17		0.200			100.0	0.0
18		0.450			0.0	100.0
19		0.100			0.0	100.0
20		8.800			0.0	100.0
21		0.060			100.0	0.0
22		0.000			50.0	50.0
23		1.850			6.0	94.0
TOTAL SYSTEM-MMcfd	11.400	27.305				
TOTAL SYSTEM-MDTH/d	12.084	28.943				

* T = Transmission Service Line; D = Distribution Service Line

TABLE II

2013 TCAP EOR FORECAST--STEAMING
(MDTH)

YEAR	TYPE	PRIORITY	AREA	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
2013	TRANS-ST	P5	LA	82	74	82	80	82	80	82	82	80	82	80	82	968
2013	TRANS-ST	P5	SJ	175	158	175	169	175	169	175	175	169	175	169	175	2,059
2013	TRANS-SD	P5	LA	1	1	1	1	1	1	1	1	1	1	1	1	12
2013	TRANS-SD	P5	CT	85	77	85	83	85	83	85	85	83	85	83	85	1,004
2013	TRANS-SD	P5	SJ	554	500	554	536	554	536	554	554	536	554	536	554	6,522
	TOTAL SYSTEM			897	810	897	869	897	869	897	897	869	897	869	897	10,565
2014	TRANS-ST	P5	LA	82	74	82	80	82	80	82	82	80	82	80	82	968
2014	TRANS-ST	P5	SJ	175	158	175	169	175	169	175	175	169	175	169	175	2,059
2014	TRANS-SD	P5	LA	1	1	1	1	1	1	1	1	1	1	1	1	12
2014	TRANS-SD	P5	CT	85	77	85	83	85	83	85	85	83	85	83	85	1,004
2014	TRANS-SD	P5	SJ	554	500	554	536	554	536	554	554	536	554	536	554	6,522
	TOTAL SYSTEM			897	810	897	869	897	869	897	897	869	897	869	897	10,565
2015	TRANS-ST	P5	LA	82	74	82	80	82	80	82	82	80	82	80	82	968
2015	TRANS-ST	P5	SJ	175	158	175	169	175	169	175	175	169	175	169	175	2,059
2015	TRANS-SD	P5	LA	1	1	1	1	1	1	1	1	1	1	1	1	12
2015	TRANS-SD	P5	CT	85	77	85	83	85	83	85	85	83	85	83	85	1,004
2015	TRANS-SD	P5	SJ	554	500	554	536	554	536	554	554	536	554	536	554	6,522
	TOTAL SYSTEM			897	810	897	869	897	869	897	897	869	897	869	897	10,565

LA: LOS ANGELES BASIN
CT: NORTH COASTAL
SJ: SAN JOAQUIN VALLEY (KERN CO.)

TABLE III

2013 TCAP EOR FORECAST--COGEN
(MDTH)

YEAR	TYPE	PRIORITY	AREA	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
2013	TRANS-ST	P3A	LA	329	297	329	318	329	318	329	329	318	329	318	329	3,872
2013	TRANS-ST	P3A	SJ	3	3	3	3	3	3	3	3	3	3	3	3	36
2013	TRANS-SD	P3A	SJ	43	39	43	41	43	41	43	43	41	43	41	43	504
	TOTAL SYSTEM			375	339	375	362	375	362	375	375	362	375	362	375	4,412
2014	TRANS-ST	P3A	LA	329	297	329	318	329	318	329	329	318	329	318	329	3,872
2014	TRANS-ST	P3A	SJ	3	3	3	3	3	3	3	3	3	3	3	3	36
2014	TRANS-SD	P3A	SJ	43	39	43	41	43	41	43	43	41	43	41	43	504
	TOTAL SYSTEM			375	339	375	362	375	362	375	375	362	375	362	375	4,412
2015	TRANS-ST	P3A	LA	329	297	329	318	329	318	329	329	318	329	318	329	3,872
2015	TRANS-ST	P3A	SJ	3	3	3	3	3	3	3	3	3	3	3	3	36
2015	TRANS-SD	P3A	SJ	43	39	43	41	43	41	43	43	41	43	41	43	504
	TOTAL SYSTEM			375	339	375	362	375	362	375	375	362	375	362	375	4,412

LA: LOS ANGELES BASIN
SJ: SAN JOAQUIN VALLEY (KERN CO.)

TABLE IV

2013 TCAP EOR FORECAST-TOTAL
(MDTH)

YEAR	TYPE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
2013	TRANS-T	589	532	589	570	589	570	589	589	570	589	570	589	6,935
2013	TRANS-D	683	617	683	661	683	661	683	683	661	683	661	683	8,042
	TOTAL EOR	1,272	1,149	1,272	1,231	1,272	1,231	1,272	1,272	1,231	1,272	1,231	1,272	14,977
2014	TRANS-T	589	532	589	570	589	570	589	589	570	589	570	589	6,935
2014	TRANS-D	683	617	683	661	683	661	683	683	661	683	661	683	8,042
	TOTAL EOR	1,272	1,149	1,272	1,231	1,272	1,231	1,272	1,272	1,231	1,272	1,231	1,272	14,977
2015	TRANS-T	589	532	589	570	589	570	589	589	570	589	570	589	6,935
2015	TRANS-D	683	617	683	661	683	661	683	683	661	683	661	683	8,042
	TOTAL EOR	1,272	1,149	1,272	1,231	1,272	1,231	1,272	1,272	1,231	1,272	1,231	1,272	14,977

TRANS-T: Load connected to a Transmission Service Line
TRANS-D: Load connected to a Distribution Service Line

SDG&E Noncore Retail Gas Demand

San Diego & Electric Company
Noncore Commercial/Industrial and Cogeneration Gas Demand Forecast

Noncore Commercial, Industrial and Cogeneration Forecasts

Forecasts of gas demand for these market segments were calculated from relationships developed from monthly consumption data and employment in the San Diego area.

The estimated equations are provided in the next page followed by the historical and calculated forecasts.

SDG&E Non-Core Demand Equations—before DSM adjustments (Mdth)

Cogeneration (MDTH_CGNNC_SD)

```
Cochrane-Orcutt
MONTHLY data for   59 periods from  FEB 2006 to  DEC 2010

mdth_cgnnc_sd

  =  - 602.203 * dum2006janmay + 1508.62 * dum2009novdec
      (3.65397)                 (10.3284)

     + 1.20762 * (ecsd+eisd)/1000
      (35.7462)

Sum Sq    1483732   Std Err   164.245   LHS Mean  1618.79
R Sq       0.8494   R Bar Sq   0.8412   F  4, 55  77.5521
D.W.( 1)   2.2259   D.W.(12)   1.6565

AR_0 =  + 0.51436 * AR_1
         (3.77242)
```

****

Commercial (MDTH_COMNC_SD)

```
Cochrane-Orcutt
MONTHLY data for   59 periods from  FEB 2006 to  DEC 2010

mdth_comnc_sd

  =    0.18287 * ecsd/1000 + 173.120 * dum2006janmay
      (34.7902)             (6.64589)

Sum Sq    44048.7   Std Err   28.0460   LHS Mean  228.886
R Sq       0.7884   R Bar Sq   0.7808   F  3, 56  69.5319
D.W.( 1)   2.2621   D.W.(12)   1.2604

AR_0 =  + 0.39883 * AR_1
         (2.95153)
```

****

Industrial (MDTH_INDNC_SD)

```
Cochrane-Orcutt
MONTHLY data for   58 periods from  MAR 2006 to  DEC 2010

mdth_indnc_sd

  =    1.28066 * eisd/1000
      (13.4437)

Sum Sq    11313.9   Std Err   14.3425   LHS Mean  131.542
R Sq       0.5656   R Bar Sq   0.5498   F  2, 55  35.8107
D.W.( 1)   1.9425   D.W.(12)   1.4217

AR_0 =  + 0.54426 * AR_1 + 0.26204 * AR_2
         (4.18352)       (2.01576)
```

SDGE Noncore Commercial, Industrial and Cogeneration Gas Demand (Annual)

ANNUAL SUMMARY

	SDG&E Noncore Commercial & Industrial Demand (MDth)			San Diego County	San Diego County	Cumulative	Cumulative
	Cogeneration MDTH_CGNNC_SD	Commercial MDTH_COMNC_SD	Industrial MDTH_INDNC_SD	Comcl Employment ECSD	Indstl Employment EISD	DSM Cmcl (MDth)	DSM Indl. (MDth)
2006	16,300	3,757	1,374	1,208,058	104,417	0.0	0.0
2007	19,920	2,560	1,483	1,216,850	102,850	0.0	0.0
2008	18,929	2,546	1,886	1,206,108	103,158	0.0	0.0
2009	23,606	2,536	1,670	1,145,233	95,667	0.0	0.0
2010	17,480	2,559	1,912	1,141,927	92,829	0.0	0.0
2011	17,850	2,684	1,912	1,160,094	94,128	5.3	18.6
2012	18,537	2,755	1,978	1,180,116	96,643	10.5	39.4
2013	19,049	2,821	2,007	1,204,845	99,522	15.7	60.2
2014	19,413	2,869	2,001	1,232,531	100,437	20.9	81.0
2015	19,701	2,907	1,985	1,257,468	101,588	26.1	101.8
2016	19,984	2,944	1,968	1,280,735	102,095	31.3	122.6

SDGE Noncore Commercial, Industrial and Cogeneration Gas Demand
(Monthly)

SDG&E Noncore Commercial & Industrial Demand (MDth)				San Diego County	San Diego County	Cumulative	Cumulative
	Cogeneration	Commercial	Industrial	Comcl Employment	Indstl Employment	DSM Cmcl	DSM Indl.
	MDTH_CGNNC_SD	MDTH_COMNC_SD	MDTH_INDNC_SD	ECSD	EISD	(MDth)	(MDth)
Jan-06	726.9	453.7	119.7	1,183,900	103,700	0.0	0.0
Feb-06	773.8	449.3	128.8	1,193,300	104,300	0.0	0.0
Mar-06	693.2	409.3	108.2	1,199,800	104,900	0.0	0.0
Apr-06	750.4	474.6	130.8	1,201,800	104,500	0.0	0.0
May-06	1,210.4	351.8	134.1	1,210,300	104,700	0.0	0.0
Jun-06	1,716.4	244.8	126.5	1,218,400	105,200	0.0	0.0
Jul-06	1,695.0	231.9	133.6	1,203,900	105,000	0.0	0.0
Aug-06	1,788.4	206.3	98.9	1,208,400	104,600	0.0	0.0
Sep-06	1,778.3	222.2	117.8	1,213,400	104,400	0.0	0.0
Oct-06	1,803.7	214.9	97.9	1,214,200	103,800	0.0	0.0
Nov-06	1,733.6	257.5	96.4	1,223,800	104,000	0.0	0.0
Dec-06	1,630.1	240.2	80.9	1,225,500	103,900	0.0	0.0
Jan-07	1,806.8	235.9	100.4	1,195,400	103,000	0.0	0.0
Feb-07	1,746.5	274.8	127.9	1,204,700	102,800	0.0	0.0
Mar-07	1,542.7	236.5	97.4	1,212,600	103,100	0.0	0.0
Apr-07	1,523.2	263.3	123.3	1,212,000	102,000	0.0	0.0
May-07	1,640.0	228.3	122.3	1,220,800	102,100	0.0	0.0
Jun-07	1,757.6	207.0	123.9	1,228,900	102,200	0.0	0.0
Jul-07	1,634.3	169.5	118.6	1,218,500	103,100	0.0	0.0
Aug-07	1,739.6	167.8	127.4	1,219,600	102,800	0.0	0.0
Sep-07	1,768.7	172.0	141.3	1,219,600	102,500	0.0	0.0
Oct-07	1,739.9	162.9	118.7	1,217,800	103,100	0.0	0.0
Nov-07	1,599.3	201.1	140.0	1,224,000	103,500	0.0	0.0
Dec-07	1,421.7	240.6	142.0	1,228,300	104,000	0.0	0.0
Jan-08	1,726.7	244.4	138.1	1,197,700	103,000	0.0	0.0
Feb-08	1,629.8	263.2	147.7	1,206,700	103,000	0.0	0.0
Mar-08	1,576.5	233.0	165.5	1,211,700	103,400	0.0	0.0
Apr-08	1,578.0	234.3	164.5	1,211,600	103,300	0.0	0.0
May-08	1,530.6	192.1	166.6	1,215,300	103,400	0.0	0.0
Jun-08	1,443.4	208.4	171.5	1,218,600	103,700	0.0	0.0
Jul-08	1,552.3	171.2	169.1	1,206,500	103,500	0.0	0.0
Aug-08	1,611.5	182.4	172.7	1,205,800	103,700	0.0	0.0
Sep-08	1,551.3	196.6	170.8	1,202,300	103,300	0.0	0.0
Oct-08	1,453.5	209.0	150.2	1,200,800	103,200	0.0	0.0
Nov-08	1,553.0	238.4	145.6	1,200,300	102,500	0.0	0.0
Dec-08	1,722.6	172.6	124.2	1,196,000	101,900	0.0	0.0

SDGE Noncore Commercial, Industrial and Cogeneration Gas Demand
(Monthly)

SDG&E Noncore Commercial & Industrial Demand (MDth)				San Diego County	San Diego County	Cumulative	Cumulative
	Cogeneration	Commercial	Industrial	Comcl Employment	Indstl Employment	DSM Cmcl	DSM Indl.
	MDTH_CGNNC_SD	MDTH_COMNC_SD	MDTH_INDNC_SD	ECSD	EISD	(MDth)	(MDth)
Jan-09	1,753.0	216.3	117.6	1,159,000	101,400	0.0	0.0
Feb-09	1,717.4	224.2	123.4	1,156,400	100,300	0.0	0.0
Mar-09	1,287.6	232.7	149.7	1,155,400	99,200	0.0	0.0
Apr-09	1,617.9	235.2	143.8	1,150,500	97,300	0.0	0.0
May-09	1,284.3	274.0	118.7	1,153,800	96,100	0.0	0.0
Jun-09	1,822.4	181.9	110.2	1,153,000	95,600	0.0	0.0
Jul-09	1,728.2	176.4	147.9	1,129,900	94,200	0.0	0.0
Aug-09	1,923.2	174.7	146.0	1,130,800	93,700	0.0	0.0
Sep-09	1,694.0	204.6	159.0	1,126,700	93,200	0.0	0.0
Oct-09	2,133.5	204.3	146.9	1,138,300	92,500	0.0	0.0
Nov-09	3,441.1	198.1	171.5	1,144,100	92,200	0.0	0.0
Dec-09	3,203.8	214.1	135.5	1,144,900	92,300	0.0	0.0
Jan-10	1,578.7	223.0	144.0	1,121,312	92,052	0.0	0.0
Feb-10	1,580.9	220.6	138.3	1,127,432	92,627	0.0	0.0
Mar-10	1,457.6	206.2	128.2	1,134,877	93,209	0.0	0.0
Apr-10	1,700.8	207.0	157.0	1,142,433	94,153	0.0	0.0
May-10	1,462.0	202.3	142.8	1,150,547	93,523	0.0	0.0
Jun-10	1,325.2	221.2	169.0	1,154,123	93,573	0.0	0.0
Jul-10	1,350.5	204.3	178.4	1,139,680	93,059	0.0	0.0
Aug-10	1,424.6	216.1	169.4	1,140,582	92,797	0.0	0.0
Sep-10	1,497.0	207.9	177.2	1,136,435	92,534	0.0	0.0
Oct-10	1,345.8	199.5	176.3	1,145,352	92,182	0.0	0.0
Nov-10	1,392.5	228.3	176.5	1,153,465	92,008	0.0	0.0
Dec-10	1,364.1	223.0	155.0	1,156,880	92,233	0.0	0.0
Jan-11	1,350.5	212.0	149.9	1,139,739	92,267	0.4	1.5
Feb-11	1,406.0	215.4	152.1	1,144,798	92,810	0.4	1.5
Mar-11	1,444.9	218.5	154.8	1,151,164	93,359	0.4	1.5
Apr-11	1,463.0	219.9	155.8	1,154,466	93,643	0.4	1.5
May-11	1,489.4	223.1	157.6	1,164,614	93,606	0.4	1.5
Jun-11	1,512.7	226.1	159.6	1,170,129	94,252	0.4	1.5
Jul-11	1,521.9	227.0	162.0	1,158,757	94,524	0.4	1.5
Aug-11	1,526.3	227.6	162.4	1,160,234	94,662	0.4	1.5
Sep-11	1,525.4	227.4	162.7	1,156,551	94,798	0.4	1.5
Oct-11	1,530.1	227.9	164.6	1,166,895	95,245	0.4	1.5
Nov-11	1,537.6	229.0	165.1	1,175,244	95,069	0.4	1.5
Dec-11	1,542.6	229.7	165.4	1,178,536	95,305	0.4	1.5
Jan-12	1,463.0	217.9	159.4	1,160,871	95,518	0.9	3.3
Feb-12	1,486.1	221.3	160.4	1,165,888	95,907	0.9	3.3
Mar-12	1,508.5	224.4	162.1	1,172,032	96,304	0.9	3.3
Apr-12	1,518.0	225.9	162.1	1,175,111	96,393	0.9	3.3
May-12	1,540.2	229.1	163.3	1,185,103	96,217	0.9	3.3
Jun-12	1,561.4	232.1	164.8	1,190,148	96,743	0.9	3.3
Jul-12	1,568.9	232.9	167.0	1,177,290	96,787	0.9	3.3
Aug-12	1,572.7	233.6	166.9	1,179,081	96,887	0.9	3.3
Sep-12	1,571.3	233.4	166.7	1,175,604	96,987	0.9	3.3
Oct-12	1,575.2	233.8	168.0	1,185,987	97,139	0.9	3.3
Nov-12	1,583.1	234.9	168.4	1,195,115	97,183	0.9	3.3
Dec-12	1,588.8	235.8	168.7	1,199,165	97,648	0.9	3.3

SDGE Noncore Commercial, Industrial and Cogeneration Gas Demand
(Monthly)

SDG&E Noncore Commercial & Industrial Demand (MDth)				San Diego County	San Diego County	Cumulative	Cumulative
	Cogeneration	Commercial	Industrial	Comcl Employment	Indstl Employment	DSM Cmcl	DSM Indl.
	MDTH_CGNNC_SD	MDTH_COMNC_SD	MDTH_INDNC_SD	ECSD	EISD	(MDth)	(MDth)
Jan-13	1,508.9	223.8	162.6	1,181,839	98,185	1.3	5.0
Feb-13	1,531.8	227.2	163.6	1,187,413	98,713	1.3	5.0
Mar-13	1,554.2	230.3	165.2	1,194,389	99,248	1.3	5.0
Apr-13	1,563.8	231.8	165.4	1,198,033	99,703	1.3	5.0
May-13	1,585.3	234.9	166.3	1,208,974	99,412	1.3	5.0
Jun-13	1,605.8	237.8	167.5	1,215,019	99,846	1.3	5.0
Jul-13	1,612.6	238.6	169.4	1,203,809	99,768	1.3	5.0
Aug-13	1,615.0	239.0	169.0	1,205,657	99,777	1.3	5.0
Sep-13	1,611.9	238.6	168.5	1,202,041	99,785	1.3	5.0
Oct-13	1,614.3	238.8	169.7	1,212,511	100,179	1.3	5.0
Nov-13	1,620.8	239.8	169.8	1,222,025	99,798	1.3	5.0
Dec-13	1,625.0	240.4	169.7	1,226,436	99,850	1.3	5.0
Jan-14	1,541.4	228.1	162.9	1,209,154	99,794	1.7	6.7
Feb-14	1,564.0	231.4	163.8	1,214,942	100,091	1.7	6.7
Mar-14	1,586.2	234.5	165.3	1,222,298	100,395	1.7	6.7
Apr-14	1,595.7	235.9	165.3	1,226,837	100,359	1.7	6.7
May-14	1,616.8	239.0	166.0	1,237,609	100,087	1.7	6.7
Jun-14	1,637.0	241.9	167.1	1,243,373	100,544	1.7	6.7
Jul-14	1,643.2	242.6	168.8	1,231,608	100,465	1.7	6.7
Aug-14	1,644.9	243.0	168.3	1,233,203	100,516	1.7	6.7
Sep-14	1,640.9	242.4	167.8	1,229,154	100,566	1.7	6.7
Oct-14	1,642.4	242.5	168.8	1,239,776	100,958	1.7	6.7
Nov-14	1,648.4	243.4	168.8	1,249,131	100,664	1.7	6.7
Dec-14	1,651.9	244.0	168.6	1,253,294	100,808	1.7	6.7
Jan-15	1,566.0	231.3	161.6	1,235,316	100,908	2.2	8.5
Feb-15	1,588.6	234.6	162.4	1,240,831	101,233	2.2	8.5
Mar-15	1,610.9	237.8	163.9	1,248,025	101,564	2.2	8.5
Apr-15	1,619.9	239.2	163.8	1,252,285	101,573	2.2	8.5
May-15	1,641.1	242.2	164.6	1,262,908	101,301	2.2	8.5
Jun-15	1,661.4	245.2	165.7	1,268,506	101,767	2.2	8.5
Jul-15	1,667.4	245.8	167.4	1,256,303	101,767	2.2	8.5
Aug-15	1,668.9	246.1	166.9	1,257,687	101,746	2.2	8.5
Sep-15	1,664.5	245.5	166.4	1,253,264	101,724	2.2	8.5
Oct-15	1,665.4	245.5	167.5	1,263,857	102,054	2.2	8.5
Nov-15	1,671.5	246.4	167.4	1,273,270	101,677	2.2	8.5
Dec-15	1,675.0	247.0	167.3	1,277,360	101,742	2.2	8.5
Jan-16	1,587.9	234.1	160.4	1,258,879	101,766	2.6	10.2
Feb-16	1,611.0	237.5	161.2	1,264,427	102,012	2.6	10.2
Mar-16	1,633.7	240.7	162.6	1,271,681	102,264	2.6	10.2
Apr-16	1,642.9	242.1	162.5	1,275,808	102,166	2.6	10.2
May-16	1,664.5	245.3	163.3	1,286,543	101,836	2.6	10.2
Jun-16	1,685.2	248.3	164.3	1,292,134	102,247	2.6	10.2
Jul-16	1,691.4	249.0	165.9	1,279,757	102,138	2.6	10.2
Aug-16	1,693.0	249.3	165.4	1,280,879	102,111	2.6	10.2
Sep-16	1,688.7	248.7	164.9	1,276,098	102,082	2.6	10.2
Oct-16	1,689.9	248.8	165.9	1,286,754	102,373	2.6	10.2
Nov-16	1,696.0	249.7	165.8	1,296,010	102,024	2.6	10.2
Dec-16	1,699.5	250.3	165.7	1,299,845	102,117	2.6	10.2

Gas Demand Forecasts for the Combined, Electric Generation Rate Group By EG Rate Tier

The over-all gas demand forecasts for electric generation (under the EG rate category) are aggregated from the individual market segment forecasts for Cogeneration and Power Plant gas demand.

Cogeneration gas demand is billed according to the two-tiered EG rate structure. The projected gas demand by tier assigns 90.4704% of the total cogeneration demand to tier 2; the remaining 9.5296% is assigned to tier 1. Tables 1a and 1b show the monthly forecasts of cogeneration gas demand by EG rate tier.

Using the August 2014 data as an example, the resulting EG-tier1 and EG-tier 2 forecasts of gas demand would be:

Tier 1:

EG-Tier1_MDth = (157 MDth forCoGen)
+ (465 MDth for Power Plant)
EG-Tier1_MDth = (622 MDth).

Tier 2:

EG-Tier2_MDth = (1,488 MDth for CoGen)
+ (6,640 MDth for Power Plant)
EG-Tier2_MDth = (8,128 MDth).

These results (noting that 1 MDth = 10 MTherms) check with the values 5,304 MTherms and data 82,195 MTherms, respectively, for tier1 and tier2 gas demand shown in the SDG&E consolidated gas demand forecast work papers for August 2014.

Table 1a Cogeneration Gas Demand (2010-2012)

MONTHLY FORECAST DATA		Total Cogeneration	SDG&E Cogeneration: Tier 1	SDG&E Cogeneration: Tier 2
		(MDth)	(MDth)	(MDth)
Year	Month			
2010	Jan	1,579	150	1,428
2010	Feb	1,581	151	1,430
2010	Mar	1,458	139	1,319
2010	Apr	1,701	162	1,539
2010	May	1,462	139	1,323
2010	Jun	1,325	126	1,199
2010	Jul	1,350	129	1,222
2010	Aug	1,425	136	1,289
2010	Sep	1,497	143	1,354
2010	Oct	1,346	128	1,218
2010	Nov	1,393	133	1,260
2010	Dec	1,364	130	1,234
2011	Jan	1,350	129	1,222
2011	Feb	1,406	134	1,272
2011	Mar	1,445	138	1,307
2011	Apr	1,463	139	1,324
2011	May	1,489	142	1,347
2011	Jun	1,513	144	1,369
2011	Jul	1,522	145	1,377
2011	Aug	1,526	145	1,381
2011	Sep	1,525	145	1,380
2011	Oct	1,530	146	1,384
2011	Nov	1,538	147	1,391
2011	Dec	1,543	147	1,396
2012	Jan	1,463	139	1,324
2012	Feb	1,486	142	1,344
2012	Mar	1,508	144	1,365
2012	Apr	1,518	145	1,373
2012	May	1,540	147	1,393
2012	Jun	1,561	149	1,413
2012	Jul	1,569	150	1,419
2012	Aug	1,573	150	1,423
2012	Sep	1,571	150	1,422
2012	Oct	1,575	150	1,425
2012	Nov	1,583	151	1,432
2012	Dec	1,589	151	1,437

Table 1b Cogeneration Gas Demand (2013-2016)

MONTHLY FORECAST DATA		Total Cogeneration	SDG&E Cogeneration: Tier 1	SDG&E Cogeneration: Tier 2
		(MDth)	(MDth)	(MDth)
Year	Month			
2013	Jan	1,509	144	1,365
2013	Feb	1,532	146	1,386
2013	Mar	1,554	148	1,406
2013	Apr	1,564	149	1,415
2013	May	1,585	151	1,434
2013	Jun	1,606	153	1,453
2013	Jul	1,613	154	1,459
2013	Aug	1,615	154	1,461
2013	Sep	1,612	154	1,458
2013	Oct	1,614	154	1,460
2013	Nov	1,621	154	1,466
2013	Dec	1,625	155	1,470
2014	Jan	1,541	147	1,395
2014	Feb	1,564	149	1,415
2014	Mar	1,586	151	1,435
2014	Apr	1,596	152	1,444
2014	May	1,617	154	1,463
2014	Jun	1,637	156	1,481
2014	Jul	1,643	157	1,487
2014	Aug	1,645	157	1,488
2014	Sep	1,641	156	1,485
2014	Oct	1,642	157	1,486
2014	Nov	1,648	157	1,491
2014	Dec	1,652	157	1,495
2015	Jan	1,566	149	1,417
2015	Feb	1,589	151	1,437
2015	Mar	1,611	154	1,457
2015	Apr	1,620	154	1,466
2015	May	1,641	156	1,485
2015	Jun	1,661	158	1,503
2015	Jul	1,667	159	1,508
2015	Aug	1,669	159	1,510
2015	Sep	1,665	159	1,506
2015	Oct	1,665	159	1,507
2015	Nov	1,671	159	1,512
2015	Dec	1,675	160	1,515
2016	Jan	1,588	151	1,437
2016	Feb	1,611	154	1,457
2016	Mar	1,634	156	1,478
2016	Apr	1,643	157	1,486
2016	May	1,665	159	1,506
2016	Jun	1,685	161	1,525
2016	Jul	1,691	161	1,530
2016	Aug	1,693	161	1,532
2016	Sep	1,689	161	1,528
2016	Oct	1,690	161	1,529
2016	Nov	1,696	162	1,534
2016	Dec	1,700	162	1,538

Table 2a Power Plant Gas Demand (2010-2012)

MONTHLY FORECAST DATA		Total Power Plant (MDth)	SDG&E Power Plant: Tier 1 (MDth)	SDG&E Power Plant: Tier 2 (MDth)
Year	Month			
2010	Jan	5,403	59	5,344
2010	Feb	4,467	32	4,435
2010	Mar	4,347	18	4,329
2010	Apr	4,465	13	4,452
2010	May	3,845	38	3,807
2010	Jun	3,532	33	3,499
2010	Jul	2,234	80	2,154
2010	Aug	3,746	103	3,643
2010	Sep	4,199	84	4,115
2010	Oct	3,578	84	3,494
2010	Nov	3,656	63	3,593
2010	Dec	4,149	69	4,080
2011	Jan	2,009	157	1,852
2011	Feb	1,558	42	1,516
2011	Mar	1,741	74	1,667
2011	Apr	1,964	176	1,788
2011	May	2,290	299	1,991
2011	Jun	3,355	250	3,105
2011	Jul	6,779	528	6,251
2011	Aug	7,090	613	6,477
2011	Sep	6,487	458	6,029
2011	Oct	3,752	412	3,340
2011	Nov	2,926	417	2,509
2011	Dec	4,323	167	4,156
2012	Jan	2,236	117	2,119
2012	Feb	1,858	34	1,824
2012	Mar	2,221	156	2,065
2012	Apr	2,396	258	2,138
2012	May	2,286	257	2,029
2012	Jun	3,627	292	3,335
2012	Jul	7,043	566	6,476
2012	Aug	7,039	624	6,415
2012	Sep	6,504	452	6,052
2012	Oct	3,860	506	3,354
2012	Nov	3,116	547	2,569
2012	Dec	4,310	139	4,171

Table 2b Power Plant Gas Demand (2013-2016)

MONTHLY FORECAST DATA Year Month	Total Power Plant (MDth)	SDG&E Power Plant: Tier 1 (MDth)	SDG&E Power Plant: Tier 2 (MDth)
2013 Jan	2,403	83	2,320
2013 Feb	2,131	59	2,072
2013 Mar	2,348	79	2,269
2013 Apr	2,598	188	2,411
2013 May	2,546	137	2,409
2013 Jun	3,931	136	3,795
2013 Jul	6,939	275	6,663
2013 Aug	6,989	361	6,628
2013 Sep	6,560	281	6,279
2013 Oct	3,765	69	3,696
2013 Nov	2,548	30	2,518
2013 Dec	4,358	28	4,331
2014 Jan	2,393	31	2,363
2014 Feb	2,111	16	2,095
2014 Mar	2,333	4	2,328
2014 Apr	2,525	86	2,439
2014 May	2,441	76	2,365
2014 Jun	3,753	128	3,626
2014 Jul	6,951	379	6,573
2014 Aug	7,105	465	6,640
2014 Sep	6,534	275	6,260
2014 Oct	3,801	132	3,669
2014 Nov	2,689	90	2,599
2014 Dec	4,495	72	4,423
2015 Jan	2,466	124	2,343
2015 Feb	2,127	81	2,045
2015 Mar	2,369	117	2,252
2015 Apr	2,399	178	2,222
2015 May	2,364	156	2,207
2015 Jun	3,662	230	3,433
2015 Jul	7,052	447	6,605
2015 Aug	7,129	507	6,623
2015 Sep	6,605	351	6,255
2015 Oct	3,942	386	3,556
2015 Nov	2,729	332	2,397
2015 Dec	4,491	109	4,382
2016 Jan	2,491	136	2,356
2016 Feb	2,156	57	2,098
2016 Mar	2,367	70	2,297
2016 Apr	2,448	113	2,336
2016 May	2,466	149	2,317
2016 Jun	3,799	222	3,577
2016 Jul	7,068	451	6,617
2016 Aug	7,174	525	6,649
2016 Sep	6,675	408	6,266
2016 Oct	3,848	269	3,579
2016 Nov	2,631	167	2,464
2016 Dec	4,598	112	4,485

SoCalGas Other Wholesale Gas Demand

Gas Demand Forecast for Wholesale Customers
Other than SDG&E

Work papers for SDG&E are provided in separate sections as indicated in the table of contents. The supporting material provided below are for the following additional wholesale customers of SoCalGas: City of Long Beach, Southwest Gas (SWG), City of Vernon (COV) and ECOGAS, a wholesale customer located in Mexicali, Mexico.

CITY OF LONG BEACH

The forecast developed for the 2010 California Gas Report was used for the City of Long Beach's gas deamd. The tables below show the monthly data fro 2010 through 2016 for core and noncore market segments.

Table CLB-1a City of Long Beach Gas Demand (2010-2016) Average Year HDD:

Market	TEMP	YEAR	MDTH1	MDTH2	MDTH3	MDTH4	MDTH5	MDTH6
Core	Avg HDD	2010	705.8	631.7	664.2	484.7	422.2	309.0
Noncore	Avg HDD	2010	200.3	231.2	237.3	220.3	199.0	179.7
Core	Avg HDD	2011	736.0	696.4	660.6	509.0	447.1	331.8
Noncore	Avg HDD	2011	213.1	224.0	235.8	209.5	169.3	155.1
Core	Avg HDD	2012	743.4	721.0	659.2	501.2	438.9	324.9
Noncore	Avg HDD	2012	188.3	216.7	221.7	206.4	173.8	161.4
Core	Avg HDD	2013	744.9	705.1	666.3	510.5	448.4	333.2
Noncore	Avg HDD	2013	207.3	230.1	236.1	211.8	178.1	167.2
Core	Avg HDD	2014	747.7	711.2	669.6	511.8	449.4	334.5
Noncore	Avg HDD	2014	196.3	225.3	229.2	206.3	171.6	158.5
Core	Avg HDD	2015	752.1	712.8	675.1	516.9	454.6	338.9
Noncore	Avg HDD	2015	203.2	224.1	230.9	211.4	177.9	164.5
Core	Avg HDD	2016	753.6	734.4	678.7	520.2	457.6	341.8
Noncore	Avg HDD	2016	201.2	225.5	232.0	209.8	175.8	162.8

Table CLB-1b City of Long Beach Gas Demand (2010-2016) Average Year HDD:

Market	TEMP	YEAR	MDTH7	MDTH8	MDTH9	MDTH10	MDTH11	MDTH12	TOTAL
Core	Avg HDD	2010	311.8	309.6	317.9	388.8	616.5	726.1	5888.1
Noncore	Avg HDD	2010	189.5	180.4	167.2	167.0	186.0	202.6	2360.5
Core	Avg HDD	2011	335.2	326.6	328.2	398.6	627.5	745.0	6141.9
Noncore	Avg HDD	2011	167.0	151.3	144.4	137.8	158.2	174.2	2139.6
Core	Avg HDD	2012	327.0	322.4	326.9	396.7	624.1	738.0	6123.7
Noncore	Avg HDD	2012	173.5	157.7	149.6	151.7	174.9	188.6	2164.3
Core	Avg HDD	2013	335.4	329.0	332.9	400.9	628.8	747.2	6182.7
Noncore	Avg HDD	2013	176.7	162.9	155.4	149.1	165.0	185.4	2224.8
Core	Avg HDD	2014	335.5	330.8	334.8	403.0	630.3	747.4	6205.9
Noncore	Avg HDD	2014	170.5	153.9	146.0	145.0	167.1	180.0	2149.8
Core	Avg HDD	2015	340.0	334.5	339.3	405.5	633.5	753.1	6256.3
Noncore	Avg HDD	2015	174.4	160.2	151.5	150.9	169.4	185.2	2203.7
Core	Avg HDD	2016	342.0	337.6	341.9	408.3	635.5	755.3	6306.8
Noncore	Avg HDD	2016	174.0	159.1	151.1	147.5	167.5	183.8	2190.2

Table CLB-2a City of Long Beach Gas Demand (2010-2016) Cold Year HDD:

Market	TEMP	YEAR	MDTH1	MDTH2	MDTH3	MDTH4	MDTH5	MDTH6
Core	Cold HDD	2010	796.2	717.4	734.4	525.0	435.7	311.2
Noncore	Cold HDD	2010	200.3	231.2	237.3	220.3	199.0	179.7
Core	Cold HDD	2011	826.4	782.2	730.7	549.3	460.6	334.0
Noncore	Cold HDD	2011	213.1	224.0	235.8	209.5	169.3	155.1
Core	Cold HDD	2012	833.8	806.7	729.3	541.5	452.5	327.1
Noncore	Cold HDD	2012	188.3	216.7	221.7	206.4	173.8	161.4
Core	Cold HDD	2013	835.6	791.1	736.5	551.0	462.0	335.4
Noncore	Cold HDD	2013	207.3	230.1	236.1	211.8	178.1	167.2
Core	Cold HDD	2014	838.6	797.4	740.0	552.3	463.0	336.6
Noncore	Cold HDD	2014	196.3	225.3	229.2	206.3	171.6	158.5
Core	Cold HDD	2015	843.1	799.2	745.7	557.5	468.3	341.1
Noncore	Cold HDD	2015	203.2	224.1	230.9	211.4	177.9	164.5
Core	Cold HDD	2016	844.9	820.9	749.5	560.9	471.2	344.0
Noncore	Cold HDD	2016	201.2	225.5	232.0	209.8	175.8	162.8

Table CLB-2b City of Long Beach Gas Demand (2010-2016) Cold Year HDD:

Market	TEMP	YEAR	MDTH7	MDTH8	MDTH9	MDTH10	MDTH11	MDTH12	TOTAL
Core	Cold HDD	2010	311.8	309.6	318.1	395.7	663.7	821.4	6340.1
Noncore	Cold HDD	2010	189.5	180.4	167.2	167.0	186.0	202.6	2360.5
Core	Cold HDD	2011	335.2	326.6	328.4	405.4	674.7	840.3	6593.9
Noncore	Cold HDD	2011	167.0	151.3	144.4	137.8	158.2	174.2	2139.6
Core	Cold HDD	2012	327.0	322.4	327.1	403.6	671.3	833.3	6575.7
Noncore	Cold HDD	2012	173.5	157.7	149.6	151.7	174.9	188.6	2164.3
Core	Cold HDD	2013	335.4	329.0	333.1	407.7	676.1	842.8	6635.7
Noncore	Cold HDD	2013	176.7	162.9	155.4	149.1	165.0	185.4	2224.8
Core	Cold HDD	2014	335.6	330.8	335.0	409.8	677.7	843.2	6660.0
Noncore	Cold HDD	2014	170.5	153.9	146.0	145.0	167.1	180.0	2149.8
Core	Cold HDD	2015	340.0	334.5	339.5	412.4	681.0	849.1	6711.5
Noncore	Cold HDD	2015	174.4	160.2	151.5	150.9	169.4	185.2	2203.7
Core	Cold HDD	2016	342.0	337.6	342.1	415.2	683.2	851.5	6763.0
Noncore	Cold HDD	2016	174.0	159.1	151.1	147.5	167.5	183.8	2190.2

SOUTHWEST GAS

The gas demand and forecasts for Southwest Gas (SWG) sponsored by SoCalGas were developed from a forecast provided by SWG for 2011 through 2016; the gas consumption shown for 2010 are recorded deliveries to SWG by SoCalGas. The gas demand shown for SWG represents the gas deliveries that SoCalGas makes to SWG and does not include gas transacted under the exchange agreement between SoCalGas and SWG.

The segmentation (into core sales, core transportation and noncore transportation) is imputed based on the gas demand forecast provided by SWG.

Table SWG-1a SoCalGas Deliveries to Southwest Gas (2011-2012)

SoCalGas Deliveries to Southwest Gas (MDth)

		Normal Weather Scenario ("Avg Year HDD")				Extreme Weather Scenario ("Cold Yr HDD")			
		Total	Core Sales	Core Transp.	Non-Core Transp.	Total	Core Sales	Core Transp.	Non-Core Transp.
2011	Jan	1,000.1	935.5	7.7	56.9	1,088.9	1023.6	8.4	56.9
	Feb	847.1	783.2	7.5	56.3	900.8	836.4	8.0	56.3
	Mar	692.3	619.4	4.7	68.1	777.8	704.3	5.4	68.1
	Apr	543.4	475.6	2.6	65.2	597.1	529.0	2.9	65.2
	May	358.4	298.2	2.4	57.8	371.3	311.0	2.5	57.8
	Jun	292.1	225.4	1.5	65.3	297.0	230.3	1.5	65.3
	Jul	251.0	199.1	1.4	50.6	251.0	199.1	1.4	50.6
	Aug	255.8	207.8	1.4	46.6	255.8	207.8	1.4	46.6
	Sep	256.3	214.4	1.4	40.5	263.0	221.1	1.5	40.5
	Oct	370.5	325.4	2.1	42.9	388.6	343.4	2.3	42.9
	Nov	616.7	560.0	2.9	53.8	685.2	628.2	3.2	53.8
	Dec	1,010.4	949.4	5.4	55.6	1,076.9	1015.5	5.8	55.6
2012	Jan	1,010.1	945.6	7.7	56.9	1,099.9	1034.6	8.4	56.9
	Feb	866.8	802.9	7.5	56.3	921.0	856.7	8.0	56.3
	Mar	698.9	626.0	4.7	68.1	785.4	711.8	5.4	68.1
	Apr	548.5	480.7	2.6	65.2	602.7	534.7	2.9	65.2
	May	361.5	301.3	2.4	57.8	374.5	314.2	2.5	57.8
	Jun	294.4	227.7	1.5	65.3	299.4	232.6	1.5	65.3
	Jul	253.0	201.1	1.4	50.6	253.0	201.1	1.4	50.6
	Aug	258.0	210.0	1.4	46.6	258.0	210.0	1.4	46.6
	Sep	258.5	216.6	1.4	40.5	265.3	223.4	1.5	40.5
	Oct	373.9	328.8	2.1	42.9	392.1	347.0	2.3	42.9
	Nov	622.8	566.1	2.9	53.8	692.0	635.0	3.2	53.8
	Dec	1,021.1	960.1	5.4	55.6	1,088.3	1027.0	5.8	55.6

Table SWG-1b SoCalGas Deliveries to Southwest Gas (2013-2016)

		SoCalGas Deliveries to Southwest Gas (MDth)							
		Normal Weather Scenario ("Avg Year HDD")				Extreme Weather Scenario ("Cold Yr HDD")			
		Total	Core Sales	Core Transp.	Non-Core Transp.	Total	Core Sales	Core Transp.	Non-Core Transp.
2013	Jan	1,021.3	956.7	7.7	56.9	1,112.0	1046.8	8.4	56.9
	Feb	864.8	801.0	7.5	56.3	919.7	855.3	8.0	56.3
	Mar	706.4	633.5	4.7	68.1	793.9	720.4	5.4	68.1
	Apr	554.2	486.5	2.6	65.2	609.2	541.1	2.9	65.2
	May	365.2	304.9	2.4	57.8	378.3	318.0	2.5	57.8
	Jun	297.2	230.4	1.5	65.3	302.1	235.4	1.5	65.3
	Jul	255.5	203.5	1.4	50.6	255.5	203.5	1.4	50.6
	Aug	260.4	212.5	1.4	46.6	260.4	212.5	1.4	46.6
	Sep	261.1	219.2	1.4	40.5	268.0	226.1	1.5	40.5
	Oct	378.0	332.9	2.1	42.9	396.4	351.3	2.3	42.9
	Nov	630.0	573.3	2.9	53.8	700.1	643.1	3.2	53.8
	Dec	1,033.8	972.8	5.4	55.6	1,101.9	1040.5	5.8	55.6
2014	Jan	1,034.7	970.2	7.7	56.9	1,126.7	1061.5	8.4	56.9
	Feb	876.1	812.2	7.5	56.3	931.7	867.4	8.0	56.3
	Mar	715.4	642.5	4.7	68.1	804.2	730.7	5.4	68.1
	Apr	561.1	493.4	2.6	65.2	616.9	548.8	2.9	65.2
	May	369.5	309.3	2.4	57.8	382.8	322.5	2.5	57.8
	Jun	300.4	233.7	1.5	65.3	305.4	238.7	1.5	65.3
	Jul	258.3	206.4	1.4	50.6	258.3	206.4	1.4	50.6
	Aug	263.5	215.5	1.4	46.6	263.5	215.5	1.4	46.6
	Sep	264.2	222.3	1.4	40.5	271.2	229.2	1.5	40.5
	Oct	382.7	337.7	2.1	42.9	401.4	356.3	2.2	42.9
	Nov	638.7	582.0	2.9	53.8	709.9	652.9	3.2	53.8
	Dec	1,049.4	988.4	5.4	55.6	1,118.6	1057.2	5.8	55.6
2015	Jan	1,050.2	985.6	7.7	56.9	1,143.6	1078.3	8.4	56.9
	Feb	889.0	825.2	7.5	56.3	945.5	881.2	8.0	56.3
	Mar	725.7	652.8	4.7	68.1	815.9	742.4	5.4	68.1
	Apr	569.1	501.3	2.6	65.2	625.8	557.7	2.9	65.2
	May	374.4	314.2	2.4	57.8	388.0	327.7	2.5	57.8
	Jun	304.1	237.4	1.5	65.3	309.2	242.4	1.5	65.3
	Jul	261.6	209.7	1.4	50.6	261.6	209.7	1.4	50.6
	Aug	266.9	219.0	1.4	46.6	266.9	219.0	1.4	46.6
	Sep	267.7	225.9	1.4	40.5	274.8	232.9	1.5	40.5
	Oct	388.1	343.0	2.1	42.9	407.0	361.9	2.2	42.9
	Nov	647.8	591.2	2.9	53.8	720.1	663.1	3.2	53.8
	Dec	1,064.9	1003.9	5.4	55.6	1,135.3	1073.9	5.8	55.6
2016	Jan	1,065.9	1001.4	7.7	56.9	1,160.8	1095.6	8.4	56.9
	Feb	914.3	850.5	7.5	56.3	971.7	907.3	8.0	56.3
	Mar	736.2	663.3	4.7	68.1	828.0	754.4	5.4	68.1
	Apr	577.3	509.5	2.6	65.2	635.0	566.9	2.9	65.2
	May	379.6	319.4	2.4	57.8	393.3	333.0	2.5	57.8
	Jun	308.0	241.2	1.5	65.3	313.1	246.4	1.5	65.3
	Jul	265.0	213.1	1.4	50.6	265.0	213.1	1.4	50.6
	Aug	270.5	222.5	1.4	46.6	270.5	222.5	1.4	46.6
	Sep	271.4	229.5	1.4	40.5	278.6	236.6	1.5	40.5
	Oct	393.6	348.6	2.1	42.9	412.9	367.7	2.2	42.9
	Nov	657.6	600.9	2.9	53.8	731.1	674.1	3.2	53.8
	Dec	1,081.8	1020.8	5.4	55.6	1,153.3	1092.0	5.8	55.6

CITY OF VERNON

Vernon initiated municipal gas service to its electric power plant in June 2005 and to non-core customers in December 2006. The 2010 recorded wholesale volumes for the City of Vernon were 8.4 MMdth. Of the 8.4 MMdth, it was estimated that about 2.2 MMdth were consumed by the Commercial/Industrial customers and the remaining 6.2 MMdth by the single EG customer.

For the TCAP forecasting period, the Commercial/Industrial customers served by the City of Vernon are forecasted to remain at the 2010 level of 2.2 MMdth. In addition, since there are about 1.01 MMdth of noncore and noncore eligible Commercial/Industrial load served by SoCalGas in City of Vernon, it is assumed that this retail load will migrate to Vernon's service in 4 years beginning 2012. The expected annual migration load is 0.25 MMdth.

The throughput forecast for Vernon EG customer is based on City of Vernon's input and Ventyx's Market Analytics Model as noted in Witness Mr. Jeff Huang's testimony on EG demand.

The first two tables below show the monthly forecast for Vernon's gas demand; the third table shows the expected commercial and industrial migration to service by Vernon.

Table COV-1 City of Vernon Demand (2010-2012):

	Average Year Throughput (Mth)		COV Wholesale	C/I	Vernon EG
Recorded	2010	Jan	8,428	2,584	5,844
Recorded		Feb	7,661	1,460	6,201
Recorded		Mar	8,331	1,141	7,191
Recorded		Apr	8,102	2,172	5,929
Recorded		May	2,697	1,877	819
Recorded		Jun	2,773	1,962	811
Recorded		Jul	5,746	1,418	4,329
Recorded		Aug	6,910	1,254	5,656
Recorded		Sep	8,410	1,820	6,590
Recorded		Oct	8,743	2,562	6,181
Recorded		Nov	8,733	1,231	7,502
Recorded		Dec	7,877	2,937	4,940
Recorded	2010 Total		84,412	22,418	61,994
	2011	Jan	8,428	2,584	5,844
		Feb	7,661	1,460	6,201
		Mar	8,331	1,141	7,191
		Apr	8,102	2,172	5,929
		May	2,697	1,877	819
		Jun	2,773	1,962	811
		Jul	5,746	1,418	4,329
		Aug	6,910	1,254	5,656
		Sep	8,410	1,820	6,590
		Oct	8,743	2,562	6,181
		Nov	8,733	1,231	7,502
		Dec	7,877	2,937	4,940
	2011 Total		84,412	22,418	61,994
	2012	Jan	8,246	2,795	5,451
		Feb	6,592	1,671	4,921
		Mar	1,351	1,351	0
		Apr	2,383	2,383	0
		May	2,088	2,088	0
		Jun	7,590	2,173	5,417
		Jul	7,979	1,628	6,351
		Aug	7,836	1,465	6,371
		Sep	7,728	2,031	5,697
		Oct	8,349	2,773	5,576
		Nov	6,717	1,442	5,275
		Dec	8,683	3,148	5,535
	2012 Total		75,542	24,948	50,594

Table COV-2 City of Vernon Demand (2013-2016):

Average Year Throughput (Mth)		COV Wholesale	C/I	Vernon EG
2013	Jan	8,457	3,006	5,451
	Feb	6,802	1,881	4,921
	Mar	1,562	1,562	0
	Apr	2,594	2,594	0
	May	2,299	2,299	0
	Jun	7,800	2,383	5,417
	Jul	8,190	1,839	6,351
	Aug	8,047	1,676	6,371
	Sep	7,939	2,242	5,697
	Oct	8,559	2,983	5,576
	Nov	6,928	1,653	5,275
	Dec	8,894	3,359	5,535
2013 Total		78,072	27,478	50,594
2014	Jan	8,667	3,216	5,451
	Feb	7,013	2,092	4,921
	Mar	1,773	1,773	0
	Apr	2,805	2,805	0
	May	2,510	2,510	0
	Jun	8,011	2,594	5,417
	Jul	8,401	2,050	6,351
	Aug	8,258	1,887	6,371
	Sep	8,150	2,453	5,697
	Oct	8,770	3,194	5,576
	Nov	7,139	1,864	5,275
	Dec	9,105	3,570	5,535
2014 Total		80,602	30,008	50,594
2015	Jan	8,878	3,427	5,451
	Feb	7,224	2,303	4,921
	Mar	1,984	1,984	0
	Apr	3,016	3,016	0
	May	2,721	2,721	0
	Jun	8,222	2,805	5,417
	Jul	8,612	2,261	6,351
	Aug	8,468	2,097	6,371
	Sep	8,361	2,664	5,697
	Oct	8,981	3,405	5,576
	Nov	7,350	2,075	5,275
	Dec	9,315	3,780	5,535
2015 Total		83,132	32,538	50,594
2016	Jan	8,878	3,427	5,451
	Feb	7,224	2,303	4,921
	Mar	1,984	1,984	0
	Apr	3,016	3,016	0
	May	2,721	2,721	0
	Jun	8,222	2,805	5,417
	Jul	8,612	2,261	6,351
	Aug	8,468	2,097	6,371
	Sep	8,361	2,664	5,697
	Oct	8,981	3,405	5,576
	Nov	7,350	2,075	5,275
	Dec	9,315	3,780	5,535
2016 Total		83,132	32,538	50,594

Table COV-3 City of Vernon C&I Migration Demand:

SoCalGas Retail Volumes in City of Vernon Migrate to Wholesale Class Starting 1/2012 (25% per Year)

Year	Month	Therms Core Com	Therms Core Ind	Therms Noncore Com	Therms Noncore Ind	Therms Total Core	Therms Total Noncore	Therms Core + Noncore
2012	1	26,723	56,877	6,320	120,909	83,599	127,228	210,827
2012	2	26,723	56,877	6,320	120,909	83,599	127,228	210,827
2012	3	26,723	56,877	6,320	120,909	83,599	127,228	210,827
2012	4	26,723	56,877	6,320	120,909	83,599	127,228	210,827
2012	5	26,723	56,877	6,320	120,909	83,599	127,228	210,827
2012	6	26,723	56,877	6,320	120,909	83,599	127,228	210,827
2012	7	26,723	56,877	6,320	120,909	83,599	127,228	210,827
2012	8	26,723	56,877	6,320	120,909	83,599	127,228	210,827
2012	9	26,723	56,877	6,320	120,909	83,599	127,228	210,827
2012	10	26,723	56,877	6,320	120,909	83,599	127,228	210,827
2012	11	26,723	56,877	6,320	120,909	83,599	127,228	210,827
2012	12	26,723	56,877	6,320	120,909	83,599	127,228	210,827
2012 Total		320,671	682,519	75,835	1,450,904	1,003,190	1,526,739	2,529,928
2013	1	53,445	113,753	12,639	241,817	167,198	254,456	421,655
2013	2	53,445	113,753	12,639	241,817	167,198	254,456	421,655
2013	3	53,445	113,753	12,639	241,817	167,198	254,456	421,655
2013	4	53,445	113,753	12,639	241,817	167,198	254,456	421,655
2013	5	53,445	113,753	12,639	241,817	167,198	254,456	421,655
2013	6	53,445	113,753	12,639	241,817	167,198	254,456	421,655
2013	7	53,445	113,753	12,639	241,817	167,198	254,456	421,655
2013	8	53,445	113,753	12,639	241,817	167,198	254,456	421,655
2013	9	53,445	113,753	12,639	241,817	167,198	254,456	421,655
2013	10	53,445	113,753	12,639	241,817	167,198	254,456	421,655
2013	11	53,445	113,753	12,639	241,817	167,198	254,456	421,655
2013	12	53,445	113,753	12,639	241,817	167,198	254,456	421,655
2013 Total		641,342	1,365,037	151,670	2,901,807	2,006,379	3,053,477	5,059,856
2014	1	80,168	170,630	18,959	362,726	250,797	381,685	632,482
2014	2	80,168	170,630	18,959	362,726	250,797	381,685	632,482
2014	3	80,168	170,630	18,959	362,726	250,797	381,685	632,482
2014	4	80,168	170,630	18,959	362,726	250,797	381,685	632,482
2014	5	80,168	170,630	18,959	362,726	250,797	381,685	632,482
2014	6	80,168	170,630	18,959	362,726	250,797	381,685	632,482
2014	7	80,168	170,630	18,959	362,726	250,797	381,685	632,482
2014	8	80,168	170,630	18,959	362,726	250,797	381,685	632,482
2014	9	80,168	170,630	18,959	362,726	250,797	381,685	632,482
2014	10	80,168	170,630	18,959	362,726	250,797	381,685	632,482
2014	11	80,168	170,630	18,959	362,726	250,797	381,685	632,482
2014	12	80,168	170,630	18,959	362,726	250,797	381,685	632,482
2014 Total		962,013	2,047,556	227,505	4,352,711	3,009,569	4,580,216	7,589,784
2015	1	106,890	227,506	25,278	483,635	334,397	508,913	843,309
2015	2	106,890	227,506	25,278	483,635	334,397	508,913	843,309
2015	3	106,890	227,506	25,278	483,635	334,397	508,913	843,309
2015	4	106,890	227,506	25,278	483,635	334,397	508,913	843,309
2015	5	106,890	227,506	25,278	483,635	334,397	508,913	843,309
2015	6	106,890	227,506	25,278	483,635	334,397	508,913	843,309
2015	7	106,890	227,506	25,278	483,635	334,397	508,913	843,309
2015	8	106,890	227,506	25,278	483,635	334,397	508,913	843,309
2015	9	106,890	227,506	25,278	483,635	334,397	508,913	843,309
2015	10	106,890	227,506	25,278	483,635	334,397	508,913	843,309
2015	11	106,890	227,506	25,278	483,635	334,397	508,913	843,309
2015	12	106,890	227,506	25,278	483,635	334,397	508,913	843,309
2015 Total		1,282,684	2,730,074	303,340	5,803,614	4,012,758	6,106,954	10,119,712
2016	1	-	-	-	-	-	-	-
2016	2	-	-	-	-	-	-	-
2016	3	-	-	-	-	-	-	-
2016	4	-	-	-	-	-	-	-
2016	5	-	-	-	-	-	-	-
2016	6	-	-	-	-	-	-	-
2016	7	-	-	-	-	-	-	-
2016	8	-	-	-	-	-	-	-
2016	9	-	-	-	-	-	-	-
2016	10	-	-	-	-	-	-	-
2016	11	-	-	-	-	-	-	-
2016	12	-	-	-	-	-	-	-
2016 Total		-	-	-	-	-	-	-

ECOGAS

The monthly data for year 2010 were from SoCalGas' recorded data; the monthly forecasts for years 2011 through 2016 were provided from this wholesale customer's staff. These values are the same as those shown in the SoCalGas Consolidated Gas Demand Forecast work papers above.

SoCalGas Company Use Fuel, UAF and “Dth/Mcf” Conversion

Conversion of Energy to Volume, Percentages of Company Use Fuel and Un-Accounted-For Gas for SoCalGas

November 2011

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I. Conversion Between Energy and Volumetric Units

The estimated conversion of Dth to Mcf was calculated from SoCalGas' system-wide gas consumption for year 2010. The value we've used is 1.0235, the same as that provided in the *2011 California Gas Report Supplement* on page 27 at line number 40, for year 2010.

This conversion factor is used to develop a volumetric (e.g., Mcf unit) load estimate from the gas demand forecasts which are developed on an energy (e.g., Dth unit) basis.

II. Company-Use-Fuel (Co-Use-Fuel) as Percent of Receipts

For SoCalGas, data on gas consumed for Company uses is tracked via the SoCalGas gas accounting system. Three categories of use are identified: Transmission, Storeage and "Other." Further, to facilitate the calculations of gas consumed for Company uses, a simple percentage is calculated using the total gas available for disposition as the denominator. These percentages were calculated over the time frame of April 2008 through March 2011. Table 1, below, shows the monthly data and the summary calculations.

Table 1

Company Use Fuel Data as Percentage of Receipts

Southern California Gas Company

Date (MMM-yy)	Trans-mission (Dth)	Storage (Dth)	"Other" (Dth)	Total (Dth)	Actual Receipts PGA: Net Avail.-for Disposition (Dth)
Apr-08	298,015	310,649	10,855	619,519	78,088,483
May-08	302,189	398,668	13,689	714,546	76,412,248
Jun-08	289,192	370,785	14,115	674,092	74,298,646
Jul-08	329,439	392,730	16,082	738,251	79,851,045
Aug-08	289,825	169,572	13,395	472,792	86,084,474
Sep-08	307,465	322,053	15,501	645,019	80,924,699
Oct-08	265,129	313,012	14,576	592,717	84,044,245
Nov-08	222,758	164,271	14,052	401,081	82,636,919
Dec-08	213,787	63,514	14,376	291,677	108,243,376
Jan-09	208,762	67,200	14,677	290,639	93,044,444
Feb-09	191,458	37,153	12,842	241,453	91,054,372
Mar-09	218,474	152,654	12,738	383,866	82,349,914
Apr-09	207,870	309,283	60,484	577,637	76,440,894
May-09	174,687	361,742	16,718	553,147	71,021,997
Jun-09	122,923	336,486	11,167	470,576	65,638,064
Jul-09	151,932	116,933	12,467	281,332	79,834,102
Aug-09	156,416	150,621	10,725	317,762	78,993,362
Sep-09	174,210	242,780	11,014	428,004	84,893,452
Oct-09	120,877	259,681	13,396	393,954	73,378,387
Nov-09	111,176	116,312	13,573	241,061	77,826,360
Dec-09	87,690	29,146	13,596	130,432	104,952,793
Jan-10	79,636	33,371	13,164	126,171	97,788,561
Feb-10	80,847	44,943	18,020	143,810	85,821,633
Mar-10	188,488	223,248	11,640	423,376	86,134,189
Apr-10	185,362	366,119	10,860	562,341	78,365,035
May-10	94,243	391,396	10,827	496,466	70,413,585
Jun-10	70,082	326,230	12,030	408,342	64,908,866
Jul-10	84,899	209,047	23,297	317,243	72,751,040
Aug-10	80,527	151,216	17,759	249,502	79,438,840
Sep-10	43,728	117,847	13,097	174,672	75,178,673
Oct-10	128,520	370,739	10,277	509,536	82,201,773
Nov-10	132,347	77,353	10,303	220,003	92,153,132
Dec-10	126,974	52,485	16,808	196,267	100,215,887
Jan-11	14,548	27,438	15,198	57,184	99,407,722
Feb-11	61,527	31,177	17,543	110,247	95,066,523
Mar-11	144,843	133,153	11,829	289,825	87,109,113
36-Month (Apr'08-Mar'11) Total:	5,960,845	7,241,007	542,690	13,744,542	2,996,966,846
As %-of-Receipts:	0.199%	0.242%	0.018%	0.459%	

III. Un-Accounted-For (UAF) as a Percent of Receipts

The data in Table 2, below provide monthly data to calculate UAF. UAF is calculated from this data as: UAF = Recorded Receipts – Recorded Deliveries. The percentage we use is based on the 36-month sums of the respective component terms of the formula above.

Table 2

Southern California Gas Company

Date (MMM-yy)	Recorded Receipts (Dth)	Recorded Deliveries (Dth)	Un-Accounted-For (UAF) = Receipts less Deliveries (Dth)	UAF as % of Receipts (%)
Apr-08	82,692,415	80,737,839	1,954,576	2.36%
May-08	78,088,483	78,611,097	-522,614	-0.67%
Jun-08	76,412,248	76,418,330	-6,082	-0.01%
Jul-08	74,298,646	73,325,954	972,692	1.31%
Aug-08	79,851,045	79,700,404	150,641	0.19%
Sep-08	85,864,351	86,391,542	-527,191	-0.61%
Oct-08	80,924,699	80,615,853	308,846	0.38%
Nov-08	84,264,368	83,978,199	286,169	0.34%
Dec-08	82,636,919	82,508,626	128,293	0.16%
Jan-09	108,243,376	106,532,628	1,710,748	1.58%
Feb-09	93,044,444	90,889,058	2,155,386	2.32%
Mar-09	91,054,372	92,589,254	-1,534,882	-1.69%
Apr-09	82,349,914	80,781,492	1,568,422	1.90%
May-09	76,440,894	74,926,775	1,514,119	1.98%
Jun-09	71,021,997	71,636,365	-614,368	-0.87%
Jul-09	65,638,064	64,108,806	1,529,258	2.33%
Aug-09	79,834,102	80,125,947	-291,845	-0.37%
Sep-09	78,993,362	78,179,122	814,240	1.03%
Oct-09	84,893,452	84,551,006	342,446	0.40%
Nov-09	73,378,387	72,851,281	527,106	0.72%
Dec-09	77,826,360	76,820,295	1,006,065	1.29%
Jan-10	104,952,793	104,902,864	49,929	0.05%
Feb-10	97,788,561	96,436,723	1,351,838	1.38%
Mar-10	85,821,633	85,197,064	624,569	0.73%
Apr-10	86,134,189	84,167,263	1,966,926	2.28%
May-10	78,365,035	77,478,767	886,268	1.13%
Jun-10	70,413,585	71,101,893	-688,308	-0.98%
Jul-10	64,908,866	62,786,590	2,122,276	3.27%
Aug-10	72,751,040	72,533,377	217,663	0.30%
Sep-10	79,438,840	78,853,135	585,705	0.74%
Oct-10	75,178,673	75,465,030	-286,357	-0.38%
Nov-10	82,201,773	81,276,435	925,338	1.13%
Dec-10	92,153,132	92,806,060	-652,928	-0.71%
Jan-11	100,215,887	97,838,522	2,377,365	2.37%
Feb-11	99,407,722	96,424,319	2,983,403	3.00%
Mar-11	95,066,523	96,498,951	-1,432,428	-1.51%
Totals	2,992,550,150	2,970,046,866	22,503,284	0.752%

IV. Calculations of Company Use and Un-Accounted-For Load

SoCalGas prepares forecasts of gas demand—gas received through customers' meters. Consequently, to calculate the projected quantities of Co-Use-Fuel and UAF, the basis for the percentages developed above needs to be changed so they represent gas load as a *percentage of gas demand*—not gas receipts (or gas available for disposition).

The equation below states an identity:

(1) $Q_{out} = Q_{in} - \text{(Co-Use-Fuel)} - \text{(UAF)}$, where

Q_{out} = Gas Demand through customers' meters,

Q_{in} = Gas Available for Disposition ("receipts"),

Co-Use-Fuel = F x Q_{in} ,

UAF = U x Q_{in} ,

F = Co-Use-Fuel as a proportion (or %) of Q_{in}, and

U = UAF as a proportion (or %) of Q_{in}.

By substituting the relationships for Co-Use-Fuel and UAF into equation (1), the following result yields a relationship between Q_{out} and Q_{in}:

(2) $Q_{out} = Q_{in} (1 - F - U)$, and

(3) $Q_{in} = Q_{out} [1 / (1 - F - U)]$.

These equations will be used to change the basis of the percentages of Co-Use-Fuel and UAF from a "receipts basis" to a "demand basis."

The total amount of gas load for Co-Use-Fuel or UAF is numerically the same regardless of the basis for the respective percentages:

(4) Co-Use-Fuel = F x Q_{in} = f x Q_{out} , and substituting for Q_{in} from (3)yields,

(5) F x Q_{out} [1 / (1 – F – U)] = f x Q_{out} ,

(5') [F / (1 – F – U)] x Q_{out} = f x Q_{out} .

Consequently, the percentage of gas demand to use to calculate Co-Use-Fuel is:

(6) f = [F / (1 – F – U)] ; similarly,

the percentage of gas demand to use to calculate Co-Use-Fuel is:

(7) u = [U / (1 – F – U)] .

Since Co-Use-Fuel is separated into several components (denoted with subscript "c" in the formulas below), the component loads also can be calculated from gas demand using the following formula:

(8) $f_c = [F_c / (1 - F - U)]$; where $F = \sum_{i=1, ..., N} (F_i)$, or

(9) $f_c = (F_c / F) \times f$.

Example: From the Co-Use-Fuel percentages in Table 1 and the UAF percentage, 0.752%, of Table 2, we calculate:

f = 0.464% = [0.459% / (100% - 0.459% - 0.752%)],

u = 0.761% = [0.752% / (100% - 0.459% - 0.752%)], and

$f_c = (F_c / F) \times f$ = 0.201% = (0.199% / 0.459%) x 0.464%,

where "c" means the *transmission* fuel component of company use fuel.

SDG&E Company Use Fuel, UAF and "Dth/Mcf" Conversion

Conversion of Energy to Volume, Percentages of Company Use Fuel and Un-Accounted-For Gas for SDG&E

November 2011

Table of Contents

I. Conversion Between Energy and Volumetric Units

The estimated conversion of Dth to Mcf was calculated from SDG&E's system-wide gas consumption for year 2010. The value is 1.0194 Dth/Mcf and is the value (with one additional digit of precision) shown in the *2011 California Gas Report Supplement*, for SDG&E at page 30.

This conversion factor is used to develop a volumetric (e.g., Mcf unit) load estimate from the gas demand forecasts which are developed on an energy (e.g., Dth unit) basis.

II. Company-Use-Fuel (Co-Use-Fuel) as Percent of Receipts

For SDG&E, data on gas consumed for Company uses is tracked via the SDG&E gas accounting system. Three categories of use are identified: Transmission, Storage and "Other." Further, to facilitate the calculations of gas consumed for Company uses, a simple percentage is calculated using the total gas available for disposition as the denominator. These percentages were calculated over the time frame of April 2008 through March 2011. Table 1, below, shows the monthly data and the summary calculations.

Table 1

Company Use Fuel Data as Percentage of "Receipts"

San Diego Gas & Electric Company

Date (MMM-yy)	Trans-mission (Dth)	Storage (Dth)	"Other" (Dth)	Total (Dth)	Actual Receipts PGA: Net Avail.-for Disposition (Dth)
Apr-08	1,410	0	1,485	2,895	9,078,134
May-08	1,738	0	1,823	3,561	9,043,210
Jun-08	4,270	0	866	5,135	8,403,168
Jul-08	2,061	0	377	2,438	8,274,355
Aug-08	2,401	0	339	2,740	8,988,770
Sep-08	5,483	0	1,365	6,848	9,956,624
Oct-08	4,963	0	1,471	6,434	10,839,609
Nov-08	3,238	0	1,836	5,074	10,348,551
Dec-08	27,352	0	2,329	29,681	14,081,585
Jan-09	21,440	0	2,762	24,201	12,129,190
Feb-09	18,058	0	2,360	20,419	10,824,783
Mar-09	3,125	0	2,499	5,625	9,485,167
Apr-09	3,096	0	2,038	5,134	8,078,032
May-09	2,111	0	1,542	3,653	8,773,086
Jun-09	653	0	1,309	1,961	7,221,011
Jul-09	10,724	0	1,220	11,944	9,078,245
Aug-09	12,077	0	1,336	13,412	8,783,645
Sep-09	39,318	0	1,327	40,645	10,240,501
Oct-09	29,047	0	1,679	30,725	11,235,685
Nov-09	25,268	0	1,871	27,139	10,802,893
Dec-09	47,208	0	2,485	49,693	13,928,133
Jan-10	45,076	0	3,076	48,152	12,687,385
Feb-10	36,994	0	2,811	39,805	11,454,614
Mar-10	34,178	0	2,552	36,730	11,663,994
Apr-10	23,984	0	2,516	26,500	10,049,405
May-10	5,263	0	2,136	7,399	8,996,000
Jun-10	2,179	0	1,787	3,966	7,109,430
Jul-10	9,796	0	1,871	11,668	8,634,302
Aug-10	24,182	0	1,496	25,679	8,992,296
Sep-10	8,560	0	1,677	10,237	8,169,325
Oct-10	1,963	0	1,838	3,801	8,852,565
Nov-10	27,110	0	2,125	29,235	10,865,714
Dec-10	29,887	0	2,674	32,561	12,413,261
Jan-11	41,261	0	3,177	44,437	11,335,144
Feb-11	40,043	0	3,144	43,187	11,152,112
Mar-11	22,498	0	2,903	25,401	10,174,109
36-Month (Apr'08-Mar'11) Total:	618,015	0	70,099	688,114	362,144,028
As %-of-Receipts:	0.171%	0.000%	0.019%	0.190%	

III. Un-Accounted-For (UAF) as a Percent of Receipts

The data in Table 2, below provide monthly data to calculate UAF. UAF is calculated from this data as: UAF = Recorded Receipts – Recorded Deliveries.

(1) Un-Adjusted-UAF = Recorded Receipts – Recorded Deliveries,

(2) Adjusted-UAF = Un-Adjusted-UAF + Billing Adjustments-to-UAF.

The UAF percentages in Table 2 are calculated as Adjusted-UAF relative to Recorded Receipts. The percentage we use is based on the sums of the respective component terms of the formulas above for all months of the data.

Table 2

San Diego Gas & Electric Company

Date (MMM-yy)	Recorded Receipts (Dth)	Recorded Deliveries (Dth)	Un-Adjusted, Un-Accounted-For (UAF) = Receipts less Deliveries (Dth)	Billing Adjustments to UAF (Dth)	Adjusted UAF = (Receipts less Deliveries) plus Bill Adj (Dth)	Adjusted UAF as % of Receipts (%)
May-08	9,078,134	8,168,907	909,227	-893,683	15,544	0.17%
Jun-08	9,043,210	9,428,939	-385,729	368,292	-17,437	-0.19%
Jul-08	8,403,168	8,345,014	58,153	147,768	205,921	2.45%
Aug-08	8,274,355	8,386,112	-111,757	100,537	-11,220	-0.14%
Sep-08	8,988,770	8,541,780	446,990	-483,355	-36,365	-0.40%
Oct-08	9,956,624	8,886,232	1,070,392	-1,026,111	44,282	0.44%
Nov-08	10,839,609	10,052,749	786,860	-712,852	74,008	0.68%
Dec-08	10,348,551	11,153,593	-805,042	949,021	143,979	1.39%
Jan-09	14,081,585	11,416,352	2,665,234	-2,586,232	79,002	0.56%
Feb-09	12,129,190	13,861,867	-1,732,677	2,285,534	552,857	4.56%
Mar-09	10,824,783	11,948,452	-1,123,669	1,181,888	58,218	0.54%
Apr-09	9,485,167	10,339,557	-854,390	887,169	32,779	0.35%
May-09	8,078,032	7,499,849	578,183	-730,714	-152,531	-1.89%
Jun-09	8,773,086	8,791,146	-18,060	256,419	238,359	2.72%
Jul-09	7,221,011	8,409,561	-1,188,550	1,371,664	183,114	2.54%
Aug-09	9,078,245	7,553,004	1,525,241	-1,561,890	-36,649	-0.40%
Sep-09	8,783,645	8,557,498	226,147	-138,383	87,764	1.00%
Oct-09	10,240,501	8,965,230	1,275,271	-1,264,284	10,987	0.11%
Nov-09	11,235,685	10,619,789	615,896	-444,476	171,420	1.53%
Dec-09	10,802,893	11,004,916	-202,023	399,346	197,322	1.83%
Jan-10	13,928,133	12,091,883	1,836,250	-1,770,837	65,413	0.47%
Feb-10	12,687,385	13,761,716	-1,074,331	1,437,760	363,429	2.86%
Mar-10	11,454,614	12,098,279	-643,665	927,566	283,901	2.48%
Apr-10	11,663,994	10,729,441	934,553	-642,441	292,112	2.50%
May-10	10,049,405	11,410,584	-1,361,179	1,344,265	-16,914	-0.17%
Jun-10	8,996,000	8,782,220	213,780	-4,729	209,051	2.32%
Jul-10	7,109,430	8,545,144	-1,435,714	1,611,917	176,203	2.48%
Aug-10	8,634,302	8,414,523	219,779	-154,363	65,416	0.76%
Sep-10	8,992,296	8,821,500	170,796	-83,222	87,574	0.97%
Oct-10	8,169,325	8,274,233	-104,909	176,398	71,489	0.88%
Nov-10	8,852,565	8,299,067	553,498	-397,295	156,203	1.76%
Dec-10	10,865,714	9,983,097	882,617	-921,016	-38,399	-0.35%
Jan-11	12,413,261	11,804,707	608,554	-340,580	267,974	2.16%
Feb-11	11,335,144	11,839,014	-503,870	813,760	309,890	2.73%
Mar-11	11,152,112	10,974,746	177,366	-164,225	13,142	0.12%
Totals	351,969,919	347,760,700	4,209,219	-61,383	4,147,836	1.178%

IV. Calculations of Company Use and Un-Accounted-For Load

SDG&E prepares forecasts of gas demand—gas received through customers' meters. Consequently, to calculate the projected quantities of Co-Use-Fuel and UAF, the basis for the percentages developed above needs to be changed so they represent gas load as a *percentage of gas demand*—not gas receipts (or gas available for disposition).

The equation below states an identity:

(1) $Q_{out} = Q_{in} -$ (Co-Use-Fuel) – (UAF), where

Q_{out} = Gas Demand through customers' meters,

Q_{in} = Gas Available for Disposition ("receipts"),

Co-Use-Fuel = F x Q_{in} ,

UAF = U x Q_{in} ,

F = Co-Use-Fuel as a proportion (or %) of Q_{in}, and

U = UAF as a proportion (or %) of Q_{in}.

By substituting the relationships for Co-Use-Fuel and UAF into equation (1), the following result yields a relationship between Q_{out} and Q_{in}:

(2) $Q_{out} = Q_{in} (1 - F - U)$, and

(3) $Q_{in} = Q_{out} [1 / (1 - F - U)]$.

These equations will be used to change the basis of the percentages of Co-Use-Fuel and UAF from a "receipts basis" to a "demand basis."

The total amount of gas load for Co-Use-Fuel or UAF is numerically the same regardless of the basis for the respective percentages:

(4) Co-Use-Fuel = $F \times Q_{in} = f \times Q_{out}$, and substituting for Q_{in} from (3) yields,

(5) $F \times Q_{out} [1 / (1 - F - U)] = f \times Q_{out}$,

(5') $[F / (1 - F - U)] \times Q_{out} = f \times Q_{out}$.

Consequently, the percentage of gas demand to use to calculate Co-Use-Fuel is:

(6) $f = [F / (1 - F - U)]$; similarly,

the percentage of gas demand to use to calculate Co-Use-Fuel is:

(7) $u = [U / (1 - F - U)]$.

Since Co-Use-Fuel is separated into several components (denoted with subscript "c" in the formulas below), the component loads also can be calculated from gas demand using the following formula:

(8) $f_c = [F_c / (1 - F - U)]$; where $F = \sum_{i=1, \ldots, N} (F_i)$, or

(9) $f_c = (F_c / F) \times f$.

Example: From the Co-Use-Fuel percentages in Table 1 and the UAF percentage, 1.178%, of Table 2, we calculate:

$f = 0.193\% = [0.190\% / (100\% - 0.190\% - 1.178\%)]$,

$u = 1.195\% = [1.178\% / (100\% - 0.190\% - 1.178\%)]$, and

$f_c = (F_c / F) \times f = 0.173\% = (0.171\% / 0.190\%) \times 0.193\%$,

where "c" means the *transmission* fuel component of company use fuel.

SoCalGas HDD and Peak Day Temperature Designs

Weather for SoCalGas: Heating Degree Days – Average and Cold Year Designs; and Winter Peak Day Design Temperatures

November 2011

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I. Overview

Southern California Gas Company's service area extends from Fresno County to the Mexican border. To quantify the overall temperature experienced within this region, SoCalGas aggregates daily temperature recordings from fifteen U.S. Weather Bureau weather stations first into six temperature zones and then into one system average heating degree-day ("HDD") figure. The table below lists weather station locations by temperature zones.

Table 1

Weather Stations by Temperature Zones and Weights

Temperature Zone	Weight	Station (After 10/31/2002)	Station (Before 11/1/2002)
1. High mountain	0.0062	Big Bear Lake	Lake Arrowhead
2. Low desert	0.0418	Palm Springs	Palm Springs
		El Centro	Brawley
3. Coastal	0.1774	Los Angeles Airport	Los Angeles Airport
		Newport Beach	Newport Beach Harbor
		Santa Barbara Airport	Santa Barbara Airport
4. High desert	0.0746	Bakersfield	Bakersfield Airport
		Lancaster Airport	Palmdale
		Fresno	Visalia
5. Interior valleys	0.3802	Burbank	Burbank
		Pasadena	Pasadena
		Ontario	Pomona Cal Poly
		Rialto	Redlands
6. Basin	0.3198	Los Angeles Civic Center	Los Angeles Civic Center
		Santa Ana	Santa Ana

SoCalGas uses 65° Fahrenheit to calculate the number of HDDs. One heating degree day is accumulated for each degree that the daily average is below 65° Fahrenheit. To arrive at the HDD figure for each temperature zone, SoCalGas uses the simple average of the weather station HDDs in that temperature zone. To arrive at the system average HDDs figure for its entire service area, SoCalGas weights the HDD figure for each zone using the proportion of gas customers within each temperature zone based on calendar year 2010 customer counts. These weights are used in calculating the data shown from January 1991 to December 2010.

Daily weather temperatures are from the National Climatic Data Center or from preliminary data that SoCalGas captures each day and posts on its web-site: http://www.socalgas.com/business/weather/ for various individual weather stations as well as for its system average values of HDD. Annual HDDs for the entire service area from 1991 to 2010 are listed in Table 2, below.

Table 2

Calendar Month Heating Degree-Days (Jan. 1991 through Dec. 2010)

	Month												Total
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	"Cal-Year"
1991	285	116	315	118	99	25	4	3	4	45	114	278	1406
1992	285	183	201	40	15	14	1	1	1	11	129	374	1255
1993	339	259	115	51	15	11	0	0	3	11	129	277	1210
1994	231	260	129	110	78	6	3	0	2	41	293	311	1464
1995	318	136	179	128	109	40	2	1	2	14	67	246	1242
1996	264	201	169	57	14	3	1	0	1	68	145	263	1186
1997	283	206	113	97	5	4	1	0	0	27	120	298	1154
1998	269	283	186	184	87	20	0	0	5	43	167	323	1567
1999	266	246	284	234	77	38	1	2	5	8	128	247	1536
2000	247	243	209	80	25	5	2	1	3	64	248	242	1369
2001	379	338	195	207	25	6	4	3	3	21	146	360	1687
2002	335	202	225	148	78	10	2	4	8	77	93	315	1497
2003	142	233	166	180	73	17	1	1	3	16	201	306	1339
2004	293	301	86	84	17	8	3	2	4	73	228	293	1392
2005	288	209	176	115	35	11	4	1	9	44	100	235	1227
2006	272	200	338	162	28	3	0	1	5	36	104	279	1428
2007	348	214	125	116	49	16	1	1	12	37	126	354	1399
2008	348	263	148	123	76	8	1	0	2	23	75	335	1402
2009	196	259	193	133	18	15	3	4	1	43	117	320	1302
2010	255	220	174	163	71	13	8	9	13	42	204	269	1441
20-Yr-Avg (Jan1991-Dec2010)													
Avg.	282.2	228.6	186.3	126.5	49.7	13.7	2.1	1.7	4.3	37.2	146.7	296.3	1375.2
St.Dev.	55.3	52.1	65.5	51.7	33.3	10.5	1.9	2.2	3.6	21.2	59.5	40.7	138.620
Min.	142.0	116.0	86.0	40.0	5.0	3.0	0.0	0.0	0.0	8.0	67.0	235.0	1154.0
Max.	379.0	338.0	338.0	234.0	109.0	40.0	8.0	9.0	13.0	77.0	293.0	374.0	1687.0

II. Calculations to Define Our Average-Temperature Year

The simple average of the 20-year period (January 1991 through December 2010) was used to represent the Average Year total and the individual monthly values for HDD. The standard deviation of these 20 years of annual HDDs was used to design the two Cold Years based on a "1-in-10" and "1-in-35" chance, ***c***, that the respective annual "Cold Year" $\boldsymbol{hdd_c}$ value would be exceeded.

Our model for the annual HDD data is essentially a regression model where the only "explanatory" variable is the constant term. For example, the annual HDDs are modeled by the equation below:

$HDD_y = \beta_0 + e_y$; where β_0 represents the mean and the e_y is an error term.

It turns out (e.g., see *Econometrics*, Wonnacott and Wonnacott, 1970, Wiley & Sons, Inc., 1970, p. 254) that the average of the annual HDD_y estimates β_0 and that the standard deviation of these HDDs about the mean, β_0, estimates the standard deviation, s_e, of the error term, e_y. Further, a probability model for the annual HDD is based on a T-Distribution with N-1 degrees of freedom, where, N is the number of years of HDD data we use:

$U = (HDD_y - \beta_0)/s_e$, has a T-Distribution with N-1 degrees of freedom.

III. Calculating the Cold-Temperature Year Weather Designs

<u>Cold Year HDD Weather Designs</u>

For SoCalGas, cold-temperature-year HDD weather designs are developed with a 1-in-35 annual chance of occurrence. In terms of probabilities this can be expressed as the following for a "1-in-35" cold-year HDD value in equation 1 and a "1-in-10" cold-year HDD value in equation 2, with Annual HDD as the random variable:

(1) Prob { Annual HDD > "1-in-35" Cold-Yr HDD } = 1/35 = 0.0286

(2) Prob { Annual HDD > "1-in-10" Cold-Yr HDD } = 1/10 = 0.1000

An area of 0.0286 under one tail of the T-Distribution translates to 2.025 standard deviations *above* an average-year based on a t-statistic with 19 degrees of freedom. Using the standard deviation of 138.62 HDD from the last 20 years of data, these equations yield values of about 1,656 HDD for a “1-in-35” cold year and 1,559 as the number of HDDs for a “1-in-10” cold year (an area of 0.1000 under one tail of the T-Distribution translates to 1.328 standard deviations *above* an average-year based on a t-statistic with 19 degrees of freedom). For example, the “1-in-35” cold-year HDD is calculated as follows:

(3) Cold-year HDD = 1,656 which equals approximately

1,375 average-year HDDs + 2.025 * 138.62

Table 3 shows monthly HDD figures for “1-in-35” cold year, “1-in-10” cold year and, average year temperature designs. The monthly average-temperature-year HDDs are calculated from weighted monthly HDDs from 1991 to 2010, as shown as the bottom of Table 2, above. For example, the average-year December value of 296.2 HDD equals the simple average of the 20 December HDD figures from 1991 to 2010, and represents 21.5 percent of the HDDs in an average-year. SoCalGas calculates the cold--temperature-year monthly HDD values using the same shape of the average-year HDDs. For example, since 21.5 percent of average-temperature-year HDDs occurred in December, the estimated number of HDDs during December for a cold-year is equal to 1,656 HDDs multiplied by 21.5 percent, or 356.8 HDDs.

Table 3

Calendar Month Heating Degree-Day Designs

	Cold		Average	Hot	
	1-in-35 Design	1-in-10 Design		1-in-10 Design	1-in-35 Design
January	339.8	319.9	282.1	244.4	224.5
February	275.3	259.2	228.6	198.0	181.9
March	224.3	211.2	186.3	161.4	148.2
April	152.3	143.4	126.5	109.6	100.6
May	59.9	56.3	49.7	43.0	39.5
June	16.4	15.5	13.6	11.8	10.9
July	2.5	2.4	2.1	1.8	1.7
August	2.0	1.9	1.7	1.5	1.4
September	5.2	4.9	4.3	3.7	3.4
October	44.8	42.2	37.2	32.2	29.6
November	176.7	166.3	146.7	127.1	116.7
December	356.8	335.9	296.2	256.6	235.7
	1656	1559	1375	1191	1094

IV. Calculating the Peak-Day Design Temperature

SoCalGas' Peak-Day design temperature of 39.7 degrees Fahrenheit, denoted "Deg-F," is determined from a statistical analysis of observed annual minimum daily system average temperatures constructed from daily temperature recordings from the three U.S. Weather Bureau weather stations discussed above. Since we have a time series of daily data by year, the following notation will be used for the remainder of this discussion:

(1) $AVG_{y,d}$ = system average value of Temperature

for calendar year "y" and day "d".

The calendar year, y, can range from 1950 through 2010, while the day, d, can range from 1 to 365, for non leap years, or from 1 to 366 for leap years. The "upper" value for the day, d, thus depends on the calendar year, y, and will be denoted by n(y)=365, or 366, respectively, when y is a non-leap year or a leap year.

For each calendar year, we calculate the following statistic from our series of daily system average temperatures defined in equation (1) above:

(2) $MinAVG_y = \min_{d=1}^{n(y)}\{ AVG_{y,d} \}$, for y=1950, 1973, …, 2010.

(The notation used in equation 2 means "For a particular year, y, list all the daily values of system average temperature for that year, then pick the smallest one.")

The resulting minimum annual temperatures are shown in Table 4, below. Note that most of the minimum temperatures occur in the months of December or January; however, for some calendar years the minimums occurred in other months (the minimum for 2006 was observed in March).

The statistical methods we use to analyze this data employ software developed to fit three generic probability models: the Generalized Extreme Value (GEV) model, the Double-Exponential or GUMBEL (EV1) model and a 2-Parameter Students' T-Distribution (T-Dist) model. [The GEV and EV1 models have the same mathematical specification as those implemented in a DOS-based executable-only computer code that was developed by Richard L. Lehman and described in a paper published in the Proceedings of the Eighth Conference on Applied Climatology, January 17-22, 1993, Anaheim, California, pp. 270-273, by the American Meteorological Society, Boston, MA., with the title "Two Software Products for Extreme Value Analysis: System Overviews of ANYEX and DDEX." At the time he wrote the paper, Dr. Lehman was with the Climate

Analysis Center, National Weather Service/NOAA in Washington, D.C., zip code 20233.] The Statistical Analysis Software (SAS) procedure for nonlinear statistical model estimation (PROC MODEL, from SAS V6.12) was used to do the calculations. Further, the calculation procedures were implemented to fit the probability models to observed *maximums* of data, like heating degrees. By recognizing that:

$$- MinAVG_y = - \min_{d=1}^{n(y)}\{AVG_{y,d}\} = \max_{d=1}^{n(y)}\{ -AVG_{y,d}\}, \text{ for } y=1950, \ldots, 2010;$$

this same software, when applied to the *negative* of the minimum temperature data, yields appropriate probability model estimation results.

The calculations done to fit any one of the three probability models chooses the parameter values that provide the "best fit" of the parametric probability model's calculated cumulative distribution function (CDF) to the empirical cumulative distribution function (ECDF). Note that the ECDF is constructed based on the variable "-$MinAVG_y$" (which is a *maximum* over a set of *negative* temperatures) with values of the variable $MinAVG_y$ that are the same as shown in Table 4.

In Table 5, the data for -$MinAVG_y$ are shown after they have been sorted from "lowest" to "highest" value. The ascending *ordinal* value is shown in the column labeled "RANK" and the empirical cumulative distribution function is calculated and shown in the next column. The formula used to calculate this function is:

$$ECDF = (RANK – \alpha)/[MaxRANK + (1 – 2 \alpha)],$$

where the parameter "α" (shown as *alpha* in Table 5) is a "small" positive value (usually less than ½) that is used to bound the ECDF away from 0 and 1.

Of the three probability models considered (GEV, EV1, and T_Dist) the results obtained for the T_Dist model were selected since the fit to the ECDF was better than that of either the GEV model or the EV1 model. (Although convergence to stable parameter estimates is occasionally a problem with fitting a GEV model to the ECDF, the T_Dist model had no problems with convergence of the iterative procedure to estimate parameters.)

The T_Dist model used here is a three-parameter probability model where the varable $z = (-MinAVG_y - \gamma) / \theta$, for each year, y, is presumed to follow a T_Dist with location parameter, γ, and scale parameter, θ, and a third parameter, v, that represents the number of degrees of freedom. For a given number of years of data, N, then v=N-2.

The following mathematical expression specifies the T_Dist model we fit to the data for "-$MinAVG_y$ " shown in Table 5.

(3) $ECDF(-MinAVG_y) = Prob \{ -T < -MinAVG_y \}= T\_Dist\{z; \gamma, \theta, v=N-2\},$

where "T_Dist{ . }" is the cumulative probability distribution function for Student's T-Distribution[1], and

(4) $z = (-MinAVG_y - \gamma) / \theta$, for each year, y, and

the parameters "γ" and "θ" are estimated for this model for given degrees of freedom v=N-2. The estimated values for γ and θ are shown in Table 5 along with the fitted values of the model CDF (the column: "Fitted" Model CDF).

Now, to calculate a *peak-day design temperature*, $TPDD_\delta$, with a specified likelihood, δ, that a value less than $TPDD_\delta$ would be observed, we use the equation below:

(5) $\delta = Prob\{ T \leq TPDD_\delta \}$, which is equivalent to

(6) $\delta = Prob\{ [(-T - \gamma) / \theta] \geq [(-TPDD_\delta - \gamma) / \theta] \}, = Prob\{ [(-T - \gamma) / \theta] \geq [z_\delta] \}$,

where $z_\delta = [(-TPDD_\delta - \gamma) / \theta]$. In terms of our probability model,

(7) $\delta = 1 – T\_Dist\{ z_\delta; \gamma, \theta, v=N-2\}$,

which yields the following equation for z_δ,

(7') $z_\delta = \{ TINV\_Dist\{ (1-\delta); \gamma, \theta, v=N-2\}$, where "TINV_Dist{ . }" is the inverse function of the T_Dist{ . } function[2]. The implied equation for $TPDD_\delta$ is:

(8) $TPDD_\delta = - [\gamma + (z_\delta)(\theta)]$.

To calculate the minimum daily (system average) temperature to define our extreme weather event, we specify that this COLDEST-Day be one where the temperature would be lower with a "1-in-35" likelihood. This criterion translates into two equations to be solved based on equations (7) and (8) above:

(9) solve for "z_δ" from equation (7') above with (1-δ) = (1 - 1/35) = 1 - 0.0286,

(10) solve for "$TPDD_\delta$" from $TPDD_\delta = - [\gamma + (z_\delta)(\theta)]$.

The value of $z_\delta = 1.940$ and $TPDD_\delta = - [\gamma + (z_\delta)(\theta)] = 39.7$ degrees Fahrenheit, with values for "v=N-2"; along with "γ" and "θ" in Table 5, below.

---

[1] A common mathematical expression for Student's T-Distribution is provided at http://en.wikipedia.org/wiki/Student%27s_t-distribution; with a probability density function

$$f(t) = \frac{\Gamma(\frac{\nu+1}{2})}{\sqrt{\nu\pi}\,\Gamma(\frac{\nu}{2})} \left(1 + \frac{t^2}{\nu}\right)^{-\frac{\nu+1}{2}},$$

such that T_Dist{z; γ, θ, ν=N-2}=∫f(t) dt, from t=-∞ to t=z. Also, the notation Γ(.) is known in mathematics as the GAMMA function; see http://www.wikipedia.org/wiki/Gamma_function for a description. Also, see *Statistical Theory*, 3rd Ed., B.W. Lindgren, MacMillian Pub. Inc, 1976, pp. 336-337.

[2] Computer software packages such as SAS and EXCEL have implemented statistical and mathematical functions to readily calculate values for T_Dist{ . } and TINV_Dist{ . } as defined above.

SoCalGas' peak-day design temperature of 41.6 degrees Fahrenheit, is calculated in a methodologically similar way as for the 39.7 degree peak day temperature. The criteria specified in equation (9) above for a "1-in-35" likelihood would be replaced by a "1-in-10" likelihood.

(9') solve for "z_δ" from equation (7') above with $(1-\delta) = (1 - 1/10) = 1 - 0.1000$,

which yields a "z_δ" value of $z_\delta = 1.296$ and, $TPDD_\delta = - [\gamma + (z_\delta)(\theta)] = 41.6$ with values for "v=N-2"; along with "γ" and "θ" in Table 5, below.

A plot of the cumulative distribution function for $MinAVG_y$ based on "v=N-2", the fitted model parameters, "γ" and "θ" with values in Table 5, below, is shown in Figure 1.

Table 4

YEAR	MINAVG	Month(MinAvg)
1950	40.8139	Jan
1951	44.5450	Dec
1952	43.0373	Jan
1953	45.6665	Feb
1954	45.6663	Dec
1955	45.8391	Dec
1956	44.8810	Feb
1957	39.4935	Jan
1958	46.2199	Nov
1959	48.2412	Feb
1960	42.2848	Jan
1961	47.1685	Dec
1962	43.3900	Jan
1963	42.5639	Jan
1964	45.2007	Nov
1965	44.7710	Jan
1966	46.6832	Jan
1967	40.7231	Dec
1968	40.6154	Dec
1969	44.8169	Jan
1970	46.8150	Dec
1971	42.9758	Jan
1972	41.4069	Dec
1973	45.0335	Jan
1974	42.9467	Jan
1975	44.6235	Jan
1976	44.8124	Jan
1977	48.2931	Jan
1978	41.6190	Dec
1979	41.3718	Jan
1980	50.3397	Jan
1981	49.3314	Jan
1982	45.3314	Jan
1983	48.6651	Jan
1984	46.9062	Dec
1985	45.0927	Feb
1986	48.5721	Feb
1987	43.4273	Dec
1988	43.2554	Dec
1989	40.5770	Feb
1990	38.9869	Dec
1991	48.6803	Mar
1992	47.3103	Dec
1993	46.0750	Jan
1994	47.1404	Nov
1995	49.8132	Dec
1996	44.9449	Feb
1997	48.3889	Jan
1998	43.5981	Dec
1999	48.9918	Jan
2000	48.7734	Mar
2001	47.1624	Feb
2002	45.8139	Jan
2003	47.0545	Dec
2004	48.1809	Nov
2005	47.2540	Jan
2006	45.7981	Mar
2007	41.4863	Jan
2008	45.7927	Dec
2009	45.2538	Dec
2010	44.6756	Dec

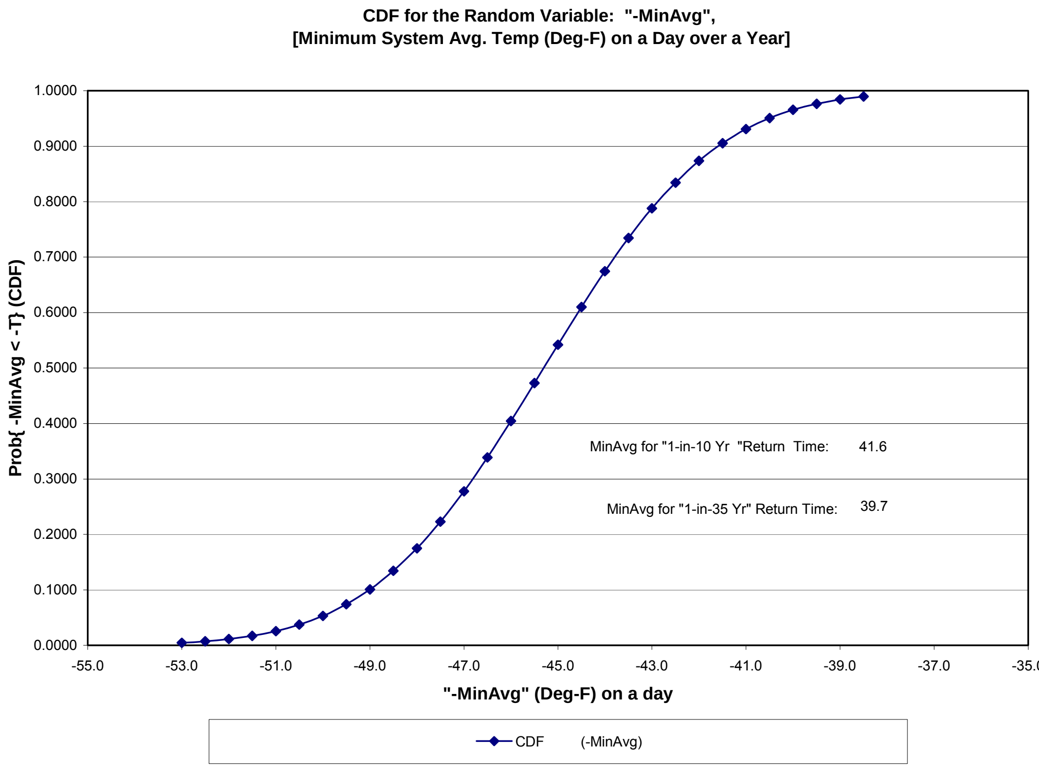
Table 5

alpha= 0.375

YEAR	Month(-MinAvg)	Days/Yr	-MinAvg	Empirical CDF	"Rank"	Empirical CDF	Fitted Model CDF
1980	Jan	366	-50.3397	0.01613	1	0.01020	-2.38306
1995	Dec	365	-49.8132	0.03226	2	0.02653	-1.97407
1981	Jan	365	-49.3314	0.04839	3	0.04286	-1.74772
1999	Jan	365	-48.9918	0.06452	4	0.05918	-1.58476
2000	Mar	366	-48.7734	0.08065	5	0.07551	-1.45481
1991	Mar	365	-48.6803	0.09677	6	0.09184	-1.34531
1983	Jan	365	-48.6651	0.11290	7	0.10816	-1.24975
1986	Feb	365	-48.5721	0.12903	8	0.12449	-1.16432
1997	Jan	365	-48.3889	0.14516	9	0.14082	-1.08660
1977	Jan	365	-48.2931	0.16129	10	0.15714	-1.01492
1959	Feb	365	-48.2412	0.17742	11	0.17347	-0.94811
2004	Nov	366	-48.1809	0.19355	12	0.18980	-0.88529
1992	Dec	366	-47.3103	0.20968	13	0.20612	-0.82580
2005	Jan	365	-47.2540	0.22581	14	0.22245	-0.76911
1961	Dec	365	-47.1685	0.24194	15	0.23878	-0.71480
2001	Feb	365	-47.1624	0.25806	16	0.25510	-0.66254
1994	Nov	365	-47.1404	0.27419	17	0.27143	-0.61205
2003	Dec	365	-47.0545	0.29032	18	0.28776	-0.56309
1984	Dec	366	-46.9062	0.30645	19	0.30408	-0.51545
1970	Dec	365	-46.8150	0.32258	20	0.32041	-0.46897
1966	Jan	365	-46.6832	0.33871	21	0.33673	-0.42350
1958	Nov	365	-46.2199	0.35484	22	0.35306	-0.37890
1993	Jan	365	-46.0750	0.37097	23	0.36939	-0.33505
1955	Dec	365	-45.8391	0.38710	24	0.38571	-0.29185
2002	Jan	365	-45.8139	0.40323	25	0.40204	-0.24919
2006	Mar	365	-45.7981	0.41935	26	0.41837	-0.20698
2007	Jan	365	-45.7981	0.43548	27	0.43469	-0.16515
2008	Dec	366	-45.7981	0.45161	28	0.45102	-0.12361
2009	Dec	365	-45.7981	0.46774	29	0.46735	-0.08229
2010	Dec	365	-45.7981	0.48387	30	0.48367	-0.04111
1953	Feb	365	-45.6665	0.50000	31	0.50000	0.00000
1954	Dec	365	-45.6663	0.51613	32	0.51633	0.04111
1982	Jan	365	-45.3314	0.53226	33	0.53265	0.08229
1964	Nov	366	-45.2007	0.54839	34	0.54898	0.12361
1985	Feb	365	-45.0927	0.56452	35	0.56531	0.16515
1973	Jan	365	-45.0335	0.58065	36	0.58163	0.20698
1996	Feb	366	-44.9449	0.59677	37	0.59796	0.24919
1956	Feb	366	-44.8810	0.61290	38	0.61429	0.29185
1969	Jan	365	-44.8169	0.62903	39	0.63061	0.33505
1976	Jan	366	-44.8124	0.64516	40	0.64694	0.37890
1965	Jan	365	-44.7710	0.66129	41	0.66327	0.42350
1975	Jan	365	-44.6235	0.67742	42	0.67959	0.46897
1951	Dec	365	-44.5450	0.69355	43	0.69592	0.51545
1998	Dec	365	-43.5981	0.70968	44	0.71224	0.56309
1987	Dec	365	-43.4273	0.72581	45	0.72857	0.61205
1962	Jan	365	-43.3900	0.74194	46	0.74490	0.66254
1988	Dec	366	-43.2554	0.75806	47	0.76122	0.71480
1952	Jan	366	-43.0373	0.77419	48	0.77755	0.76911
1971	Jan	365	-42.9758	0.79032	49	0.79388	0.82580
1974	Jan	365	-42.9467	0.80645	50	0.81020	0.88529
1963	Jan	365	-42.5639	0.82258	51	0.82653	0.94811
1960	Jan	366	-42.2848	0.83871	52	0.84286	1.01492
1978	Dec	365	-41.6190	0.85484	53	0.85918	1.08660
1972	Dec	366	-41.4069	0.87097	54	0.87551	1.16432
1979	Jan	365	-41.3718	0.88710	55	0.89184	1.24975
1950	Jan	365	-40.8139	0.90323	56	0.90816	1.34531
1967	Dec	365	-40.7231	0.91935	57	0.92449	1.45481
1968	Dec	366	-40.6154	0.93548	58	0.94082	1.58476
1989	Feb	365	-40.5770	0.95161	59	0.95714	1.74772
1957	Jan	365	-39.4935	0.96774	60	0.97347	1.97407
1990	Dec	365	-38.9869	0.98387	61	0.98980	2.38306

"Gamma" (Fitted) = -45.30
"Theta" (Fitted) = 2.86
Deg. Freedom= 59

Figure 1



CDF for the Random Variable: "-MinAvg",
[Minimum System Avg. Temp (Deg-F) on a Day over a Year]
Prob{ -MinAvg < -T} (CDF)
1.0000
0.9000
0.8000
0.7000
0.6000
0.5000
0.4000
0.3000
0.2000
0.1000
0.0000
MinAvg for "1-in-10 Yr "Return Time: 41.6
MinAvg for "1-in-35 Yr" Return Time: 39.7
-55.0
-53.0
-51.0
-49.0
-47.0
-45.0
-43.0
-41.0
-39.0
-37.0
-35.0
"-MinAvg" (Deg-F) on a day
CDF (-MinAvg)

V. Estimating the Uncertainty in the Peak-Day Design Temperature

The calculated peak-day design temperatures in section IV above also have a statistical uncertainty associated with them. The estimated measures of uncertainty recommended for our use are calculated from the fitted model for the probability distribution and are believed to be reasonable, although rough, approximations.

The basic approach used the estimated parameters for the probability distribution (see the results provided in Table 5, above) to calculate the fitted temperatures as a function of the empirical CDF listed in Table 5. These fitted temperatures are then “compared” with the observed temperatures by calculating the difference = “observed” – “fitted” values. The full set of differences are then separated into the lower third (L), the middle third (M) and the upper third (U) of the distribution. Finally, calculate values of the root-mean-square error (RMSE) of the differences in each third of the distribution, along with the entire set of differences overall. The data in Table 6, below, show the temperature data and the resulting RMSE values.

The formula below is used to calculate the RMSE for a specified set of “N” data differences:

$$\text{RMSE} = \text{SQRT}\left\{ \left(\sum_{i=1, \ldots, N} e[\,i\,]^{2} \right) / (N-3) \right\},$$

where e[i] = *observed* less *fitted* value of temperature, T[i]. The number of estimated paramters (3 for the GEV model) is subtracted from the respective number of data differences, N, in the denominator of the RMSE expression.

Since both the “1-in-35” and “1-in-10” peak-day temperature values are in the lower third quantile of the fitted distribution, the calculated standard error for these estimates is 0.4 Deg-F.

Table 6

Quantile: (Lower, Middle, Upper 3rd's)	Observed $T_{[i]}$ Temp. Ranked	Fitted Value of $T_{[i]}$	Residual $e_{[i]}$: Obs'd. less Fitted Value of $T_{[i]}$	Square of $e_{[i]}$:
U	50.3397	52.1263	-1.7866	3.191769
U	49.8132	50.9553	-1.1421	1.304474
U	49.3314	50.3073	-0.9759	0.952462
U	48.9918	49.8407	-0.8490	0.720720
U	48.7734	49.4687	-0.6953	0.483484
U	48.6803	49.1552	-0.4749	0.225515
U	48.6651	48.8816	-0.2165	0.046884
U	48.5721	48.6370	-0.0649	0.004211
U	48.3889	48.4145	-0.0256	0.000655
U	48.2931	48.2093	0.0838	0.007019
U	48.2412	48.0180	0.2232	0.049801
U	48.1809	47.8382	0.3427	0.117452
U	47.3103	47.6678	-0.3575	0.127821
U	47.2540	47.5055	-0.2515	0.063258
U	47.1685	47.3501	-0.1815	0.032955
U	47.1624	47.2004	-0.0381	0.001448
U	47.1404	47.0559	0.0846	0.007150
U	47.0545	46.9157	0.1388	0.019258
U	46.9062	46.7793	0.1268	0.016090
U	46.8150	46.6463	0.1687	0.028475
M	46.6832	46.5161	0.1671	0.027933
M	46.2199	46.3884	-0.1685	0.028389
M	46.0750	46.2628	-0.1879	0.035288
M	45.8391	46.1391	-0.3000	0.090023
M	45.8139	46.0170	-0.2031	0.041267
M	45.7981	45.8962	-0.0981	0.009617
M	45.7981	45.7764	0.0217	0.000471
M	45.7981	45.6575	0.1406	0.019774
M	45.7981	45.5392	0.2589	0.067044
M	45.7981	45.4213	0.3768	0.141999
M	45.6665	45.3036	0.3629	0.131690
M	45.6663	45.1859	0.4804	0.230821
M	45.3314	45.0680	0.2634	0.069374
M	45.2007	44.9497	0.2510	0.063008
M	45.0927	44.8308	0.2619	0.068595
M	45.0335	44.7110	0.3225	0.104028
M	44.9449	44.5902	0.3547	0.125795
M	44.8810	44.4680	0.4130	0.170532
M	44.8169	44.3443	0.4725	0.223288
M	44.8124	44.2188	0.5936	0.352370
M	44.7710	44.0911	0.6798	0.462174
L	44.6235	43.9609	0.6626	0.439002
L	44.5450	43.8279	0.7172	0.514332
L	43.5981	43.6915	-0.0934	0.008731
L	43.4273	43.5513	-0.1240	0.015370
L	43.3900	43.4067	-0.0168	0.000281
L	43.2554	43.2571	-0.0017	0.000003
L	43.0373	43.1017	-0.0644	0.004142
L	42.9758	42.9393	0.0365	0.001330
L	42.9467	42.7690	0.1777	0.031579
L	42.5639	42.5892	-0.0253	0.000638
L	42.2848	42.3979	-0.1131	0.012792
L	41.6190	42.1927	-0.5737	0.329084
L	41.4069	41.9702	-0.5632	0.317241
L	41.3718	41.7256	-0.3538	0.125144
L	40.8139	41.4520	-0.6381	0.407193
L	40.7231	41.1385	-0.4154	0.172588
L	40.6154	40.7665	-0.1511	0.022836
L	40.5770	40.2999	0.2771	0.076798
L	39.4935	39.6519	-0.1584	0.025090
L	38.9869	38.4809	0.5059	0.255971
			Overall RMSE ($e_{[i]}$):	0.5 °F
			Upper 3rd RMSE ($e_{[i]}$):	0.6 °F
			Middle 3rd RMSE ($e_{[i]}$):	0.4 °F
			Lower 3rd RMSE ($e_{[i]}$):	0.4 °F

VI. The Relationship between Annual Likelihoods for Peak-Day Temperatures and "Expected Return Time"

The event whose probability distribution we've modeled is the likelihood that the minimum daily temperature over a calendar year is less than a specified value. And, in particular, we've used this probability model to infer the value of a temperature, our *peak-day design temperature* ($TPDD_\delta$), that corresponds to a pre-defined likelihood, δ, that the observed minimum temperature is less than or equal to this design temperature.

(1) δ = Prob{ Minimum Daily Temperature over the Year < $TPDD_\delta$ }.

For some applications, it is useful to think of how this specified likelihood (or "risk level" δ) relates to the expected number of years until this Peak-Day event would first occur. This expected number of years is what is meant by the *return period*. The results stated below are found in the book: ***Statistics of Extremes***, E.J. Gumbel, Columbia University Press, 1958, on pages 21-25.

(2) E[#Yrs for Peak-Day Event to Occur] = 1 / δ,

1 / Prob{ Minimum Daily Temperature over the Year < $TPDD_\delta$ }.

For our peak-day design temperature (38.8°F) associated with a 1-in-35 annual likelihood, the return period is 35 years (δ=1/35). For the 41.2°F peak-day design temperature, the return period is 10 years (δ=1/10). Occasionally, a less precise terminology is used. For example, the 38.8°F peak-day design temperature may be referred to as a "1-in-35 year cold day"; and the 41.2°F peak-day design temperature may be referred to as a "1-in-10 year cold day."

The probability model for the *return period*, as a random variable, is a geometric (discrete) distribution with positive integer values for the *return period*. The parameter δ = Prob{ Minimum Daily Temperature over the Year < $TPDD_\delta$ }.

(3) Prob{ *return period* = r } = $(1 - \delta)^{(r-1)}\,\delta$, for r = 1, 2, 3, . . .

The expected value of the *return period* is already given in (2) above; the variance of the *return period* is:

(4) Var[*return period*] = (E[*return period*])^2 x (1- (1 / E [*return period*])),

(4') Var[*return period*] = (E[*return period*]) x (E [*return period*] - 1).

Equations (4) and (4') indicate that the standard deviation (square root of the variance) of the *return period* is nearly equal to its expected value. Thus, there is substantial variability about the expected value—a *return period* is not very precise.

VII. Calculation of Likelihoods for Peak-Day Temperature Events Over a Specified Number of Years

With a specified annual likelihood (i.e., a level of risk) for a peak-day temperature event, several forward-looking questions can be posed:

1). What is the probability that we observe *no* peak-day event over the next N years?

2). What is the probability that we observe *at least one* specified peak-day event over the next N years?"

3). What is the probability that we observe exactly one peak-day event over the next N years?

4). What is the underlying peak-day temperature associated with the annual likelihood computed from setting the probability in question 3 above to a specified value?

To calculate the probabilities to answer questions 1-3, we use a binomial probability model:

(1) BiNomial(s, N, δ) = { N! / [(s!) (N-s)!]} $[\delta]^{(s)}\ [1 - \delta]^{(N-s)}$, where

N = # of years, s = # of peak-day events and δ = Annual Likelihood of a peak-day event.; the notation "N!" means the product "N(N-1)(N-2) ... (2)(1)" in the formula.

The binomial probability model is the one that applies here since for a specified number of years in the future, N, and a specified annual likelihood, δ, for the peak-day event, there are typically a number of ways that a specified number of annual peak-day events can occur out of the total, N, regardless of the order in which the outcomes might occur.

For δ=0.1, N=10 years the answer to question 1) is calculated from:

(2) Prob{ *No* peak-day event over 10 years } = BiNomial(0, 10, 0.1) = 0.3487

The answer to question 2) is simply:

(3) Prob{ *At Least* One peak-day event over 10 years } =

1 - Prob{ No peak-day event over 10 years } = 1 – 0.3487 = 0.6513

The answer to question 3) is calculated from:

(4) Prob{ *Exactly One* peak-day event over 10 years } = BiNomial(1, 10, 0.1)

(4’) Prob{ *Exactly One* peak-day event over 10 years } = 0.3874

Finally, to find an answer to question 4) where there’s a 1/10 chance that only one peak-day event occurs over a ten-year period, we solve for δ in the equation:

(5) $0.1000 = \text{BiNomial}(1, 10, \delta)$.

A numerical solution to this equation yields δ = 0.0011, approximately, for the annual likelihood of a peak-day event. Our estimation results of Section IV, above, allow us to calculate the peak-day design temperature for this value of δ. The resulting calculations yield $TPDD_{\delta}$ = 37.2°F. A similar set of calculations for the case where we want to find the annual likelihood of a peak-day where only one peak-day event occurs over a thirty-five year period with a chance of 1/35=0.0286. The resulting value of δ = 0.000841 with $TPDD_{\delta}$ = 33.9°F for this value of δ.

VIII. Attachment 1: SAS Program Execution Log

```
NOTE: Copyright (c) 1989-1996 by SAS Institute Inc., Cary, NC, USA.
NOTE: SAS (r) Proprietary Software Release 6.12  TS020
      Licensed to SAN DIEGO GAS & ELECTRIC CO, Site 0009311007.


Title1 "Data Analysis for Maximum/Minimum Daily SysAvg Temperatures (Un-Rounded)." ;
Title2 "Fit GEV Probability Model to Empirical CDF using NL-OLS Regression Methods." ;
/****************************************************************************************************/
/*                                                                                                  */
/*                                                                                                  */
/*                                                                                                  */
/* FILE SAVED: "S:\Weather\2013Tcap\SoCalGas\GEV4DlyTemp(NLReg2)_Scg4WP.sas"                        */
/*                                                                                                  */
/*              Aug. 11th, 2011 for Annual Max of Negative of Min. Temp.                            */
/*              Also, separately for and each of twelve(12) calendar months Jan-Dec.                */
/*              Fit GEV models (3-parameter and 2-parameter), plus a simple T-Dist. model.          */
/*                                                                                                  */
/****************************************************************************************************/
options mprint ;
/* %cour8p
   %cour8l ; */
 options ls=211 ps=69 ; **<<LANDSCAPE:  SAS-Monospace w/Roman 6pt. Font >>**;
*options ls=160 ps=90 ; **<<PORTRAIT:   SAS-Monospace w/Roman 6pt. Font >>**;
options date number notes ;
libname out2 'S:\Weather\2013Tcap\SoCalGas\' ;
NOTE: Libref OUT2 was successfully assigned as follows:
      Engine:        V612
      Physical Name: S:\Weather\2013Tcap\SoCalGas
  **<< Change library reference to use applicable daily data. >>**;
libname estout2 'S:\Weather\2013Tcap\SoCalGas\MinTemp\' ;
NOTE: Libref ESTOUT2 was successfully assigned as follows:
      Engine:        V612
      Physical Name: S:\Weather\2013Tcap\SoCalGas\MinTemp
  **<< Change library reference to use estimation results directory. >>**;
proc contents data=out2.DlySys_d ;
run ;

NOTE: The PROCEDURE CONTENTS used 1.25 seconds.


data seriesD ;
  set out2.DlySys_d ;
  year = year(date) ;
  month = month(date) ;
  posAvg = avg ;
  negAvg = -avg ;
run ;

NOTE: The data set WORK.SERIESD has 22339 observations and 8 variables.
NOTE: The DATA statement used 0.92 seconds.


proc means data=seriesD noprint nway ;
 class year month ;
  var posAvg negAvg ;
 output out=mostat
                 mean=posAvg  negAvg
```

```
                    max=MxPosAvg MxNegAvg
                    min=MnPosAvg MnNegAvg    ;
run;

NOTE: The data set WORK.MOSTAT has 734 observations and 10 variables.
NOTE: The PROCEDURE MEANS used 0.32 seconds.


proc sort data=mostat ;
   by year month ;
run ;

NOTE: The data set WORK.MOSTAT has 734 observations and 10 variables.
NOTE: The PROCEDURE SORT used 0.34 seconds.


data mostat ;
   set mostat ;
   MxPRatio = MxPosAvg/ PosAvg  ;
   MnPRatio = MnPosAvg/ PosAvg  ;
   MxNRatio = MxNegAvg/ NegAvg  ;
   MnNRatio = MnNegAvg/ NegAvg  ;
run ;

NOTE: The data set WORK.MOSTAT has 734 observations and 14 variables.
NOTE: The DATA statement used 0.26 seconds.


/****************
***<< Print Summary Tables of Means/Minimums/Maximums of daily NEGATIVE-Temperatures (degrees-F). >>*** ;

proc transpose data=mostat out=AvTData prefix=AvT_ ;  **<< Update "year" value as necessary! >>** ;
   where (year < 2011) ;
   by year;
   id month ;
   var NegAvg  ;
run ;

data AvTData ;
   set AvTData ;

 if (mod(year,4)=0) then do ;
        AvTyr = (AvT_1 + AvT_3 + AvT_5 + AvT_7 + AvT_8 + AvT_10 + AvT_12)*31
               + (AvT_4 + AvT_6 + AvT_9 + AvT_11)*30
               + (AvT_2)*29 ;
        AvTyr = AvTyr / 366 ;
        end ;
 else do ;
        AvTyr = (AvT_1 + AvT_3 + AvT_5 + AvT_7 + AvT_8 + AvT_10 + AvT_12)*31
               + (AvT_4 + AvT_6 + AvT_9 + AvT_11)*30
               + (AvT_2)*28 ;
        AvTyr = AvTyr / 365 ;
        end ;

run ;

proc print data=AvTData ;
 id year ;
 var AvTyr AvT_1-AvT_12 ;
title3 'Monthly Mean NEGATIVE Temperature (Deg-F) from 1950 thru 2006.';
run ;
```

```
proc transpose data=mostat out=MnTData prefix=MnT_ ;
   where (year < 2011) ;     **<< Update "year" value as necessary! >>** ;
   by year;
   id month ;
   var MnNegAvg ;
run ;

data MnTData ;
   set MnTData ;
 MnTyr = min(of MnT_1-MnT_12) ;
run ;

proc print data=MnTData ;
 id year ;
 var MnTyr MnT_1-MnT_12 ;
title3 'Monthly MINIMUM NEGATIVE-Temperature (Deg-F) from 1950 thru 2006.';
run ;
****************/




proc transpose data=mostat out=MxTData prefix=MxT_ ;
   where (year < 2011) ;    **<< Update "year" value as necessary! >>** ;
   by year;
   id month ;
   var MxNegAvg ;
run ;

NOTE: The data set WORK.MXTDATA has 61 observations and 14 variables.
NOTE: The PROCEDURE TRANSPOSE used 0.42 seconds.



data MxTData ;
   set MxTData ;
 MxTyr = max(of MxT_1-MxT_12) ;
run ;

NOTE: The data set WORK.MXTDATA has 61 observations and 15 variables.
NOTE: The DATA statement used 0.25 seconds.



proc print data=MxTData ;
 id year ;
 var MxTyr MxT_1-MxT_12 ;
title3 'Monthly MAXIMUM NEGATIVE-Temperature (Deg-F) from 1950 thru 2010.';    **<< Update "year" value as
necessary! >>** ;
run ;

NOTE: The PROCEDURE PRINT used 0.23 seconds.











/****************
***<< Descriptive Statistics: Maximums of daily NEGATIVE-Temperatures (Deg-F) for Year and each calendar month.
>>*** ;


proc corr data=MxTData ;
  var MxTyr MxT_1 - MxT_12 ;
title3 'Correlation Matrix of Monthly Maximum NEGATIVE-Temperatures (Deg-F) within same year.';
run ;

proc arima data=MxTData ;
  identify var=MxTyr ;
```

```
  identify var=MxT_1 ;
  identify var=MxT_2 ;
  identify var=MxT_3 ;
  identify var=MxT_4 ;
  identify var=MxT_5 ;
  identify var=MxT_6 ;
  identify var=MxT_7 ;
  identify var=MxT_8 ;
  identify var=MxT_9 ;
  identify var=MxT_10 ;
  identify var=MxT_11 ;
  identify var=MxT_12 ;
title3 "Auto-correlation analysis of each calendar month's Maximum NEGATIVE-Temperatures (Deg-F) within same year.";
run ;

proc univariate normal data=MxTData plot ;
  id year ;
  var MxTyr MxT_1 - MxT_12 ;
title3 "Probability plots and tests for NORMALity by each calendar month's Maximun NEGATIVE-Temperatures (Deg-F) time series.";
run ;

proc means data=MxTData ;
  var MxT_1 - MxT_12  MxTYr ;
run ;
****************/

***<< Statistical Estimation of GEV Models: Maximums of daily heating degrees for Year and each calendar month. >>*** ;

%macro RankIt(file=MxTData,var=MxTYr,rank=RankYr,prob=PrMxTYr,Nobser=61,PltValue=0.375) ;
          **<< Update "Nobser" value as necessary! >>** ;
proc sort data=&file ;
  by &var ;
run ;

data &file ;
   set &file ;
   retain &rank 0     alpha &pltvalue ;

  &rank = &rank + 1 ;
  &prob =  (&rank - alpha) / (&Nobser +(1 - 2*alpha)) ;
run ;

proc print data=&file ;
  var &var &rank &prob alpha year ;
run ;
%mend RankIt ;

%macro GEVfit(file=MxTData,ofile=MxTNL1,outfit=fit1,outest=est1,depvar=PrMxTYr,var=MxTYr,typeGEV=1,
              KappaI=0.25,GammaI=-47.05,ThetaI=2.77,YrLo=1950,YrHi=2010) ;

          **<< Update "year" value as necessary! >>** ;

proc sort data=&file ;
   by year ;
run ;

proc model data=&file converge=0.001
           maxit=500 dw ;  outmodel=&ofile ;
     range year = &YrLo to &YrHi ;  **<< Dropped monthly data beyond 2010 data. >>** ;
```

```
     y = (&var - Gamma) / Theta ;

    %if &typeGEV=1 %then %do ;  ***<< 3-parameter GEV Model. >>>*** ;
        &depvar = exp( -(1 - Kappa * (y))**(1/Kappa) ) ;
        %let typmod = 3-parameter GEV Model. ;
        %end ;

    %if &typeGEV=2 %then %do ;  **<< 2-parameter "Double Exponential" or  "Gumbel" Model. >>** ;
        &depvar = exp( -exp(-(y)) ) ;
        %let typmod = 2-parameter Double Exponential or Gumbel Model. ;
        %end ;

    %if (&typeGEV NE 1) AND (&typeGEV NE 2) %then  %do ; **<< 2-parameter "T-Dist" Model. >>** ;
        dft=(&YrHi - &YrLo) +1 -2 ;
        &depvar = probt(y,dft) ;
        %let typmod = 2-parameter T-Dist Model. ;
        %end ;


  %if &typeGEV = 1 %then %do ;
  parms
        Kappa  &KappaI
        Gamma  &GammaI
        Theta  &ThetaI ;
  %end ;

  %if (&typeGEV NE 1)  %then %do ;
  parms
        Gamma  &GammaI
        Theta  &ThetaI ;
  %end ;


  fit &depvar   /out=&outfit  outall
                 outest=&outest corrb corrs outcov ;

title3 "Non-linear Estimation of &&typmod: for Maximum NEGATIVE Temperature (Deg-F)." ;
run ;
%mend GEVfit ;

/****************
****************/

proc means data=MxTData ;
  var MxT_1 - MxT_12  MxTYr ;
 output out=VarStat
        mean=mean1-mean12 meanYr
        std=stdev1-stdev12 stdevYr;
title3 "Calc. Means and Standard Deviantions to use as Starting Values in Non-Linear Estimations." ;
run ;

NOTE: The data set WORK.VARSTAT has 1 observations and 28 variables.
NOTE: The PROCEDURE MEANS used 0.15 seconds.


proc print data=VarStat ;
run ;

NOTE: The PROCEDURE PRINT used 0.01 seconds.


data _null_ ;
   set VarStat ;

  call symput('gamma_Yr',meanYr) ;
  call symput('theta_Yr',stdevYr) ;
```

```
322    call symput('gamma_12',mean12) ;
323    call symput('theta_12',stdev12) ;
324
325    call symput('gamma_11',mean11) ;
326    call symput('theta_11',stdev11) ;
327
328    call symput('gamma_10',mean10) ;
329    call symput('theta_10',stdev10) ;
330
331    call symput('gamma_9',mean9) ;
332    call symput('theta_9',stdev9) ;
333
334    call symput('gamma_8',mean8) ;
335    call symput('theta_8',stdev8) ;
336
337    call symput('gamma_7',mean7) ;
338    call symput('theta_7',stdev7) ;
339
340    call symput('gamma_6',mean6) ;
341    call symput('theta_6',stdev6) ;
342
343    call symput('gamma_5',mean5) ;
344    call symput('theta_5',stdev5) ;
345
346    call symput('gamma_4',mean4) ;
347    call symput('theta_4',stdev4) ;
348
349    call symput('gamma_3',mean3) ;
350    call symput('theta_3',stdev3) ;
351
352    call symput('gamma_2',mean2) ;
353    call symput('theta_2',stdev2) ;
354
355    call symput('gamma_1',mean1) ;
356    call symput('theta_1',stdev1) ;
357
358  run ;

NOTE: Numeric values have been converted to character values at the places given by: (Line):(Column).
      319:26   320:26   322:26   323:26   325:26   326:26   328:26   329:26   331:25   332:25   334:25   335:25
337:25   338:25   340:25   341:25   343:25   344:25   346:25   347:25   349:25   350:25
      352:25   353:25   355:25   356:25
NOTE: The DATA statement used 0.17 seconds.


359
360
361
362
363
364
365  *********<<< Analysis for "Annual" Data  (i.e., SUFIX "mm" = "_Yr"  >>>******************;
366
367
368
MPRINT(RANKIT):   **<< UPDATE "NOBSER" VALUE AS NECESSARY! >>** ;
369
370
371  %RankIt(file=MxTData,var=MxTYr,rank=RankYr,prob=PrMxTYr,Nobser=61,PltValue=0.375) ;
MPRINT(RANKIT):   PROC SORT DATA=MXTDATA ;
MPRINT(RANKIT):   BY MXTYR ;
MPRINT(RANKIT):   RUN ;

NOTE: The data set WORK.MXTDATA has 61 observations and 15 variables.
NOTE: The PROCEDURE SORT used 0.11 seconds.


MPRINT(RANKIT):   DATA MXTDATA ;
MPRINT(RANKIT):   SET MXTDATA ;
MPRINT(RANKIT):   RETAIN RANKYR 0 ALPHA 0.375 ;
MPRINT(RANKIT):   RANKYR = RANKYR + 1 ;
MPRINT(RANKIT):   PRMXTYR = (RANKYR - ALPHA) / (61 +(1 - 2*ALPHA)) ;
MPRINT(RANKIT):   RUN ;

NOTE: The data set WORK.MXTDATA has 61 observations and 18 variables.
NOTE: The DATA statement used 0.32 seconds.
```

```
MPRINT(RANKIT):   PROC PRINT DATA=MXTDATA ;
MPRINT(RANKIT):   VAR MXTYR RANKYR PRMXTYR ALPHA YEAR ;
MPRINT(RANKIT):   RUN ;

NOTE: The PROCEDURE PRINT used 0.01 seconds.


372
373
374
375
376
377  %GEVfit(file=MxTData,ofile=MxTNL0,outfit=fit0,outest=est0,depvar=PrMxTYr,var=MxTYr,typeGEV=0,
MPRINT(GEVFIT):   **<< UPDATE "YEAR" VALUE AS NECESSARY! >>** ;
378          KappaI=0.25,GammaI=&gamma_Yr,ThetaI=&theta_Yr,YrLo=1950,YrHi=2010) ;
MPRINT(GEVFIT):   PROC SORT DATA=MXTDATA ;
MPRINT(GEVFIT):   BY YEAR ;
MPRINT(GEVFIT):   RUN ;

NOTE: The data set WORK.MXTDATA has 61 observations and 18 variables.
NOTE: The PROCEDURE SORT used 0.14 seconds.


MPRINT(GEVFIT):   PROC MODEL DATA=MXTDATA CONVERGE=0.001 MAXIT=500 DW ;
MPRINT(GEVFIT):   OUTMODEL%MXTNL0 ;
MPRINT(GEVFIT):   RANGE YEAR = 1950 TO 2010 ;
MPRINT(GEVFIT):   **<< DROPPED MONTHLY DATA BEYOND 2010 DATA. >>** ;
MPRINT(GEVFIT):   Y % (MXTYR - GAMMA) / THETA ;
MPRINT(GEVFIT):   **<< 2-PARAMETER "T-DIST" MODEL. >>** ;
MPRINT(GEVFIT):   DFT%(2010 - 1950) +1 -2 ;
MPRINT(GEVFIT):   PRMXTYR % PROBT(Y,DFT) ;
MPRINT(GEVFIT):   PARMS GAMMA -45.16708607 THETA 2.7490016839 ;

MPRINT(GEVFIT):   FIT PRMXTYR /OUT=FIT0 OUTALL OUTEST=EST0 CORRB CORRS OUTCOV ;
MPRINT(GEVFIT):   TITLE3 "Non-linear Estimation of 2-parameter T-Dist Model.: for Maximum NEGATIVE Temperature (Deg-
F)." ;
MPRINT(GEVFIT):   RUN ;

NOTE: At OLS Iteration 3 CONVERGE=0.001 Criteria Met.
NOTE: The data set WORK.FIT0 has 183 observations and 6 variables.
NOTE: The data set WORK.EST0 has 3 observations and 5 variables.
379
380            **<< Update "YrHi" value as necessary! >>** ;
381

NOTE: The PROCEDURE MODEL used 1.01 seconds.


382  proc print data=fit0 ;
383  run ;

NOTE: The PROCEDURE PRINT used 0.01 seconds.


384
385
386
387
388  proc transpose data=fit0 out=pred0 prefix=probP ;
389     where (_type_ = "PREDICT" ) ;
390     by year;
391     var prmxtyr ;
392  run ;

NOTE: The data set WORK.PRED0 has 61 observations and 3 variables.
NOTE: The PROCEDURE TRANSPOSE used 0.21 seconds.


393
394  data comb0 ;
395     merge MxTData pred0 ;
396    by year ;
397     ProbP = ProbP1 ;
398    keep year MxTYr PrMxTYr ProbP ;
399  run ;
```

```
NOTE: The data set WORK.COMBO has 61 observations and 4 variables.
NOTE: The DATA statement used 0.17 seconds.


proc print data=comb0 ;
run ;

NOTE: The PROCEDURE PRINT used 0.01 seconds.


proc plot data=comb0 ;
  plot prmxtyr*MxTYr='*'
       probP*MxTYr='-' / overlay ;
run ;


NOTE: The PROCEDURE PLOT used 0.07 seconds.


proc print data=est0 ;
run ;

NOTE: The PROCEDURE PRINT used 0.01 seconds.


/**************
data estout2.est0_Yr ;   ***<<< Save a copy of the "2-parameter T-Dist Model" estimation results!  >>>*** ;
  set est0 ;
run ;
**************/

data comb  ;
   merge MxTData pred0(rename=(ProbP1=ProbP0)) ;
  by year ;

 ***<< "Log(PrMxTYr) - Log(ProgP)" to calc. RMSE of Proportional Errors Models! >>** ;
   LgPrRat0 = Log(PrMxTYr/ProbP0) ;

 label   LgPrRat0 = "Log(PrMxTYr/ProbP0)- T-Dist" ;

   if (PrMxTYr <= (1/3)) then Quantile=1 ;  **<< "Lower Third" >>** ;
   if (PrMxTYr > (1/3)) AND (PrMxTYr <= (2/3)) then Quantile=2 ; **<< "Middle Third" >>** ;
   if (PrMxTYr > (2/3)) then Quantile=3 ;  **<< "Upper Third" >>** ;

  keep year MxTYr Quantile PrMxTYr ProbP0 LgPrRat0 ;
run ;

NOTE: The data set WORK.COMB has 61 observations and 6 variables.
NOTE: The DATA statement used 0.23 seconds.


proc print data=comb  ;
  var year MxTYr Quantile  PrMxTYr ProbP0  LgPrRat0 ;
title3 "Est'd CDFs and Logarithms of 'Empirical CDF rel. to Fitted CDF' values by Models." ;
run ;

NOTE: The PROCEDURE PRINT used 0.01 seconds.


proc means data=comb  n mean std min max var uss ;
  var LgPrRat0 ;
```

```
title3 "Stats for Logarithms of 'Empirical CDF rel. to Fitted CDF' values by Models to calc. RMSE of Prop. Model Spec" ;
run ;

NOTE: The PROCEDURE MEANS used 0.01 seconds.


proc sort data=comb ;
  by Quantile ;
run ;

NOTE: The data set WORK.COMB has 61 observations and 6 variables.
NOTE: The PROCEDURE SORT used 0.15 seconds.


proc means data=comb  n mean std min max var uss ;
  by Quantile ;
  var LgPrRat0 ;
title3 "Stats By Quantile for Logarithms of 'Empirical CDF rel. to Fitted CDF' values by Models to calc. RMSE of Prop. Model Spec" ;
run ;

NOTE: The PROCEDURE MEANS used 0.01 seconds.


quit ;
```

IX. Attachment 2: SAS Program Output

CONTENTS PROCEDURE

Data Set Name:	OUT2.DLYSYS_D	Observations:	22339
Member Type:	DATA	Variables:	4
Engine:	V612	Indexes:	0
Created:	9:29 Wednesday, March 23, 2011	Observation Length:	32
Last Modified:	9:29 Wednesday, March 23, 2011	Deleted Observations:	0
Protection:		Compressed:	NO
Data Set Type:		Sorted:	NO
Label:			

-----Engine/Host Dependent Information-----

Data Set Page Size:	8192
Number of Data Set Pages:	89
File Format:	607
First Data Page:	1
Max Obs per Page:	254
Obs in First Data Page:	229

-----Alphabetic List of Variables and Attributes-----

#	Variable	Type	Len	Pos	Format	Informat	Label
4	AVG	Num	8	24			
3	CDD	Num	8	16			
1	DATE	Num	8	0	YYMMDD8.	YYMMDD.	DATE
2	HDD	Num	8	8			

Data Analysis for Maximum/Minimum Daily SysAvg Temperatures (Un-Rounded).
Fit GEV Probability Model to Empirical CDF using NL-OLS Regression Methods.
Monthly MAXIMUM NEGATIVE-Temperature (Deg-F) from 1950 thru 2010.

YEAR	MXTYR	MXT_1	MXT_2	MXT_3	MXT_4	MXT_5	MXT_6	MXT_7	MXT_8	MXT_9	MXT_10	MXT_11	MXT_12
1950	-40.8139	-40.8139	-44.9945	-50.7281	-53.8215	-54.7591	-60.3229	-68.4518	-67.9254	-64.1524	-63.2753	-52.1860	-51.8020
1951	-44.5450	-46.1958	-44.6791	-46.0267	-54.2092	-55.4985	-62.1946	-68.2812	-64.6131	-65.7067	-55.7693	-49.1862	-44.5450
1952	-43.0373	-43.0373	-46.8733	-45.9396	-53.2818	-61.0826	-59.8605	-68.6204	-69.5214	-62.0062	-61.1920	-46.9023	-47.0481
1953	-45.6665	-48.5201	-45.6665	-45.7696	-50.5800	-53.9671	-58.8715	-72.3729	-65.5610	-64.7003	-57.3464	-50.4306	-49.1814
1954	-45.6663	-47.6511	-49.5083	-49.0673	-56.7502	-56.4548	-61.5274	-69.9630	-67.5214	-64.1181	-58.4695	-51.3943	-45.6663
1955	-45.8391	-46.1327	-45.9568	-51.5394	-53.8966	-52.9256	-58.6232	-66.4213	-71.2665	-63.6035	-58.1608	-49.7441	-45.8391
1956	-44.8810	-48.5160	-44.8810	-51.4858	-50.4889	-58.3015	-65.1661	-66.3032	-66.5099	-70.5190	-53.5398	-53.4497	-48.6237
1957	-39.4935	-39.4935	-49.0093	-51.1492	-51.3040	-57.6922	-65.2846	-71.3404	-66.5865	-67.6677	-57.1664	-52.1969	-52.8304
1958	-46.2199	-50.2412	-53.6687	-49.7220	-51.1631	-60.7413	-66.3273	-69.7038	-72.8863	-66.5672	-62.8108	-46.2199	-52.9442
1959	-48.2412	-51.4422	-48.2412	-57.6930	-59.7410	-58.2290	-66.7075	-74.6147	-68.4704	-65.9345	-60.1275	-58.6012	-48.7190
1960	-42.2848	-42.2848	-48.3996	-52.2082	-53.3922	-57.4333	-66.4708	-69.3927	-69.6059	-67.3164	-59.0964	-50.3873	-45.6315
1961	-47.1685	-50.8077	-53.3506	-53.4250	-54.5440	-59.0321	-60.5396	-69.2706	-68.8740	-64.3175	-55.8032	-51.7877	-47.1685
1962	-43.3900	-43.3900	-45.2083	-46.9231	-57.9594	-54.9799	-57.8844	-68.3919	-70.2382	-66.2332	-60.9759	-54.8030	-47.8278
1963	-42.5639	-42.5639	-52.9621	-48.0650	-51.2185	-60.4908	-60.6511	-68.4190	-70.4347	-67.5818	-62.4992	-53.0173	-48.8686
1964	-45.2007	-47.5724	-49.7388	-48.1940	-52.1589	-52.5098	-59.0152	-68.4951	-67.9676	-65.8717	-61.5820	-45.2007	-45.6144
1965	-44.7710	-44.7710	-47.7946	-51.7324	-48.2656	-57.5895	-59.0744	-68.4699	-71.3218	-64.3910	-60.8923	-51.6347	-46.3514
1966	-46.6832	-46.6832	-48.1745	-47.3104	-57.5882	-58.5954	-62.9723	-69.9311	-68.7856	-66.8316	-63.4842	-52.6139	-47.2356
1967	-40.7231	-49.5379	-52.8302	-51.1783	-48.2355	-57.8746	-58.9019	-72.4824	-74.7951	-70.3638	-64.8775	-51.6295	-40.7231
1968	-40.6154	-46.2275	-52.4080	-53.7953	-55.4341	-56.9932	-61.6104	-68.0377	-68.4548	-64.8090	-59.6715	-54.2437	-40.6154
1969	-44.8169	-44.8169	-47.3915	-48.6209	-53.7414	-55.7068	-62.7592	-68.7907	-72.2307	-67.2543	-59.2206	-56.3563	-48.7765
1970	-46.8150	-46.9291	-54.2527	-51.9831	-51.7415	-57.6298	-62.0961	-71.5944	-71.4211	-66.0709	-58.2295	-53.2533	-46.8150
1971	-42.9758	-42.9758	-48.9289	-48.6986	-52.7971	-55.8804	-58.5820	-68.9080	-70.6816	-62.7867	-49.2300	-52.3628	-44.6663
1972	-41.4069	-45.9875	-49.8670	-55.4081	-54.2842	-56.8752	-65.9389	-70.1828	-70.1624	-66.2829	-55.9525	-53.8032	-41.4069
1973	-45.0335	-45.0335	-52.1212	-49.1276	-55.3647	-58.1796	-63.7758	-67.4148	-68.0193	-65.8916	-61.9409	-49.7084	-50.8618
1974	-42.9467	-42.9467	-51.8308	-48.2584	-55.6617	-58.3660	-65.5553	-68.7318	-70.9578	-66.8505	-56.3116	-55.0394	-44.7868
1975	-44.6235	-44.6235	-47.9742	-49.7498	-47.3643	-56.3448	-61.4059	-69.4075	-68.6200	-67.4434	-59.1993	-47.7219	-48.6304
1976	-44.8124	-44.8124	-49.5327	-45.4138	-50.4011	-58.0650	-60.5123	-70.7442	-67.7076	-67.4990	-62.8455	-51.6551	-51.2235
1977	-48.2931	-48.2931	-51.9108	-48.6825	-53.4509	-53.9726	-64.7509	-69.5354	-72.9677	-65.7008	-60.5942	-54.0497	-53.2424
1978	-41.6190	-51.1005	-48.2306	-54.1160	-51.2871	-59.4659	-65.8905	-68.8166	-68.7009	-65.8524	-59.3639	-49.0032	-41.6190
1979	-41.3718	-41.3718	-45.8328	-49.7140	-56.2736	-58.7693	-63.9540	-66.6051	-69.8454	-69.2557	-59.9759	-51.5853	-49.5022
1980	-50.3397	-50.3397	-54.7610	-52.8755	-53.2022	-57.2136	-60.6410	-71.9287	-70.0271	-66.2256	-59.0176	-56.0247	-51.6664
1981	-49.3314	-49.3314	-52.1306	-52.3738	-54.8549	-61.4079	-68.3264	-73.1600	-72.9816	-68.2618	-58.1090	-50.9048	-52.9613
1982	-45.3314	-45.3314	-52.3144	-49.2838	-50.3326	-57.8396	-62.8471	-66.7866	-69.7322	-63.7887	-61.7207	-52.0600	-48.3317
1983	-48.6651	-48.6651	-51.5608	-54.5990	-52.4889	-57.6920	-62.6277	-69.1153	-70.4734	-64.0299	-65.4348	-49.4481	-49.4522
1984	-46.9062	-49.5938	-53.8326	-56.9275	-54.8990	-59.4285	-66.1272	-73.1349	-74.8478	-70.7739	-60.6674	-50.0005	-46.9062
1985	-45.0927	-47.3686	-45.0927	-49.0939	-54.9170	-59.0856	-62.8961	-71.5935	-69.5103	-64.7365	-61.8044	-47.5243	-46.7232
1986	-48.5721	-56.1647	-48.5721	-50.3583	-57.7326	-59.4579	-66.4135	-69.1447	-72.3652	-61.1349	-61.4574	-58.2044	-52.9037
1987	-43.4273	-44.2598	-46.0322	-50.7446	-56.2859	-60.0247	-66.6641	-67.1124	-68.1821	-67.0970	-62.0544	-52.6793	-43.4273
1988	-43.2554	-49.9387	-51.3168	-54.3595	-54.0200	-55.3712	-59.1260	-70.9638	-70.1594	-64.2715	-64.0763	-50.9655	-43.2554
1989	-40.5770	-42.9407	-40.5770	-52.1846	-55.4395	-58.1969	-64.4799	-71.3099	-69.5242	-62.8527	-59.7825	-56.0329	-51.8912
1990	-38.9869	-48.7766	-43.3692	-49.1307	-58.2433	-61.1302	-63.2401	-72.1522	-69.8743	-69.0145	-63.4869	-52.3610	-38.9869
1991	-48.6803	-51.7147	-56.1695	-48.6803	-57.5468	-55.8734	-63.8235	-68.0888	-70.4270	-66.6486	-57.5488	-52.6191	-50.5155
1992	-47.3103	-48.1412	-51.8544	-53.3361	-61.2246	-66.6414	-64.4708	-68.0616	-69.0891	-70.1689	-63.4055	-55.4010	-47.3103
1993	-46.0750	-46.0750	-50.8330	-53.4625	-60.3055	-63.5140	-59.7466	-71.1594	-70.1717	-67.4909	-63.2755	-54.9006	-50.1177
1994	-47.1404	-51.5417	-50.0565	-51.7755	-54.2238	-57.1456	-66.9394	-71.1675	-73.6023	-67.1896	-62.0519	-47.1404	-49.9820
1995	-49.8132	-49.9337	-54.1178	-52.5801	-52.0590	-56.5524	-57.8187	-69.9489	-71.8247	-67.3130	-62.8118	-60.4630	-49.8132
1996	-44.9449	-47.7542	-44.9449	-55.0173	-59.6889	-62.8825	-63.9911	-71.8661	-72.0381	-68.9506	-54.4078	-53.3079	-52.4822
1997	-48.3889	-48.3889	-53.4595	-53.2943	-55.7075	-66.9441	-64.8151	-70.6066	-72.0271	-71.8727	-62.3888	-54.8644	-48.9560
1998	-43.5981	-50.7035	-52.3890	-49.8514	-50.0393	-55.2383	-61.1622	-70.3718	-72.6540	-65.0563	-60.8742	-55.3339	-43.5981
1999	-48.9918	-48.9918	-49.9809	-50.1240	-50.2280	-57.6371	-57.3322	-69.3564	-69.0034	-67.8474	-64.4993	-54.8769	-52.0528
2000	-48.7734	-49.7560	-48.9964	-48.7734	-55.6952	-61.3740	-64.7628	-69.3772	-69.5563	-67.2008	-57.1987	-50.3718	-51.1148
2001	-47.1624	-47.3342	-47.1624	-51.9496	-50.0995	-63.0701	-66.6212	-69.4000	-70.5659	-69.0556	-63.0673	-51.6624	-49.0898
2002	-45.8139	-45.8139	-48.9358	-50.2434	-56.2940	-57.7617	-64.9885	-70.1827	-70.0978	-63.3307	-58.9606	-58.5738	-48.7217
2003	-47.0545	-54.5729	-52.8301	-53.0582	-53.4292	-58.6337	-63.0442	-73.2189	-73.6591	-70.3885	-57.5562	-52.9730	-47.0545
2004	-48.1809	-49.0397	-50.7718	-53.6879	-56.6398	-63.7197	-65.9707	-68.9706	-70.3517	-65.6737	-56.1145	-48.1809	-48.2843
2005	-47.2540	-47.2540	-54.0029	-53.5940	-57.5405	-60.9911	-65.4656	-71.0177	-70.9939	-65.8620	-60.5966	-55.1862	-50.5913
2006	-45.7981	-51.5502	-48.3580	-45.7981	-53.6967	-62.5116	-68.5517	-74.8643	-72.2551	-68.2437	-62.2475	-52.0133	-48.0678
2007	-41.4863	-41.4863	-50.7744	-51.4095	-54.2568	-59.5874	-63.9786	-73.0326	-72.5253	-63.5083	-61.4366	-56.1157	-47.4825
2008	-45.7927	-47.4773	-49.8328	-54.5708	-55.1430	-57.5339	-63.9963	-72.7341	-73.0216	-68.8579	-60.3750	-58.5380	-45.7927
2009	-45.2538	-47.9895	-48.1433	-52.3793	-52.8101	-65.4246	-64.0098	-72.2585	-71.2067	-69.0043	-59.0656	-56.6532	-45.2538
2010	-44.6756	-48.7323	-50.9693	-52.1353	-52.0213	-59.1119	-65.8275	-68.1330	-67.5446	-66.6382	-60.3394	-49.6230	-44.6756

Fit GEV Probability Model to Empirical CDF using NL-OLS Regression Methods.
Calc. Means and Standard Deviantions to use as Starting Values in Non-Linear Estimations.

Variable	N	Mean	Std Dev	Minimum	Maximum
MXT_1	61	-47.2415402	3.3584971	-56.1647000	-39.4934667
MXT_2	61	-49.6124628	3.2506963	-56.1694833	-40.5770167
MXT_3	61	-50.9733855	2.8011398	-57.6930000	-45.4137667
MXT_4	61	-54.0568074	3.0315620	-61.2246333	-47.3643333
MXT_5	61	-58.5803604	3.0564965	-66.9441167	-52.5097667
MXT_6	61	-63.0808470	2.9041691	-68.5517167	-57.3321833
MXT_7	61	-69.9985593	2.0038523	-74.8642667	-66.3032167
MXT_8	61	-70.2122331	2.1448174	-74.8477833	-64.6130500
MXT_9	61	-66.4929194	2.3084588	-71.8727333	-61.1348833
MXT_10	61	-60.0891208	3.0284960	-65.4348000	-49.2300333
MXT_11	61	-52.5437902	3.2774803	-60.4629500	-45.2007000
MXT_12	61	-47.8070137	3.3917276	-53.2423833	-38.9868667
MXTYR	61	-45.1670861	2.7490017	-50.3397000	-38.9868667

Fit GEV Probability Model to Empirical CDF using NL-OLS Regression Methods.

Calc. Means and Standard Deviantions to use as Starting Values in Non-Linear Estimations.

OBS	_TYPE_	_FREQ_	MEAN1	MEAN2	MEAN3	MEAN4	MEAN5	MEAN6	MEAN7	MEAN8	MEAN9	MEAN10	MEAN11	MEAN12
1	0	61	-47.2415	-49.6125	-50.9734	-54.0568	-58.5804	-63.0808	-69.9986	-70.2122	-66.4929	-60.0891	-52.5438	-47.8070

OBS	MEANYR	STDEV1	STDEV2	STDEV3	STDEV4	STDEV5	STDEV6	STDEV7	STDEV8	STDEV9	STDEV10	STDEV11	STDEV12	STDEVYR
1	-45.1671	3.35850	3.25070	2.80114	3.03156	3.05650	2.90417	2.00385	2.14482	2.30846	3.02850	3.27748	3.39173	2.74900

Fit GEV Probability Model to Empirical CDF using NL-OLS Regression Methods.

Calc. Means and Standard Deviantions to use as Starting Values in Non-Linear Estimations.

OBS	MXTYR	RANKYR	PRMXTYR	ALPHA	YEAR
1	-50.3397	1	0.01020	0.375	1980
2	-49.8132	2	0.02653	0.375	1995
3	-49.3314	3	0.04286	0.375	1981
4	-48.9918	4	0.05918	0.375	1999
5	-48.7734	5	0.07551	0.375	2000
6	-48.6803	6	0.09184	0.375	1991
7	-48.6651	7	0.10816	0.375	1983
8	-48.5721	8	0.12449	0.375	1986
9	-48.3889	9	0.14082	0.375	1997
10	-48.2931	10	0.15714	0.375	1977
11	-48.2412	11	0.17347	0.375	1959
12	-48.1809	12	0.18980	0.375	2004
13	-47.3103	13	0.20612	0.375	1992
14	-47.2540	14	0.22245	0.375	2005
15	-47.1685	15	0.23878	0.375	1961
16	-47.1624	16	0.25510	0.375	2001
17	-47.1404	17	0.27143	0.375	1994
18	-47.0545	18	0.28776	0.375	2003
19	-46.9062	19	0.30408	0.375	1984
20	-46.8150	20	0.32041	0.375	1970
21	-46.6832	21	0.33673	0.375	1966
22	-46.2199	22	0.35306	0.375	1958
23	-46.0750	23	0.36939	0.375	1993
24	-45.8391	24	0.38571	0.375	1955
25	-45.8139	25	0.40204	0.375	2002
26	-45.7981	26	0.41837	0.375	2006
27	-45.7927	27	0.43469	0.375	2008
28	-45.6665	28	0.45102	0.375	1953
29	-45.6663	29	0.46735	0.375	1954
30	-45.3314	30	0.48367	0.375	1982
31	-45.2538	31	0.50000	0.375	2009
32	-45.2007	32	0.51633	0.375	1964
33	-45.0927	33	0.53265	0.375	1985
34	-45.0335	34	0.54898	0.375	1973
35	-44.9449	35	0.56531	0.375	1996
36	-44.8810	36	0.58163	0.375	1956
37	-44.8169	37	0.59796	0.375	1969
38	-44.8124	38	0.61429	0.375	1976
39	-44.7710	39	0.63061	0.375	1965
40	-44.6756	40	0.64694	0.375	2010
41	-44.6235	41	0.66327	0.375	1975
42	-44.5450	42	0.67959	0.375	1951
43	-43.5981	43	0.69592	0.375	1998
44	-43.4273	44	0.71224	0.375	1987
45	-43.3900	45	0.72857	0.375	1962
46	-43.2554	46	0.74490	0.375	1988
47	-43.0373	47	0.76122	0.375	1952
48	-42.9758	48	0.77755	0.375	1971
49	-42.9467	49	0.79388	0.375	1974
50	-42.5639	50	0.81020	0.375	1963
51	-42.2848	51	0.82653	0.375	1960
52	-41.6190	52	0.84286	0.375	1978
53	-41.4863	53	0.85918	0.375	2007
54	-41.4069	54	0.87551	0.375	1972
55	-41.3718	55	0.89184	0.375	1979
56	-40.8139	56	0.90816	0.375	1950
57	-40.7231	57	0.92449	0.375	1967
58	-40.6154	58	0.94082	0.375	1968
59	-40.5770	59	0.95714	0.375	1989
60	-39.4935	60	0.97347	0.375	1957
61	-38.9869	61	0.98980	0.375	1990

Fit GEV Probability Model to Empirical CDF using NL-OLS Regression Methods.
Non-linear Estimation of 2-parameter T-Dist Model.: for Maximum NEGATIVE Temperature (Deg-F).

MODEL Procedure

Model Summary

Model Variables	1
Parameters	3
RANGE Variable	YEAR
Equations	1
Number of Statements	4

Model Variables: PRMXTYR

Parameters: GAMMA: -45.17 THETA: 2.749 MXTNLO

Equations: PRMXTYR

MODEL Procedure

NOTE: A finite difference approximation is used for the derivative of the PROBT function at line 378 column 101.

Fit GEV Probability Model to Empirical CDF using NL-OLS Regression Methods.
Non-linear Estimation of 2-parameter T-Dist Model.: for Maximum NEGATIVE Temperature (Deg-F).

MODEL Procedure

The Equation to Estimate is:

PRMXTYR = F(GAMMA, THETA)

MODEL Procedure
OLS Estimation

OLS Estimation Summary

Dataset Option	Dataset
DATA=	MXTDATA
OUT=	FITO
OUTEST=	ESTO

Parameters Estimated	2

RANGE Processed	YEAR
First	1950
Last	2010

Minimization Summary

Method	GAUSS
Iterations	3

Final Convergence	Criteria
R	0.00005382
PPC(THETA)	8.286E-6
RPC(THETA)	0.000082
Object	1.11297E-6
Trace(S)	0.00087299
Objective Value	0.00084436

Observations Processed

Read	61
Solved	61

Fit GEV Probability Model to Empirical CDF using NL-OLS Regression Methods.
Non-linear Estimation of 2-parameter T-Dist Model.: for Maximum NEGATIVE Temperature (Deg-F).

MODEL Procedure
OLS Estimation

Nonlinear OLS Summary of Residual Errors

Equation	DF Model	DF Error	SSE	MSE	Root MSE	R-Square	Adj R-Sq	Durbin Watson
PRMXTYR	2	59	0.05151	0.0008730	0.02955	0.9898	0.9896	1.649

Nonlinear OLS Parameter Estimates

Parameter	Estimate	Approx. Std Err	'T' Ratio	Approx. Prob>|T|
GAMMA	-45.303592	0.03604	-1257.05	0.0001
THETA	2.862979	0.06269	45.67	0.0001

Number of Observations		Statistics for System	
Used	61	Objective	0.000844
Missing	0	Objective*N	0.0515

RANGE of Fit: YEAR = 1950 TO 2010

Correlations of Estimates

CorrB	GAMMA	THETA
GAMMA	1.0000	0.0822
THETA	0.0822	1.0000

MODEL Procedure

Model Summary

Model Variables	1
Parameters	3
RANGE Variable	YEAR
Equations	1
Number of Statements	5

Model Variables: PRMXTYR

Parameters: MXTNLO GAMMA: -45.3(-1257) THETA: 2.863(46)

Equations: PRMXTYR

Fit GEV Probability Model to Empirical CDF using NL-OLS Regression Methods.

Non-linear Estimation of 2-parameter T-Dist Model.: for Maximum NEGATIVE Temperature (Deg-F).

OBS	YEAR	_ESTYPE_	_TYPE_	_WEIGHT_	PRMXTYR	MXTYR
1	1950	OLS	ACTUAL	1	0.90816	-40.8139
2	1950	OLS	PREDICT	1	0.93891	-40.8139
3	1950	OLS	RESIDUAL	1	-0.03074	-40.8139
4	1951	OLS	ACTUAL	1	0.67959	-44.5450
5	1951	OLS	PREDICT	1	0.60402	-44.5450
6	1951	OLS	RESIDUAL	1	0.07558	-44.5450
7	1952	OLS	ACTUAL	1	0.76122	-43.0373
8	1952	OLS	PREDICT	1	0.78411	-43.0373
9	1952	OLS	RESIDUAL	1	-0.02289	-43.0373
10	1953	OLS	ACTUAL	1	0.45102	-45.6665
11	1953	OLS	PREDICT	1	0.44978	-45.6665
12	1953	OLS	RESIDUAL	1	0.00124	-45.6665
13	1954	OLS	ACTUAL	1	0.46735	-45.6663
14	1954	OLS	PREDICT	1	0.44980	-45.6663
15	1954	OLS	RESIDUAL	1	0.01754	-45.6663
16	1955	OLS	ACTUAL	1	0.38571	-45.8391
17	1955	OLS	PREDICT	1	0.42613	-45.8391
18	1955	OLS	RESIDUAL	1	-0.04042	-45.8391
19	1956	OLS	ACTUAL	1	0.58163	-44.8810
20	1956	OLS	PREDICT	1	0.55842	-44.8810
21	1956	OLS	RESIDUAL	1	0.02321	-44.8810
22	1957	OLS	ACTUAL	1	0.97347	-39.4935
23	1957	OLS	PREDICT	1	0.97653	-39.4935
24	1957	OLS	RESIDUAL	1	-0.00306	-39.4935
25	1958	OLS	ACTUAL	1	0.35306	-46.2199
26	1958	OLS	PREDICT	1	0.37503	-46.2199
27	1958	OLS	RESIDUAL	1	-0.02197	-46.2199
28	1959	OLS	ACTUAL	1	0.17347	-48.2412
29	1959	OLS	PREDICT	1	0.15453	-48.2412
30	1959	OLS	RESIDUAL	1	0.01894	-48.2412
31	1960	OLS	ACTUAL	1	0.82653	-42.2848
32	1960	OLS	PREDICT	1	0.85201	-42.2848
33	1960	OLS	RESIDUAL	1	-0.02548	-42.2848
34	1961	OLS	ACTUAL	1	0.23878	-47.1685
35	1961	OLS	PREDICT	1	0.25866	-47.1685
36	1961	OLS	RESIDUAL	1	-0.01989	-47.1685
37	1962	OLS	ACTUAL	1	0.72857	-43.3900
38	1962	OLS	PREDICT	1	0.74676	-43.3900
39	1962	OLS	RESIDUAL	1	-0.01819	-43.3900
40	1963	OLS	ACTUAL	1	0.81020	-42.5639
41	1963	OLS	PREDICT	1	0.82875	-42.5639
42	1963	OLS	RESIDUAL	1	-0.01854	-42.5639
43	1964	OLS	ACTUAL	1	0.51633	-45.2007
44	1964	OLS	PREDICT	1	0.51427	-45.2007
45	1964	OLS	RESIDUAL	1	0.00205	-45.2007
46	1965	OLS	ACTUAL	1	0.63061	-44.7710
47	1965	OLS	PREDICT	1	0.57348	-44.7710
48	1965	OLS	RESIDUAL	1	0.05714	-44.7710
49	1966	OLS	ACTUAL	1	0.33673	-46.6832
50	1966	OLS	PREDICT	1	0.31584	-46.6832
51	1966	OLS	RESIDUAL	1	0.02090	-46.6832
52	1967	OLS	ACTUAL	1	0.92449	-40.7231
53	1967	OLS	PREDICT	1	0.94252	-40.7231
54	1967	OLS	RESIDUAL	1	-0.01803	-40.7231
55	1968	OLS	ACTUAL	1	0.94082	-40.6154
56	1968	OLS	PREDICT	1	0.94658	-40.6154
57	1968	OLS	RESIDUAL	1	-0.00576	-40.6154
58	1969	OLS	ACTUAL	1	0.59796	-44.8169
59	1969	OLS	PREDICT	1	0.56720	-44.8169
60	1969	OLS	RESIDUAL	1	0.03075	-44.8169
61	1970	OLS	ACTUAL	1	0.32041	-46.8150
62	1970	OLS	PREDICT	1	0.29977	-46.8150
63	1970	OLS	RESIDUAL	1	0.02064	-46.8150

Fit GEV Probability Model to Empirical CDF using NL-OLS Regression Methods.
Non-linear Estimation of 2-parameter T-Dist Model.: for Maximum NEGATIVE Temperature (Deg-F).

OBS	YEAR	_ESTYPE_	_TYPE_	_WEIGHT_	PRMXTYR	MXTYR
64	1971	OLS	ACTUAL	1	0.77755	-42.9758
65	1971	OLS	PREDICT	1	0.79027	-42.9758
66	1971	OLS	RESIDUAL	1	-0.01272	-42.9758
67	1972	OLS	ACTUAL	1	0.87551	-41.4069
68	1972	OLS	PREDICT	1	0.91066	-41.4069
69	1972	OLS	RESIDUAL	1	-0.03515	-41.4069
70	1973	OLS	ACTUAL	1	0.54898	-45.0335
71	1973	OLS	PREDICT	1	0.53742	-45.0335
72	1973	OLS	RESIDUAL	1	0.01156	-45.0335
73	1974	OLS	ACTUAL	1	0.79388	-42.9467
74	1974	OLS	PREDICT	1	0.79315	-42.9467
75	1974	OLS	RESIDUAL	1	0.00073	-42.9467
76	1975	OLS	ACTUAL	1	0.66327	-44.6235
77	1975	OLS	PREDICT	1	0.59347	-44.6235
78	1975	OLS	RESIDUAL	1	0.06979	-44.6235
79	1976	OLS	ACTUAL	1	0.61429	-44.8124
80	1976	OLS	PREDICT	1	0.56782	-44.8124
81	1976	OLS	RESIDUAL	1	0.04647	-44.8124
82	1977	OLS	ACTUAL	1	0.15714	-48.2931
83	1977	OLS	PREDICT	1	0.15033	-48.2931
84	1977	OLS	RESIDUAL	1	0.00681	-48.2931
85	1978	OLS	ACTUAL	1	0.84286	-41.6190
86	1978	OLS	PREDICT	1	0.89843	-41.6190
87	1978	OLS	RESIDUAL	1	-0.05558	-41.6190
88	1979	OLS	ACTUAL	1	0.89184	-41.3718
89	1979	OLS	PREDICT	1	0.91257	-41.3718
90	1979	OLS	RESIDUAL	1	-0.02074	-41.3718
91	1980	OLS	ACTUAL	1	0.01020	-50.3397
92	1980	OLS	PREDICT	1	0.04188	-50.3397
93	1980	OLS	RESIDUAL	1	-0.03167	-50.3397
94	1981	OLS	ACTUAL	1	0.04286	-49.3314
95	1981	OLS	PREDICT	1	0.08236	-49.3314
96	1981	OLS	RESIDUAL	1	-0.03950	-49.3314
97	1982	OLS	ACTUAL	1	0.48367	-45.3314
98	1982	OLS	PREDICT	1	0.49614	-45.3314
99	1982	OLS	RESIDUAL	1	-0.01247	-45.3314
100	1983	OLS	ACTUAL	1	0.10816	-48.6651
101	1983	OLS	PREDICT	1	0.12253	-48.6651
102	1983	OLS	RESIDUAL	1	-0.01437	-48.6651
103	1984	OLS	ACTUAL	1	0.30408	-46.9062
104	1984	OLS	PREDICT	1	0.28888	-46.9062
105	1984	OLS	RESIDUAL	1	0.01520	-46.9062
106	1985	OLS	ACTUAL	1	0.53265	-45.0927
107	1985	OLS	PREDICT	1	0.52924	-45.0927
108	1985	OLS	RESIDUAL	1	0.00341	-45.0927
109	1986	OLS	ACTUAL	1	0.12449	-48.5721
110	1986	OLS	PREDICT	1	0.12910	-48.5721
111	1986	OLS	RESIDUAL	1	-0.00461	-48.5721
112	1987	OLS	ACTUAL	1	0.71224	-43.4273
113	1987	OLS	PREDICT	1	0.74261	-43.4273
114	1987	OLS	RESIDUAL	1	-0.03036	-43.4273
115	1988	OLS	ACTUAL	1	0.74490	-43.2554
116	1988	OLS	PREDICT	1	0.76141	-43.2554
117	1988	OLS	RESIDUAL	1	-0.01651	-43.2554
118	1989	OLS	ACTUAL	1	0.95714	-40.5770
119	1989	OLS	PREDICT	1	0.94797	-40.5770
120	1989	OLS	RESIDUAL	1	0.00918	-40.5770
121	1990	OLS	ACTUAL	1	0.98980	-38.9869
122	1990	OLS	PREDICT	1	0.98437	-38.9869
123	1990	OLS	RESIDUAL	1	0.00543	-38.9869
124	1991	OLS	ACTUAL	1	0.09184	-48.6803
125	1991	OLS	PREDICT	1	0.12148	-48.6803
126	1991	OLS	RESIDUAL	1	-0.02964	-48.6803

Fit GEV Probability Model to Empirical CDF using NL-OLS Regression Methods.
Non-linear Estimation of 2-parameter T-Dist Model.: for Maximum NEGATIVE Temperature (Deg-F).

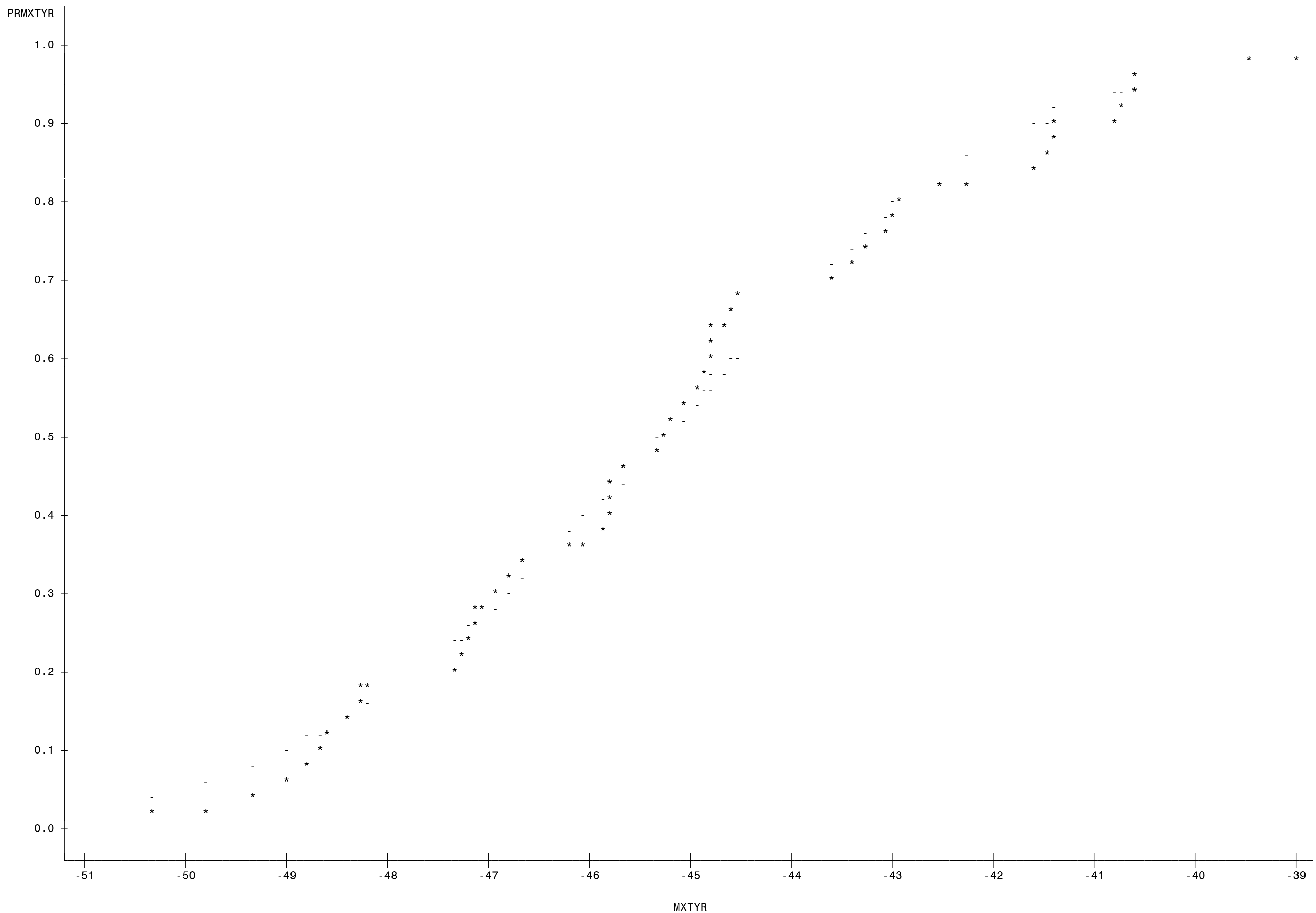
OBS	YEAR	_ESTYPE_	_TYPE_	_WEIGHT_	PRMXTYR	MXTYR
127	1992	OLS	ACTUAL	1	0.20612	-47.3103
128	1992	OLS	PREDICT	1	0.24305	-47.3103
129	1992	OLS	RESIDUAL	1	-0.03693	-47.3103
130	1993	OLS	ACTUAL	1	0.36939	-46.0750
131	1993	OLS	PREDICT	1	0.39427	-46.0750
132	1993	OLS	RESIDUAL	1	-0.02488	-46.0750
133	1994	OLS	ACTUAL	1	0.27143	-47.1404
134	1994	OLS	PREDICT	1	0.26181	-47.1404
135	1994	OLS	RESIDUAL	1	0.00961	-47.1404
136	1995	OLS	ACTUAL	1	0.02653	-49.8132
137	1995	OLS	PREDICT	1	0.06029	-49.8132
138	1995	OLS	RESIDUAL	1	-0.03376	-49.8132
139	1996	OLS	ACTUAL	1	0.56531	-44.9449
140	1996	OLS	PREDICT	1	0.54965	-44.9449
141	1996	OLS	RESIDUAL	1	0.01566	-44.9449
142	1997	OLS	ACTUAL	1	0.14082	-48.3889
143	1997	OLS	PREDICT	1	0.14279	-48.3889
144	1997	OLS	RESIDUAL	1	-0.00197	-48.3889
145	1998	OLS	ACTUAL	1	0.69592	-43.5981
146	1998	OLS	PREDICT	1	0.72318	-43.5981
147	1998	OLS	RESIDUAL	1	-0.02726	-43.5981
148	1999	OLS	ACTUAL	1	0.05918	-48.9918
149	1999	OLS	PREDICT	1	0.10135	-48.9918
150	1999	OLS	RESIDUAL	1	-0.04216	-48.9918
151	2000	OLS	ACTUAL	1	0.07551	-48.7734
152	2000	OLS	PREDICT	1	0.11518	-48.7734
153	2000	OLS	RESIDUAL	1	-0.03967	-48.7734
154	2001	OLS	ACTUAL	1	0.25510	-47.1624
155	2001	OLS	PREDICT	1	0.25935	-47.1624
156	2001	OLS	RESIDUAL	1	-0.00425	-47.1624
157	2002	OLS	ACTUAL	1	0.40204	-45.8139
158	2002	OLS	PREDICT	1	0.42958	-45.8139
159	2002	OLS	RESIDUAL	1	-0.02753	-45.8139
160	2003	OLS	ACTUAL	1	0.28776	-47.0545
161	2003	OLS	PREDICT	1	0.27159	-47.0545
162	2003	OLS	RESIDUAL	1	0.01616	-47.0545
163	2004	OLS	ACTUAL	1	0.18980	-48.1809
164	2004	OLS	PREDICT	1	0.15950	-48.1809
165	2004	OLS	RESIDUAL	1	0.03030	-48.1809
166	2005	OLS	ACTUAL	1	0.22245	-47.2540
167	2005	OLS	PREDICT	1	0.24919	-47.2540
168	2005	OLS	RESIDUAL	1	-0.02674	-47.2540
169	2006	OLS	ACTUAL	1	0.41837	-45.7981
170	2006	OLS	PREDICT	1	0.43173	-45.7981
171	2006	OLS	RESIDUAL	1	-0.01336	-45.7981
172	2007	OLS	ACTUAL	1	0.85918	-41.4863
173	2007	OLS	PREDICT	1	0.90622	-41.4863
174	2007	OLS	RESIDUAL	1	-0.04704	-41.4863
175	2008	OLS	ACTUAL	1	0.43469	-45.7927
176	2008	OLS	PREDICT	1	0.43246	-45.7927
177	2008	OLS	RESIDUAL	1	0.00223	-45.7927
178	2009	OLS	ACTUAL	1	0.50000	-45.2538
179	2009	OLS	PREDICT	1	0.50690	-45.2538
180	2009	OLS	RESIDUAL	1	-0.00690	-45.2538
181	2010	OLS	ACTUAL	1	0.64694	-44.6756
182	2010	OLS	PREDICT	1	0.58643	-44.6756
183	2010	OLS	RESIDUAL	1	0.06050	-44.6756

Fit GEV Probability Model to Empirical CDF using NL-OLS Regression Methods.
Non-linear Estimation of 2-parameter T-Dist Model.: for Maximum NEGATIVE Temperature (Deg-F).

OBS	YEAR	MXTYR	PRMXTYR	PROBP
1	1950	-40.8139	0.90816	0.93891
2	1951	-44.5450	0.67959	0.60402
3	1952	-43.0373	0.76122	0.78411
4	1953	-45.6665	0.45102	0.44978
5	1954	-45.6663	0.46735	0.44980
6	1955	-45.8391	0.38571	0.42613
7	1956	-44.8810	0.58163	0.55842
8	1957	-39.4935	0.97347	0.97653
9	1958	-46.2199	0.35306	0.37503
10	1959	-48.2412	0.17347	0.15453
11	1960	-42.2848	0.82653	0.85201
12	1961	-47.1685	0.23878	0.25866
13	1962	-43.3900	0.72857	0.74676
14	1963	-42.5639	0.81020	0.82875
15	1964	-45.2007	0.51633	0.51427
16	1965	-44.7710	0.63061	0.57348
17	1966	-46.6832	0.33673	0.31584
18	1967	-40.7231	0.92449	0.94252
19	1968	-40.6154	0.94082	0.94658
20	1969	-44.8169	0.59796	0.56720
21	1970	-46.8150	0.32041	0.29977
22	1971	-42.9758	0.77755	0.79027
23	1972	-41.4069	0.87551	0.91066
24	1973	-45.0335	0.54898	0.53742
25	1974	-42.9467	0.79388	0.79315
26	1975	-44.6235	0.66327	0.59347
27	1976	-44.8124	0.61429	0.56782
28	1977	-48.2931	0.15714	0.15033
29	1978	-41.6190	0.84286	0.89843
30	1979	-41.3718	0.89184	0.91257
31	1980	-50.3397	0.01020	0.04188
32	1981	-49.3314	0.04286	0.08236
33	1982	-45.3314	0.48367	0.49614
34	1983	-48.6651	0.10816	0.12253
35	1984	-46.9062	0.30408	0.28888
36	1985	-45.0927	0.53265	0.52924
37	1986	-48.5721	0.12449	0.12910
38	1987	-43.4273	0.71224	0.74261
39	1988	-43.2554	0.74490	0.76141
40	1989	-40.5770	0.95714	0.94797
41	1990	-38.9869	0.98980	0.98437
42	1991	-48.6803	0.09184	0.12148
43	1992	-47.3103	0.20612	0.24305
44	1993	-46.0750	0.36939	0.39427
45	1994	-47.1404	0.27143	0.26181
46	1995	-49.8132	0.02653	0.06029
47	1996	-44.9449	0.56531	0.54965
48	1997	-48.3889	0.14082	0.14279
49	1998	-43.5981	0.69592	0.72318
50	1999	-48.9918	0.05918	0.10135
51	2000	-48.7734	0.07551	0.11518
52	2001	-47.1624	0.25510	0.25935
53	2002	-45.8139	0.40204	0.42958
54	2003	-47.0545	0.28776	0.27159
55	2004	-48.1809	0.18980	0.15950
56	2005	-47.2540	0.22245	0.24919
57	2006	-45.7981	0.41837	0.43173
58	2007	-41.4863	0.85918	0.90622
59	2008	-45.7927	0.43469	0.43246
60	2009	-45.2538	0.50000	0.50690
61	2010	-44.6756	0.64694	0.58643

Fit GEV Probability Model to Empirical CDF using NL-OLS Regression Methods.
Non-linear Estimation of 2-parameter T-Dist Model.: for Maximum NEGATIVE Temperature (Deg-F).

Plot of PRMXTYR*MXTYR. Symbol used is '*'.
Plot of PROBP*MXTYR. Symbol used is '-'.



NOTE: 28 obs hidden.

Data Analysis for Maximum/Minimum Daily SysAvg Temperatures (Un-Rounded).
Fit GEV Probability Model to Empirical CDF using NL-OLS Regression Methods.
Non-linear Estimation of 2-parameter T-Dist Model.: for Maximum NEGATIVE Temperature (Deg-F).

OBS	_NAME_	_TYPE_	_NUSED_	GAMMA	THETA
1		OLS	61	-45.3036	2.86298
2	GAMMA	OLS	61	0.0013	0.00019
3	THETA	OLS	61	0.0002	0.00393

Fit GEV Probability Model to Empirical CDF using NL-OLS Regression Methods.
Est'd CDFs and Logarithms of 'Empirical CDF rel. to Fitted CDF' values by Models.

OBS	YEAR	MXTYR	QUANTILE	PRMXTYR	PROBPO	LGPRRATO
1	1950	-40.8139	3	0.90816	0.93891	-0.03329
2	1951	-44.5450	3	0.67959	0.60402	0.11789
3	1952	-43.0373	3	0.76122	0.78411	-0.02963
4	1953	-45.6665	2	0.45102	0.44978	0.00275
5	1954	-45.6663	2	0.46735	0.44980	0.03826
6	1955	-45.8391	2	0.38571	0.42613	-0.09966
7	1956	-44.8810	2	0.58163	0.55842	0.04073
8	1957	-39.4935	3	0.97347	0.97653	-0.00314
9	1958	-46.2199	2	0.35306	0.37503	-0.06037
10	1959	-48.2412	1	0.17347	0.15453	0.11564
11	1960	-42.2848	3	0.82653	0.85201	-0.03036
12	1961	-47.1685	1	0.23878	0.25866	-0.07999
13	1962	-43.3900	3	0.72857	0.74676	-0.02465
14	1963	-42.5639	3	0.81020	0.82875	-0.02263
15	1964	-45.2007	2	0.51633	0.51427	0.00398
16	1965	-44.7710	2	0.63061	0.57348	0.09498
17	1966	-46.6832	2	0.33673	0.31584	0.06407
18	1967	-40.7231	3	0.92449	0.94252	-0.01932
19	1968	-40.6154	3	0.94082	0.94658	-0.00611
20	1969	-44.8169	2	0.59796	0.56720	0.05280
21	1970	-46.8150	1	0.32041	0.29977	0.06658
22	1971	-42.9758	3	0.77755	0.79027	-0.01623
23	1972	-41.4069	3	0.87551	0.91066	-0.03937
24	1973	-45.0335	2	0.54898	0.53742	0.02129
25	1974	-42.9467	3	0.79388	0.79315	0.00091
26	1975	-44.6235	2	0.66327	0.59347	0.11118
27	1976	-44.8124	2	0.61429	0.56782	0.07866
28	1977	-48.2931	1	0.15714	0.15033	0.04433
29	1978	-41.6190	3	0.84286	0.89843	-0.06386
30	1979	-41.3718	3	0.89184	0.91257	-0.02299
31	1980	-50.3397	1	0.01020	0.04188	-1.41196
32	1981	-49.3314	1	0.04286	0.08236	-0.65323
33	1982	-45.3314	2	0.48367	0.49614	-0.02546
34	1983	-48.6651	1	0.10816	0.12253	-0.12474
35	1984	-46.9062	1	0.30408	0.28888	0.05128
36	1985	-45.0927	2	0.53265	0.52924	0.00643
37	1986	-48.5721	1	0.12449	0.12910	-0.03640
38	1987	-43.4273	3	0.71224	0.74261	-0.04174
39	1988	-43.2554	3	0.74490	0.76141	-0.02193
40	1989	-40.5770	3	0.95714	0.94797	0.00963
41	1990	-38.9869	3	0.98980	0.98437	0.00550
42	1991	-48.6803	1	0.09184	0.12148	-0.27973
43	1992	-47.3103	1	0.20612	0.24305	-0.16481
44	1993	-46.0750	2	0.36939	0.39427	-0.06518
45	1994	-47.1404	1	0.27143	0.26181	0.03606
46	1995	-49.8132	1	0.02653	0.06029	-0.82080
47	1996	-44.9449	2	0.56531	0.54965	0.02809
48	1997	-48.3889	1	0.14082	0.14279	-0.01389
49	1998	-43.5981	3	0.69592	0.72318	-0.03843
50	1999	-48.9918	1	0.05918	0.10135	-0.53791
51	2000	-48.7734	1	0.07551	0.11518	-0.42225
52	2001	-47.1624	1	0.25510	0.25935	-0.01651
53	2002	-45.8139	2	0.40204	0.42958	-0.06624
54	2003	-47.0545	1	0.28776	0.27159	0.05782
55	2004	-48.1809	1	0.18980	0.15950	0.17390
56	2005	-47.2540	1	0.22245	0.24919	-0.11351
57	2006	-45.7981	2	0.41837	0.43173	-0.03143
58	2007	-41.4863	3	0.85918	0.90622	-0.05330
59	2008	-45.7927	2	0.43469	0.43246	0.00515
60	2009	-45.2538	2	0.50000	0.50690	-0.01371
61	2010	-44.6756	2	0.64694	0.58643	0.09819

Fit GEV Probability Model to Empirical CDF using NL-OLS Regression Methods.
Stats for Logarithms of 'Empirical CDF rel. to Fitted CDF' values by Models to calc. RMSE of Prop. Model Spec

Analysis Variable : LGPRRATO Log(PrMxTYr/ProbPO)- T-Dist

N	Mean	Std Dev	Minimum	Maximum	Variance	USS
61	-0.0685020	0.2442267	-1.4119589	0.1739012	0.0596467	3.8650445

Fit GEV Probability Model to Empirical CDF using NL-OLS Regression Methods.
Stats By Quantile for Logarithms of 'Empirical CDF rel. to Fitted CDF' values by Models to calc. RMSE of Prop. Model Spec

Analysis Variable : LGPRRATO Log(PrMxTYr/ProbPO)- T-Dist

QUANTILE=1

N	Mean	Std Dev	Minimum	Maximum	Variance	USS
20	-0.2065050	0.3912282	-1.4119589	0.1739012	0.1530595	3.7610167

QUANTILE=2

N	Mean	Std Dev	Minimum	Maximum	Variance	USS
21	0.0135479	0.0586270	-0.0996551	0.1111846	0.0034371	0.0725970

QUANTILE=3

N	Mean	Std Dev	Minimum	Maximum	Variance	USS
20	-0.0166514	0.0369106	-0.0638567	0.1178919	0.0013624	0.0314308

SDG&E HDD and Peak Day Temperature Designs

Weather for SDG&E: Heating Degree Days – Average and Cold Year Designs; and Winter Peak Day Design Temperatures

November 2011

Table of Contents

I. Overview

San Diego Gas and Electric Company's service area for natural gas extends from southern Orange County throughout San Diego County to the Mexican border. To quantify the overall temperature experienced within this region, SDGandE aggregates daily temperature recordings from three U.S. Weather Bureau weather stations into one system average heating degree-day ("HDD") figure. The table below lists weather station locations along with its associated temperature zone(s).

Table 1

Representative Weather Stations with Temperature Zones

Station Location	Weight	Temperature Zone
1. El Cajon[1]	1/3	Coastal and Inland
2. San Diego's Lindberg Field	(1/3) x (#Coastal/(#Coastal + #Inland))	Coastal
3. Miramar Naval Air Station	1/3 x (#Inland/(#Coastal + #Inland))	Inland

SDGandE uses 65° Fahrenheit to calculate the number of HDDs. One heating degree-day is accumulated for each degree that the daily average is *below* 65° Fahrenheit. To arrive at the system average HDDs figure for its entire service area, SDGandE weights the HDD figure for each zone using the weights[2] shown in Table 1. These weights are used in calculating the data shown from January 1991 to December 2010.

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[1] It turns out that the location of the station for El Cajon is at the boundary of the Coastal and Inland zones. Therefore, El Cajon is use to represent the entire combined Coastal and Inland zones.

[2] As of December 2010, there were 466,297 gas customers associated with the Coastal temperature zone and 392,527 gas customers associated with the Inland temperature zone. The following URL shows a map of the SDG&E service area and temperature zones: http://www.sdge.com/tm2/pdf/ELEC_MAPS_Maps_-_Elec.pdf ; less than 0.04% of SDG&E's gas customers were in the mountain and desert zones.

Daily maximum and minimum temperatures, for each individual weather station in the table above, are compiled from National Weather Service data. The web-site:

http://newweb.wrh.noaa.gov/sgx/obs/rtp/rtpmap.php?wfo=sgx

provides easy access to temperature data for San Diego and parts of surrounding counties. For each station, the average temperature is computed as the (maximum + minimum)/2 and this value is used to compute the heating degrees (i.e., the *daily* HDD) for each station as well. System average values of HDD are then computed using the weights for each respective station. Annual and monthly HDDs for the entire SDGandE service area from 1991 to 2010 are listed in Table 2, below.

Table 2

Calendar Month Heating Degree-Days (Jan. 1991 through Dec. 2010)

Year	Month Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total "Cal-Year"
1991	256	148	281	121	97	27	0	0	1	32	107	245	1315
1992	241	117	159	13	1	0	0	0	0	3	112	346	993
1993	268	225	132	65	16	9	0	0	2	7	122	262	1106
1994	227	232	160	126	93	2	0	0	0	30	288	306	1463
1995	264	117	163	127	107	23	0	0	0	7	44	221	1073
1996	235	189	175	73	18	3	0	0	1	73	142	243	1152
1997	255	249	145	102	2	2	0	0	0	16	94	287	1152
1998	252	256	205	195	94	22	1	0	5	31	172	338	1571
1999	276	266	279	223	116	51	4	0	4	4	146	243	1610
2000	247	216	224	95	28	3	0	0	0	50	237	227	1327
2001	351	298	199	198	30	5	0	0	0	9	127	325	1543
2002	315	225	247	158	91	13	0	0	2	54	81	294	1479
2003	141	201	179	184	95	32	0	0	0	7	157	275	1270
2004	273	269	98	65	14	4	1	0	0	52	200	265	1240
2005	243	196	159	118	33	5	0	0	4	38	95	231	1121
2006	275	204	305	144	33	0	0	0	1	35	88	287	1372
2007	365	225	155	139	64	20	0	0	4	28	112	340	1451
2008	331	278	187	131	89	16	0	0	0	13	59	287	1391
2009	177	247	201	141	30	11	0	0	0	40	124	291	1262
2010	238	212	195	178	88	24	10	1	2	31	181	238	1399
20-Yr-Avg (Jan1991-Dec2010)													
Avg.	261.5	218.5	192.3	129.8	56.9	13.6	0.8	0.1	1.3	27.9	134.3	277.6	1314.6
St.Dev.	52.3	49.0	53.0	52.1	39.3	13.3	2.4	0.2	1.6	19.7	59.2	39.3	176.944
Min.	141.3	116.6	97.6	13.3	1.3	0.0	0.0	0.0	0.0	2.6	44.5	221.3	992.7
Max.	364.5	298.2	304.8	222.7	115.5	51.1	10.3	1.1	4.7	73.0	287.6	346.5	1610.1

II. Calculations to Define Our Average-Temperature Year

The simple average of the 20-year period (January 1991 through December 2010) was used to represent the Average Year total and the individual monthly values for HDD. The standard deviation of these 20 years of annual HDDs was used to design the two Cold Years based on a "1-in-10" and "1-in-35" chance, ***c***, that the respective annual "Cold Year" $\boldsymbol{hdd_c}$ value would be exceeded.

Our model for the annual HDD data is essentially a regression model where the only "explanatory" variable is the constant term. For example, the annual HDDs are modeled by the equation below:

$HDD_y = \beta_0 + e_y$; where β_0 represents the mean and the e_y is an error term.

It turns out (e.g., see *Econometrics*, Wonnacott and Wonnacott, 1970, Wiley & Sons, Inc., 1970, p. 254) that the average of the annual HDD_y estimates β_0 and that the standard deviation of these HDDs about the mean, β_0, estimates the standard deviation, s_e, of the error term, e_y. Further, a probability model for the annual HDD is based on a T-Distribution with N-1 degrees of freedom, where, N is the number of years of HDD data we use:

$U = (HDD_y - \beta_0)/s_e$, has a T-Distribution with N-1 degrees of freedom.

III. Calculating the Cold-Temperature Year Weather Designs

Cold Year HDD Weather Designs

For SDGandE, cold-temperature-year HDD weather designs are developed with a 1-in-35 year chance of occurrence. In terms of probabilities this can be expressed as the following for a "1-in-35" cold-year HDD value in equation 1 and a "1-in-10" cold-year HDD value in equation 2, with Annual HDD as the random variable:

(1) Prob { Annual HDD > "1-in-35" Cold-Yr HDD } = 1/35 = 0.0286

(2) Prob { Annual HDD > "1-in-10" Cold-Yr HDD } = 1/10 = 0.1000

An area of 0.0286 under one tail of the T-Distribution translates to 2.025 standard deviations *above* an average-year based on a t-statistic with 19 degrees of freedom. Using the standard deviation of 176.94 HDD from the last 20 years of data, these equations yield values of about 1,673 HDD for a “1-in-35” cold year and 1,550 as the number of HDDs for a “1-in-10” cold year (an area of 0.1000 under one tail of the T-Distribution translates to 1.328 standard deviations *above* an average-year based on a t-statistic with 19 degrees of freedom). For example, the “1-in-35” cold-year HDD is calculated as follows:

(3) Cold-year HDD = 1,673 which equals approximately

1,306 average-year HDDs + 2.025 * 176.94

Table 3 shows monthly HDD figures for “1-in-35” cold year, “1-in-10” cold year and, average year temperature designs. The monthly average-temperature-year HDDs are calculated from weighted monthly HDDs from 1991 to 2010, as shown as the bottom of Table 2, above. For example, the average-year December value of 277.7 HDD equals the simple average of the 20 December HDD figures from 1991 to 2010, and represents 21.1 percent of the HDDs in an average-year. SDGandE calculates the cold--temperature-year monthly HDD values using the same shape of the average-year HDDs. For example, since 21.1 percent of average-temperature-year HDDs occurred in December, the estimated number of HDDs during December for a cold-year is equal to 1,673 HDDs multiplied by 21.1 percent, or 353.3 HDDs.

Table 3

Calendar Month Heating Degree-Day Designs

	Cold		Average	Hot	
	1-in-35 Design	1-in-10 Design		1-in-10 Design	1-in-35 Design
January	332.8	308.3	261.6	214.8	190.4
February	278.1	257.6	218.6	179.5	159.1
March	244.8	226.8	192.4	158.0	140.0
April	165.2	153.0	129.8	106.6	94.5
May	72.4	67.1	56.9	46.7	41.4
June	17.3	16.1	13.6	11.2	9.9
July	1.0	0.9	0.8	0.7	0.6
August	0.1	0.1	0.1	0.0	0.0
September	1.6	1.5	1.3	1.0	0.9
October	35.5	32.9	27.9	22.9	20.3
November	170.9	158.4	134.4	110.3	97.8
December	353.3	327.3	277.7	228.1	202.1
	1673	1550	1315	1080	957

IV. Calculating the Peak-Day Design Temperature

SDGandE's Peak-Day design temperature of 42.5 degrees Fahrenheit, denoted "Deg-F," is determined from a statistical analysis of observed annual minimum daily system average temperatures constructed from daily temperature recordings from the three U.S. Weather Bureau weather stations discussed above. Since we have a time series of daily data by year, the following notation will be used for the remainder of this discussion:

(1) $AVG_{y,d}$ = system average value of Temperature

for calendar year "y" and day "d".

The calendar year, y, can range from 1972 through 2010, while the day, d, can range from 1 to 365, for non leap years, or from 1 to 366 for leap years. The "upper" value for the day, d, thus depends on the calendar year, y, and will be denoted by n(y)=365, or 366, respectively, when y is a non-leap year or a leap year.

For each calendar year, we calculate the following statistic from our series of daily system average temperatures defined in equation (1) above:

(2) $$MinAVG_y = \min_{d=1}^{n(y)}\{ AVG_{y,d} \}, \text{ for } y=1972, 1973, \ldots, 2010.$$

(The notation used in equation 2 means "For a particular year, y, list all the daily values of system average temperature for that year, then pick the smallest one.")

The resulting minimum annual temperatures are shown in Table 4, below. Note that most of the minimum temperatures occur in the months of December or January; however, for some calendar years the minimums occurred in other months (the minimum for 1991 was observed in March).

The statistical methods we use to analyze this data employ software developed to fit three generic probability models: the Generalized Extreme Value (GEV) model, the Double-Exponential or GUMBEL (EV1) model and a 2-Parameter Students' T-Distribution (T-Dist) model. [The GEV and EV1 models have the same mathematical specification as those implemented in a DOS-based executable-only computer code that was developed by Richard L. Lehman and described in a paper published in the Proceedings of the Eighth Conference on Applied Climatology, January 17-22, 1993, Anaheim, California, pp. 270-273, by the American Meteorological Society, Boston, MA., with the title "Two Software Products for Extreme Value Analysis: System Overviews of ANYEX and DDEX." At the time he wrote the paper, Dr. Lehman was with the Climate

Analysis Center, National Weather Service/NOAA in Washington, D.C., zip code 20233.] The Statistical Analysis Software (SAS) procedure for nonlinear statistical model estimation (PROC MODEL, from SAS V6.12) was used to do the calculations. Further, the calculation procedures were implemented to fit the probability models to observed *maximums* of data, like heating degrees. By recognizing that:

$$- MinAVG_y = - \min_{d=1}^{n(y)}\{AVG_{y,d}\} = \max_{d=1}^{n(y)}\{ -AVG_{y,d}\}, \text{ for } y=1972, \ldots, 2006;$$

this same software, when applied to the *negative* of the minimum temperature data, yields appropriate probability model estimation results.

The calculations done to fit any one of the three probability models chooses the parameter values that provide the "best fit" of the parametric probability model's calculated cumulative distribution function (CDF) to the empirical cumulative distribution function (ECDF). Note that the ECDF is constructed based on the variable "-$MinAVG_y$" (which is a *maximum* over a set of *negative* temperatures) with values of the variable $MinAVG_y$ that are the same as shown in Table 4.

In Table 5, the data for -$MinAVG_y$ are shown after they have been sorted from "lowest" to "highest" value. The ascending *ordinal* value is shown in the column labeled "RANK" and the empirical cumulative distribution function is calculated and shown in the next column. The formula used to calculate this function is:

$$ECDF = (RANK - \alpha)/[MaxRANK + (1 - 2\alpha)],$$

where the parameter "α" (shown as *alpha* in Table 5) is a "small" positive value (usually less than ½) that is used to bound the ECDF away from 0 and 1.

Of the three probability models considered (GEV, EV1, and T_Dist) the results obtained for the T_Dist model were selected since the fit to the ECDF was better than that of either the GEV model or the EV1 model. (Although convergence to stable parameter estimates is occasionally a problem with fitting a GEV model to the ECDF, the T_Dist model had no problems with convergence of the iterative procedure to estimate parameters.)

The T_Dist model used here is a three-parameter probability model where the varable $z = (-MinAVG_y - \gamma) / \theta$, for each year, y, is presumed to follow a T_Dist with location parameter, γ, and scale parameter, θ, and a third parameter, v, that represents the number of degrees of freedom. For a given number of years of data, N, then v=N-2.

The following mathematical expression specifies the T_Dist model we fit to the data for "-$MinAVG_y$ " shown in Table 5.

(3) $ECDF(-MinAVG_y) = Prob \{ -T < -MinAVG_y \}= T\_Dist\{z; \gamma, \theta, v=N-2\},$

where "T_Dist{ . }" is the cumulative probability distribution function for Student's T-Distribution[3], and

(4) $z = (\text{-MinAVG}_y - \gamma) / \theta$, for each year, y, and

the parameters "γ" and "θ" are estimated for this model for given degrees of freedom v=N-2. The estimated values for γ and θ are shown in Table 5 along with the fitted values of the model CDF (the column: "Fitted" Model CDF).

Now, to calculate a *peak-day design temperature*, $TPDD_\delta$, with a specified likelihood, δ, that a value less than $TPDD_\delta$ would be observed, we use the equation below:

(5) $\delta = \text{Prob} \{ T \leq TPDD_\delta \}$, which is equivalent to

(6) $\delta = \text{Prob} \{ [(-T - \gamma) / \theta] \geq [(-TPDD_\delta - \gamma) / \theta] \}, = \text{Prob} \{ [(-T - \gamma) / \theta] \geq [z_\delta] \}$,

where $z_\delta = [(-TPDD_\delta - \gamma) / \theta]$. In terms of our probability model,

(7) $\delta = 1 - \text{T\_Dist}\{ z_\delta; \gamma, \theta, v=N-2\}$,

which yields the following equation for z_δ,

(7') $z_\delta = \{ \text{TINV\_Dist}\{ (1-\delta); \gamma, \theta, v=N-2\}$, where "TINV_Dist{ . }" is the inverse function of the T_Dist{ . } function[4]. The implied equation for $TPDD_\delta$ is:

(8) $TPDD_\delta = - [\gamma + (z_\delta)(\theta)]$.

To calculate the minimum daily (system average) temperature to define our extreme weather event, we specify that this COLDEST-Day be one where the temperature would be lower with a "1-in-35" likelihood. This criterion translates into two equations to be solved based on equations (7) and (8) above:

(9) solve for "z_δ" from equation (7') above with (1-δ) = (1 - 1/35) = 1 - 0.0286,

(10) solve for "$TPDD_\delta$" from $TPDD_\delta = - [\gamma + (z_\delta)(\theta)]$.

The value of $z_\delta = 1.963$ and $TPDD_\delta = - [\gamma + (z_\delta)(\theta)] = 42.5$ degrees Fahrenheit, with values for "v=N-2"; along with "γ" and "θ" in Table 5, below.

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[3] A common mathematical expression for Student's T-Distribution is provided at http://en.wikipedia.org/wiki/Student%27s_t-distribution; with a probability density function

$$f(t) = \frac{\Gamma(\frac{\nu+1}{2})}{\sqrt{\nu\pi}\,\Gamma(\frac{\nu}{2})} \left(1 + \frac{t^2}{\nu}\right)^{-\frac{\nu+1}{2}},$$

such that T_Dist{z; γ, θ, ν=N-2}=∫f(t) dt, from t=-∞ to t=z. Also, the notation Γ(.) is known in mathematics as the GAMMA function; see http://www.wikipedia.org/wiki/Gamma_function for a description. Also, see *Statistical Theory*, 3rd Ed., B.W. Lindgren, MacMillian Pub. Inc, 1976, pp. 336-337.

[4] Computer software packages such as SAS and EXCEL have implemented statistical and mathematical functions to readily calculate values for T_Dist{ . } and TINV_Dist{ . } as defined above.

SoCalGas' peak-day design temperature of 44.2 degrees Fahrenheit, is calculated in a methodologically similar way as for the 42.5 degree peak day temperature. The criteria specified in equation (9) above for a "1-in-35" likelihood would be replaced by a "1-in-10" likelihood.

(9') solve for "z_δ" from equation (7') above with (1-δ) = (1 - 1/10) = 1 - 0.1000,

which yields a "z_δ" value of z_δ = 1.305 and, $TPDD_\delta = -[\gamma + (z_\delta)(\theta)] = 44.5$ with values for "v=N-2"; along with "γ" and "θ" in Table 5, below.

A plot of the cumulative distribution function for $MinAVG_y$ based on "v=N-2", the fitted model parameters, "γ" and "θ" with values in Table 5, below, is shown in Figure 1.

Table 4

YEAR	MINAVG	Month(MinAvg)
1972	46.7838	Dec
1973	46.1979	Jan
1974	44.2291	Dec
1975	44.1979	Jan
1976	45.0885	Jan
1977	50.6692	Mar
1978	42.7265	Dec
1979	45.1718	Jan
1980	53.8098	Jan
1981	49.8671	Jan
1982	48.8385	Dec
1983	51.5051	Jan
1984	48.4765	Dec
1985	46.1145	Dec
1986	50.1145	Feb
1987	41.5051	Dec
1988	45.4479	Dec
1989	45.1718	Jan
1990	43.7812	Feb
1991	48.7812	Mar
1992	47.1718	Dec
1993	46.7812	Jan
1994	48.0573	Nov
1995	51.1718	Dec
1996	48.7812	Feb
1997	49.0859	Dec
1998	46.7812	Dec
1999	48.8098	Jan
2000	50.3620	Jan
2001	47.6953	Jan
2002	45.7526	Jan
2003	49.0573	Dec
2004	47.7526	Nov
2005	47.8098	Jan
2006	48.3620	Dec
2007	43.3620	Jan
2008	48.7239	Dec
2009	48.4192	Feb
2010	48.2004	Dec

Table 5

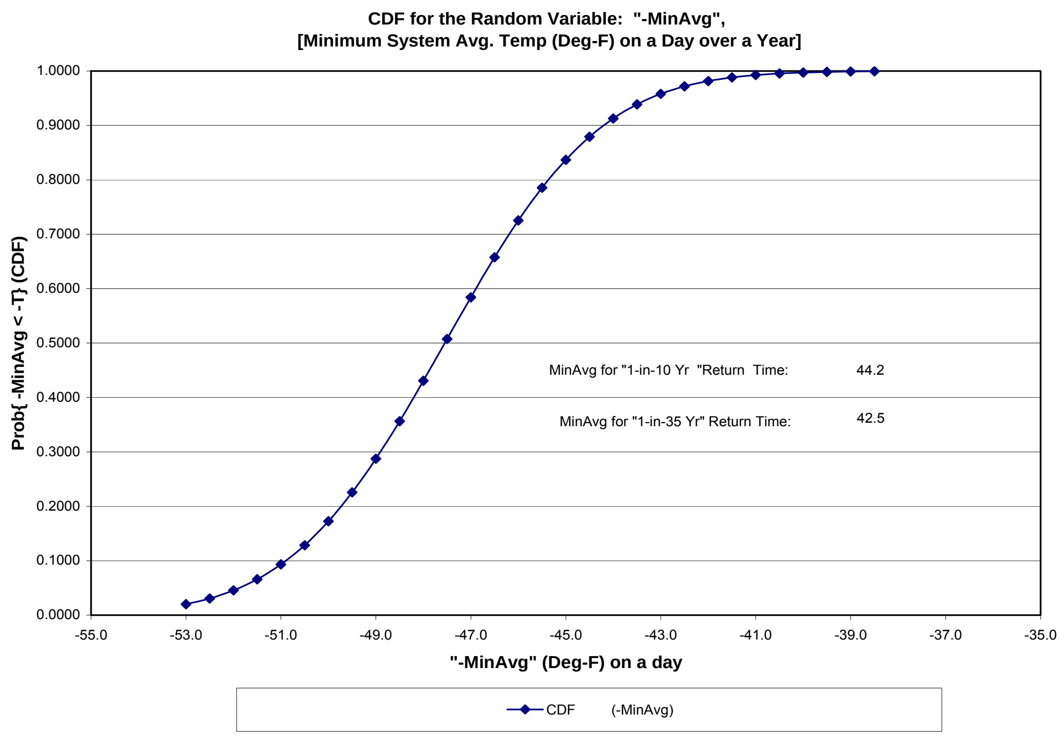
alpha= 0.375

YEAR	Month(- MinAvg)	Days/Yr	-MinAvg	"Rank"	Empirical CDF	Fitted Model CDF:
1980	Jan	366	-53.8098	1	0.0159	-2.231
1983	Jan	365	-51.5051	2	0.0414	-1.783
1995	Dec	365	-51.1718	3	0.0669	-1.533
1977	Mar	365	-50.6692	4	0.0924	-1.352
2000	Jan	366	-50.3620	5	0.1178	-1.205
1986	Feb	365	-50.1145	6	0.1433	-1.081
1981	Jan	365	-49.8671	7	0.1688	-0.972
1997	Dec	365	-49.0859	8	0.1943	-0.873
2003	Dec	365	-49.0573	9	0.2197	-0.781
1982	Dec	365	-48.8385	10	0.2452	-0.697
1999	Jan	365	-48.8098	11	0.2707	-0.616
1991	Mar	365	-48.7812	12	0.2962	-0.540
1996	Feb	366	-48.7812	13	0.3217	-0.467
2008	Dec	366	-48.7239	14	0.3471	-0.396
1984	Dec	366	-48.4765	15	0.3726	-0.327
2009	Feb	365	-48.4192	16	0.3981	-0.260
2006	Dec	365	-48.3620	17	0.4236	-0.194
2010	Dec	365	-48.2004	18	0.4490	-0.129
1994	Nov	365	-48.0573	19	0.4745	-0.064
2005	Jan	365	-47.8098	20	0.5000	0.000
2004	Nov	366	-47.7526	21	0.5255	0.064
2001	Jan	365	-47.6953	22	0.5510	0.129
1992	Dec	366	-47.1718	23	0.5764	0.194
1972	Dec	366	-46.7838	24	0.6019	0.260
1993	Jan	365	-46.7812	25	0.6274	0.327
1998	Dec	365	-46.7812	26	0.6529	0.396
1973	Jan	365	-46.1979	27	0.6783	0.467
1985	Dec	365	-46.1145	28	0.7038	0.540
2002	Jan	365	-45.7526	29	0.7293	0.616
1988	Dec	366	-45.4479	30	0.7548	0.697
1979	Jan	365	-45.1718	31	0.7803	0.781
1989	Jan	365	-45.1718	32	0.8057	0.873
1976	Jan	366	-45.0885	33	0.8312	0.972
1974	Dec	365	-44.2291	34	0.8567	1.081
1975	Jan	365	-44.1979	35	0.8822	1.205
1990	Feb	365	-43.7812	36	0.9076	1.352
2007	Jan	365	-43.3620	37	0.9331	1.533
1978	Dec	365	-42.7265	38	0.9586	1.783
1987	Dec	365	-41.5051	39	0.9841	2.231

Mean{-MinAvg}= -47.4517
St.Dev{-MinAvg}= 2.6014

"Gamma" (Fitted) = -47.55
"Theta" (Fitted) = 2.56
Deg. Freedom= 37

Figure 1



CDF for the Random Variable: "-MinAvg",
[Minimum System Avg. Temp (Deg-F) on a Day over a Year]
Prob{ -MinAvg < -T} (CDF)
1.0000
0.9000
0.8000
0.7000
0.6000
0.5000
0.4000
0.3000
0.2000
0.1000
0.0000
-55.0
-53.0
-51.0
-49.0
-47.0
-45.0
-43.0
-41.0
-39.0
-37.0
-35.0
"-MinAvg" (Deg-F) on a day
MinAvg for "1-in-10 Yr "Return Time: 44.2
MinAvg for "1-in-35 Yr" Return Time: 42.5
CDF (-MinAvg)

V. Estimating the Uncertainty in the Peak-Day Design Temperature

The calculated peak-day design temperatures in section IV above also have a statistical uncertainty associated with them. The estimated measures of uncertainty recommended for our use are calculated from the fitted model for the probability distribution and are believed to be reasonable, although rough, approximations.

The basic approach used the estimated parameters for the probability distribution (see the results provided in Table 5, above) to calculate the fitted temperatures as a function of the empirical CDF listed in Table 5. These fitted temperatures are then "compared" with the observed temperatures by calculating the difference = "observed" – "fitted" values. The full set of differences are then separated into the lower third (L), the middle third (M) and the upper third (U) of the distribution. Finally, calculate values of the root-mean-square error (RMSE) of the differences in each third of the distribution, along with the entire set of differences overall. The data in Table 6, below, show the temperature data and the resulting RMSE values.

The formula below is used to calculate the RMSE for a specified set of "N" data differences:

$$\text{RMSE} = \text{SQRT}\left\{ \left(\sum_{i=1, \ldots, N} e[\,i\,]^2 \right) / (N-3) \right\},$$

where e[i] = *observed* less *fitted* value of temperature, T[i]. The number of estimated paramters (3 for the GEV model) is subtracted from the respective number of data differences, N, in the denominator of the RMSE expression.

Since both the "1-in-35" and "1-in-10" peak-day temperature values are in the lower third quantile of the fitted distribution, the calculated standard error for these estimates is 0.3 Deg-F.

Table 6

Quantile: (Lower, Middle, Upper 3rd's)	Observed $T_{[i]}$ Temp. Ranked	Fitted Value of $T_{[i]}$	Residual $e_{[i]}$: Obs'd. less Fitted Value of $T_{[i]}$	Square of $e_{[i]}$:
U	53.8098	53.2662	0.5437	0.2956
U	51.5051	52.1185	-0.6133	0.3762
U	51.1718	51.4781	-0.3063	0.0938
U	50.6692	51.0129	-0.3436	0.1181
U	50.3620	50.6384	-0.2764	0.0764
U	50.1145	50.3197	-0.2052	0.0421
U	49.8671	50.0388	-0.1717	0.0295
U	49.0859	49.7850	-0.6991	0.4888
U	49.0573	49.5516	-0.4943	0.2444
U	48.8385	49.3339	-0.4954	0.2454
U	48.8098	49.1285	-0.3186	0.1015
U	48.7812	48.9329	-0.1517	0.0230
U	48.7812	48.7453	0.0359	0.0013
M	48.7239	48.5639	0.1600	0.0256
M	48.4765	48.3877	0.0888	0.0079
M	48.4192	48.2154	0.2039	0.0416
M	48.3620	48.0461	0.3158	0.0998
M	48.2004	47.8791	0.3213	0.1033
M	48.0573	47.7135	0.3438	0.1182
M	47.8098	47.5485	0.2613	0.0683
M	47.7526	47.3836	0.3689	0.1361
M	47.6953	47.2180	0.4773	0.2278
M	47.1718	47.0509	0.1208	0.0146
M	46.7838	46.8817	-0.0979	0.0096
M	46.7812	46.7094	0.0718	0.0052
M	46.7812	46.5331	0.2481	0.0615
L	46.1979	46.3518	-0.1539	0.0237
L	46.1145	46.1641	-0.0496	0.0025
L	45.7526	45.9686	-0.2160	0.0467
L	45.4479	45.7632	-0.3153	0.0994
L	45.1718	45.5455	-0.3737	0.1396
L	45.1718	45.3121	-0.1403	0.0197
L	45.0885	45.0583	0.0302	0.0009
L	44.2291	44.7774	-0.5483	0.3006
L	44.1979	44.4587	-0.2608	0.0680
L	43.7812	44.0842	-0.3030	0.0918
L	43.3620	43.6190	-0.2570	0.0660
L	42.7265	42.9786	-0.2521	0.0636
L	41.5051	41.8309	-0.3258	0.1061
			Overall RMSE ($e_{[i]}$):	0.3 °F
			Upper 3rd RMSE ($e_{[i]}$):	0.4 °F
			Middle 3rd RMSE ($e_{[i]}$):	0.3 °F
			Lower 3rd RMSE ($e_{[i]}$):	0.3 °F

VI. The Relationship between Annual Likelihoods for Peak-Day Temperatures and "Expected Return Time"

The event whose probability distribution we've modeled is the likelihood that the minimum daily temperature over a calendar year is less than a specified value. And, in particular, we've used this probability model to infer the value of a temperature, our *peak-day design temperature* ($TPDD_\delta$), that corresponds to a pre-defined likelihood, δ, that the observed minimum temperature is less than or equal to this design temperature.

(1) δ = Prob{ Minimum Daily Temperature over the Year < $TPDD_\delta$ }.

For some applications, it is useful to think of how this specified likelihood (or "risk level" δ) relates to the expected number of years until this Peak-Day event would first occur. This expected number of years is what is meant by the *return period*. The results stated below are found in the book: ***Statistics of Extremes***, E.J. Gumbel, Columbia University Press, 1958, on pages 21-25.

(2) E[#Yrs for Peak-Day Event to Occur] = 1 / δ,

1 / Prob{ Minimum Daily Temperature over the Year < $TPDD_\delta$ }.

For our peak-day design temperature (41.8°F) associated with a 1-in-35 annual likelihood, the return period is 35 years (δ=1/35). For the 43.7°F peak-day design temperature, the return period is 10 years (δ=1/10). Occasionally, a less precise terminology is used. For example, the 41.8°F peak-day design temperature may be referred to as a "1-in-35 year cold day"; and the 43.7°F peak-day design temperature may be referred to as a "1-in-10 year cold day."

The probability model for the *return period*, as a random variable, is a geometric (discrete) distribution with positive integer values for the *return period*. The parameter δ = Prob{ Minimum Daily Temperature over the Year < $TPDD_\delta$ }.

(3) Prob{ *return period* = r } = $(1 - \delta)^{(r-1)}\,\delta$, for r = 1, 2, 3, . . .

The expected value of the *return period* is already given in (2) above; the variance of the *return period* is:

(4) Var[*return period*] = (E[*return period*])^2 x (1- (1 / E [*return period*])),

(4') Var[*return period*] = (E[*return period*]) x (E [*return period*] - 1).

Equations (4) and (4') indicate that the standard deviation (square root of the variance) of the *return period* is nearly equal to its expected value. Thus, there is substantial variability about the expected value—a *return period* is not very precise.

VII. Calculation of Likelihoods for Peak-Day Temperature Events Over a Specified Number of Years

With a specified annual likelihood (i.e., a level of risk) for a peak-day temperature event, several forward-looking questions can be posed:

1). What is the probability that we observe *no* peak-day event over the next N years?

2). What is the probability that we observe *at least one* specified peak-day event over the next N years?"

3). What is the probability that we observe exactly one peak-day event over the next N years?

4). What is the underlying peak-day temperature associated with the annual likelihood computed from setting the probability in question 3 above to a specified value?

To calculate the probabilities to answer questions 1-3, we use a binomial probability model:

(1) $\text{BiNomial}(s, N, \delta) = \{ N! / [(s!) (N\text{-}s)!]\} [\delta]^{(s)} [1 - \delta]^{(N\text{-}s)}$, where

N = # of years, s = # of peak-day events and δ = Annual Likelihood of a peak-day event.; the notation "N!" means the product "N(N-1)(N-2) ... (2)(1)" in the formula.

The binomial probability model is the one that applies here since for a specified number of years in the future, N, and a specified annual likelihood, δ, for the peak-day event, there are typically a number of ways that a specified number of annual peak-day events can occur out of the total, N, regardless of the order in which the outcomes might occur.

For δ=0.1, N=10 years the answer to question 1) is calculated from:

(2) Prob{ *No* peak-day event over 10 years } = BiNomial(0, 10, 0.1) = 0.3487

The answer to question 2) is simply:

(3) Prob{ *At Least* One peak-day event over 10 years } =

1 - Prob{ No peak-day event over 10 years } = 1 – 0.3487 = 0.6513

The answer to question 3) is calculated from:

(4) Prob{ *Exactly One* peak-day event over 10 years } = BiNomial(1, 10, 0.1)

(4’) Prob{ *Exactly One* peak-day event over 10 years } = 0.3874

Finally, to find an answer to question 4) where there’s a 1/10 chance that only one peak-day event occurs over a ten-year period, we solve for δ in the equation:

(5) $0.1000 = \text{BiNomial}(1, 10, \delta)$.

A numerical solution to this equation yields $\delta = 0.0011$, approximately, for the annual likelihood of a peak-day event. Our estimation results of Section IV, above, allow us to calculate the peak-day design temperature for this value of δ. The resulting calculations yield $TPDD_{\delta} = 40.5°F$. A similar set of calculations for the case where we want to find the annual likelihood of a peak-day where only one peak-day event occurs over a thirty-five year period with a chance of 1/35=0.0286. The resulting value of $\delta = 0.000841$ with $TPDD_{\delta} = 38.1°F$ for this value of δ.

VIII. Attachment 1: SAS Program Execution Log

```
NOTE: Copyright (c) 1989-1996 by SAS Institute Inc., Cary, NC, USA.
NOTE: SAS (r) Proprietary Software Release 6.12  TS020
      Licensed to SAN DIEGO GAS & ELECTRIC CO, Site 0009311007.


Title1 "Data Analysis for Maximum/Minimum Daily SysAvg Temperatures (Un-Rounded)." ;
Title2 "Fit GEV Probability Model to Empirical CDF using NL-OLS Regression Methods." ;
/****************************************************************************************************/
/*                                                                                                  */
/*                                                                                                  */
/*                                                                                                  */
/* FILE SAVED: "S:\Weather\2013Tcap\SDGandE-Alt2Wgt\GEV4DlyTemp(NLReg2)_Sdge4WP.sas"                */
/*                                                                                                  */
/*              Aug. 11th, 2011 for Annual Max of Negative of Min. Temp.                            */
/*              Also, separately for and each of twelve(12) calendar months Jan-Dec.                */
/*              Fit GEV models (3-parameter and 2-parameter), plus a simple T-Dist. model.          */
/*                                                                                                  */
/****************************************************************************************************/
options mprint ;
/* %cour8p
   %cour8l ; */
 options ls=211 ps=69 ; **<<LANDSCAPE:  SAS-Monospace w/Roman 6pt. Font >>**;
*options ls=160 ps=90 ; **<<PORTRAIT:   SAS-Monospace w/Roman 6pt. Font >>**;
options date number notes ;
libname out2 'S:\Weather\2013Tcap\SDGandE-Alt2Wgt\' ;
NOTE: Libref OUT2 was successfully assigned as follows:
      Engine:        V612
      Physical Name: S:\Weather\2013Tcap\SDGandE-Alt2Wgt
 **<< Change library reference to use applicable daily data. >>**
libname estout2 'S:\Weather\2013Tcap\SDGandE-Alt2Wgt\MinTemp\' ;
 **<< Change library reference to use estimation results directory. >>**;
proc contents data=out2.SAvgSDGE ;
run ;

NOTE: The PROCEDURE CONTENTS used 0.18 seconds.


data seriesD ;
  set out2.SAvgSDGE ;
  year = year(date) ;
  month = month(date) ;
  posAvg = avg ;
  negAvg = -avg ;
run ;

NOTE: The data set WORK.SERIESD has 14335 observations and 10 variables.
NOTE: The DATA statement used 0.79 seconds.


proc means data=seriesD noprint nway ;
 class year month ;
  var posAvg negAvg ;
 output out=mostat
                  mean=posAvg  negAvg
                   max=MxPosAvg MxNegAvg
                   min=MnPosAvg MnNegAvg    ;
run;
```

```
NOTE: The data set WORK.MOSTAT has 471 observations and 10 variables.
NOTE: The PROCEDURE MEANS used 0.21 seconds.


proc sort data=mostat ;
   by year month ;
run ;

NOTE: The data set WORK.MOSTAT has 471 observations and 10 variables.
NOTE: The PROCEDURE SORT used 0.2 seconds.


data mostat ;
   set mostat ;
   MxPRatio = MxPosAvg/ PosAvg  ;
   MnPRatio = MnPosAvg/ PosAvg  ;
   MxNRatio = MxNegAvg/ NegAvg  ;
   MnNRatio = MnNegAvg/ NegAvg  ;
run ;

NOTE: The data set WORK.MOSTAT has 471 observations and 14 variables.
NOTE: The DATA statement used 0.23 seconds.


/****************
***<< Print Summary Tables of Means/Minimums/Maximums of daily NEGATIVE-Temperatures (degrees-F). >>*** ;

proc transpose data=mostat out=AvTData prefix=AvT_ ;   **<< Update "year" value as necessary! >>** ;
   where (year < 2011) ;
   by year;
   id month ;
   var NegAvg  ;
run ;

data AvTData ;
   set AvTData ;

 if (mod(year,4)=0) then do ;
        AvTyr = (AvT_1 + AvT_3 + AvT_5 + AvT_7 + AvT_8 + AvT_10 + AvT_12)*31
               + (AvT_4 + AvT_6 + AvT_9 + AvT_11)*30
               + (AvT_2)*29 ;
        AvTyr = AvTyr / 366 ;
        end ;
 else do ;
        AvTyr = (AvT_1 + AvT_3 + AvT_5 + AvT_7 + AvT_8 + AvT_10 + AvT_12)*31
               + (AvT_4 + AvT_6 + AvT_9 + AvT_11)*30
               + (AvT_2)*28 ;
        AvTyr = AvTyr / 365 ;
        end ;

run ;

proc print data=AvTData ;
 id year ;
 var AvTyr AvT_1-AvT_12 ;
title3 'Monthly Mean NEGATIVE Temperature (Deg-F) from 1972 thru 2010.';
run ;


proc transpose data=mostat out=MnTData prefix=MnT_ ;
   where (year < 2011) ;    **<< Update "year" value as necessary! >>** ;
   by year;
```

```
   id month ;
   var MnNegAvg ;
run ;

data MnTData ;
   set MnTData ;
 MnTyr = min(of MnT_1-MnT_12) ;
run ;

proc print data=MnTData ;
 id year ;
 var MnTyr MnT_1-MnT_12 ;
title3 'Monthly MINIMUM NEGATIVE-Temperature (Deg-F) from 1972 thru 2010.';
run ;
****************/

proc transpose data=mostat out=MxTData prefix=MxT_ ;
   where (year < 2011) ;    **<< Update "year" value as necessary! >>** ;
   by year;
   id month ;
   var MxNegAvg ;
run ;

NOTE: The data set WORK.MXTDATA has 39 observations and 14 variables.
NOTE: The PROCEDURE TRANSPOSE used 0.18 seconds.


data MxTData ;
   set MxTData ;
 MxTyr = max(of MxT_1-MxT_12) ;
run ;

NOTE: The data set WORK.MXTDATA has 39 observations and 15 variables.
NOTE: The DATA statement used 0.2 seconds.


proc print data=MxTData ;
 id year ;
 var MxTyr MxT_1-MxT_12 ;
title3 'Monthly MAXIMUM NEGATIVE-Temperature (Deg-F) from 1972 thru 2010.';  **<< Update "year" value as
necessary! >>** ;
run ;

NOTE: The PROCEDURE PRINT used 0.01 seconds.


/****************
***<< Descriptive Statistics: Maximums of daily NEGATIVE-Temperatures (Deg-F) for Year and each calendar month.
>>*** ;

proc corr data=MxTData ;
  var MxTyr MxT_1 - MxT_12 ;
title3 'Correlation Matrix of Monthly Maximum NEGATIVE-Temperatures (Deg-F) within same year.';
run ;

proc arima data=MxTData ;
  identify var=MxTyr ;
  identify var=MxT_1 ;
  identify var=MxT_2 ;
  identify var=MxT_3 ;
```

```
  identify var=MxT_4 ;
  identify var=MxT_5 ;
  identify var=MxT_6 ;
  identify var=MxT_7 ;
  identify var=MxT_8 ;
  identify var=MxT_9 ;
  identify var=MxT_10 ;
  identify var=MxT_11 ;
  identify var=MxT_12 ;
title3 "Auto-correlation analysis of each calendar month's Maximum NEGATIVE-Temperatures (Deg-F) within same year.";
run ;

proc univariate normal data=MxTData plot ;
  id year ;
  var MxTyr MxT_1 - MxT_12 ;
title3 "Probability plots and tests for NORMALity by each calendar month's Maximun NEGATIVE-Temperatures (Deg-F) time series.";
run ;


proc means data=MxTData ;
  var MxT_1 - MxT_12  MxTYr ;
run ;
****************/








***<< Statistical Estimation of GEV Models: Maximums of daily heating degrees for Year and each calendar month. >>*** ;

%macro RankIt(file=MxTData,var=MxTYr,rank=RankYr,prob=PrMxTYr,Nobser=39,PltValue=0.375) ;

                 **<< Update "Nobser" value as necessary! >>** ;

proc sort data=&file ;
  by &var ;
run ;

data &file ;
   set &file ;
   retain &rank 0     alpha &pltvalue ;

  &rank = &rank + 1 ;
  &prob =  (&rank - alpha) / (&Nobser +(1 - 2*alpha)) ;
run ;

proc print data=&file ;
  var &var &rank &prob alpha year ;
run ;
%mend RankIt ;




%macro GEVfit(file=MxTData,ofile=MxTNL1,outfit=fit1,outest=est1,depvar=PrMxTYr,var=MxTYr,typeGEV=1,
              KappaI=0.25,GammaI=-47.05,ThetaI=2.77,YrLo=1972,YrHi=2010) ;

                 **<< Update "YrHi" value as necessary! >>** ;

proc sort data=&file ;
   by year ;
run ;



proc model data=&file converge=0.001
           maxit=500 dw ;  outmodel=&ofile ;
    range year = &YrLo to &YrHi ;   **<< Dropped monthly data beyond 2010 data. >>** ;


    y = (&var - Gamma) / Theta ;
```

```
     %if &typeGEV=1 %then %do ;  ***<< 3-parameter GEV Model. >>>*** ;
         &depvar = exp( -(1 - Kappa * (y))**(1/Kappa) ) ;
         %let typmod = 3-parameter GEV Model. ;
         %end ;

     %if &typeGEV=2 %then %do ;  **<< 2-parameter "Double Exponential" or  "Gumbel" Model. >>** ;
         &depvar = exp( -exp(-(y)) ) ;
         %let typmod = 2-parameter Double Exponential or Gumbel Model. ;
         %end ;

     %if (&typeGEV NE 1) AND (&typeGEV NE 2) %then  %do ; **<< 2-parameter "T-Dist" Model. >>** ;
         dft=(&YrHi - &YrLo) +1 -2 ;
         &depvar = probt(y,dft) ;
         %let typmod = 2-parameter T-Dist Model. ;
         %end ;


   %if &typeGEV = 1 %then %do ;
   parms
         Kappa  &KappaI
         Gamma  &GammaI
         Theta  &ThetaI ;
   %end ;

   %if (&typeGEV NE 1)  %then %do ;
   parms
         Gamma  &GammaI
         Theta  &ThetaI ;
   %end ;


   fit &depvar   /out=&outfit  outall
                  outest=&outest corrb corrs outcov ;

 title3 "Non-linear Estimation of &&typmod: for Maximum NEGATIVE Temperature (Deg-F)." ;
 run ;
 %mend GEVfit ;

 /****************
 ****************/

 proc means data=MxTData ;
   var MxT_1 - MxT_12  MxTYr ;
  output out=VarStat
         mean=mean1-mean12 meanYr
         std=stdev1-stdev12 stdevYr;
 title3 "Calc. Means and Standard Deviantions to use as Starting Values in Non-Linear Estimations." ;
 run ;

NOTE: The data set WORK.VARSTAT has 1 observations and 28 variables.
NOTE: The PROCEDURE MEANS used 0.21 seconds.


 proc print data=VarStat ;
 run ;

NOTE: The PROCEDURE PRINT used 0.0 seconds.


 data _null_ ;
    set VarStat ;

   call symput('gamma_Yr',meanYr) ;
   call symput('theta_Yr',stdevYr) ;

   call symput('gamma_12',mean12) ;
```

```
325    call symput('theta_12',stdev12) ;
326
327    call symput('gamma_11',mean11) ;
328    call symput('theta_11',stdev11) ;
329
330    call symput('gamma_10',mean10) ;
331    call symput('theta_10',stdev10) ;
332
333    call symput('gamma_9',mean9) ;
334    call symput('theta_9',stdev9) ;
335
336    call symput('gamma_8',mean8) ;
337    call symput('theta_8',stdev8) ;
338
339    call symput('gamma_7',mean7) ;
340    call symput('theta_7',stdev7) ;
341
342    call symput('gamma_6',mean6) ;
343    call symput('theta_6',stdev6) ;
344
345    call symput('gamma_5',mean5) ;
346    call symput('theta_5',stdev5) ;
347
348    call symput('gamma_4',mean4) ;
349    call symput('theta_4',stdev4) ;
350
351    call symput('gamma_3',mean3) ;
352    call symput('theta_3',stdev3) ;
353
354    call symput('gamma_2',mean2) ;
355    call symput('theta_2',stdev2) ;
356
357    call symput('gamma_1',mean1) ;
358    call symput('theta_1',stdev1) ;
359
360  run ;

NOTE: Numeric values have been converted to character values at the places given by: (Line):(Column).
      321:26   322:26   324:26   325:26   327:26   328:26   330:26   331:26   333:25   334:25   336:25   337:25
339:25   340:25   342:25   343:25   345:25   346:25   348:25   349:25   351:25   352:25
      354:25   355:25   357:25   358:25
NOTE: The DATA statement used 0.1 seconds.


361
362
363
364
365
366
367  *********<<< Analysis for "Annual" Data  (i.e., SUFIX "mm" = "_Yr"  >>>******************;
368
369
370
MPRINT(RANKIT):   **<< UPDATE "NOBSER" VALUE AS NECESSARY! >>** ;
371
372
373  %RankIt(file=MxTData,var=MxTYr,rank=RankYr,prob=PrMxTYr,Nobser=39,PltValue=0.375) ;
MPRINT(RANKIT):   PROC SORT DATA=MXTDATA ;
MPRINT(RANKIT):   BY MXTYR ;
MPRINT(RANKIT):   RUN ;

NOTE: The data set WORK.MXTDATA has 39 observations and 15 variables.
NOTE: The PROCEDURE SORT used 0.14 seconds.


MPRINT(RANKIT):   DATA MXTDATA ;
MPRINT(RANKIT):   SET MXTDATA ;
MPRINT(RANKIT):   RETAIN RANKYR 0 ALPHA 0.375 ;
MPRINT(RANKIT):   RANKYR = RANKYR + 1 ;
MPRINT(RANKIT):   PRMXTYR = (RANKYR - ALPHA) / (39 +(1 - 2*ALPHA)) ;
MPRINT(RANKIT):   RUN ;

NOTE: The data set WORK.MXTDATA has 39 observations and 18 variables.
NOTE: The DATA statement used 0.23 seconds.
```

```
MPRINT(RANKIT):   PROC PRINT DATA=MXTDATA ;
MPRINT(RANKIT):   VAR MXTYR RANKYR PRMXTYR ALPHA YEAR ;
MPRINT(RANKIT):   RUN ;

NOTE: The PROCEDURE PRINT used 0.01 seconds.


                  **<< Update "Nobser" value as necessary! >>** ;
%GEVfit(file=MxTData,ofile=MxTNL0,outfit=fit0,outest=est0,depvar=PrMxTYr,var=MxTYr,typeGEV=0,
MPRINT(GEVFIT):   **<< UPDATE "YRHI" VALUE AS NECESSARY! >>** ;
        KappaI=0.25,GammaI=&gamma_Yr,ThetaI=&theta_Yr,YrLo=1972,YrHi=2010) ;
MPRINT(GEVFIT):   PROC SORT DATA=MXTDATA ;
MPRINT(GEVFIT):   BY YEAR ;
MPRINT(GEVFIT):   RUN ;

NOTE: The data set WORK.MXTDATA has 39 observations and 18 variables.
NOTE: The PROCEDURE SORT used 0.14 seconds.


MPRINT(GEVFIT):   PROC MODEL DATA=MXTDATA CONVERGE=0.001 MAXIT=500 DW ;
MPRINT(GEVFIT):   OUTMODEL%MXTNL0 ;
MPRINT(GEVFIT):   RANGE YEAR = 1972 TO 2010 ;
MPRINT(GEVFIT):   **<< DROPPED MONTHLY DATA BEYOND 2010 DATA. >>** ;
MPRINT(GEVFIT):   Y % (MXTYR - GAMMA) / THETA ;
MPRINT(GEVFIT):   **<< 2-PARAMETER "T-DIST" MODEL. >>** ;
MPRINT(GEVFIT):   DFT%(2010 - 1972) +1 -2 ;
MPRINT(GEVFIT):   PRMXTYR % PROBT(Y,DFT) ;
MPRINT(GEVFIT):   PARMS GAMMA -47.45166428 THETA 2.6014161571 ;

MPRINT(GEVFIT):   FIT PRMXTYR /OUT=FIT0 OUTALL OUTEST=EST0 CORRB CORRS OUTCOV ;
MPRINT(GEVFIT):   TITLE3 "Non-linear Estimation of 2-parameter T-Dist Model.: for Maximum NEGATIVE Temperature (Deg-
F)." ;
MPRINT(GEVFIT):   RUN ;

NOTE: At OLS Iteration 3 CONVERGE=0.001 Criteria Met.
NOTE: The data set WORK.FIT0 has 117 observations and 6 variables.
NOTE: The data set WORK.EST0 has 3 observations and 5 variables.
                  **<< Update "YrHi" value as necessary! >>** ;

NOTE: The PROCEDURE MODEL used 0.23 seconds.


proc print data=fit0 ;
run ;

NOTE: The PROCEDURE PRINT used 0.0 seconds.


proc transpose data=fit0 out=pred0 prefix=probP ;
   where (_type_ = "PREDICT" ) ;
   by year;
   var prmxtyr ;
run ;

NOTE: The data set WORK.PRED0 has 39 observations and 3 variables.
NOTE: The PROCEDURE TRANSPOSE used 0.09 seconds.


data comb0 ;
   merge MxTData pred0 ;
  by year ;
   ProbP = ProbP1 ;
  keep year MxTYr PrMxTYr ProbP ;
run ;
```

```
NOTE: The data set WORK.COMB0 has 39 observations and 4 variables.
NOTE: The DATA statement used 0.29 seconds.


proc print data=comb0 ;
run ;

NOTE: The PROCEDURE PRINT used 0.01 seconds.


proc plot data=comb0 ;
  plot prmxtyr*MxTYr='*'
       probP*MxTYr='-' / overlay ;
run ;


NOTE: The PROCEDURE PLOT used 0.03 seconds.


proc print data=est0 ;
run ;

NOTE: The PROCEDURE PRINT used 0.01 seconds.


/**************
data estout2.est0_Yr ;   ***<<< Save a copy of the "2-parameter T-Dist Model" estimation results!  >>>*** ;
  set est0 ;
run ;
**************/

data comb  ;
   merge MxTData pred0(rename=(ProbP1=ProbP0)) ;
  by year ;

 ***<< "Log(PrMxTYr) - Log(ProgP)" to calc. RMSE of Proportional Errors Models! >>** ;
   LgPrRat0 = Log(PrMxTYr/ProbP0) ;

 label   LgPrRat0 = "Log(PrMxTYr/ProbP0)- T-Dist" ;

   if (PrMxTYr <= (1/3)) then Quantile=1 ;  **<< "Lower Third" >>** ;
   if (PrMxTYr > (1/3)) AND (PrMxTYr <= (2/3)) then Quantile=2 ; **<< "Middle Third" >>** ;
   if (PrMxTYr > (2/3)) then Quantile=3 ;  **<< "Upper Third" >>** ;

  keep year MxTYr Quantile PrMxTYr ProbP0 LgPrRat0 ;
run ;

NOTE: The data set WORK.COMB has 39 observations and 6 variables.
NOTE: The DATA statement used 0.2 seconds.


proc print data=comb  ;
  var year MxTYr Quantile  PrMxTYr ProbP0  LgPrRat0 ;
title3 "Est'd CDFs and Logarithms of 'Empirical CDF rel. to Fitted CDF' values by Models." ;
run ;

NOTE: The PROCEDURE PRINT used 0.01 seconds.
```

```
proc means data=comb  n mean std min max var uss ;
  var LgPrRat0 ;
title3 "Stats for Logarithms of 'Empirical CDF rel. to Fitted CDF' values by Models to calc. RMSE of Prop. Model Spec" ;
run ;

NOTE: The PROCEDURE MEANS used 0.01 seconds.


proc sort data=comb ;
  by Quantile ;
run ;

NOTE: The data set WORK.COMB has 39 observations and 6 variables.
NOTE: The PROCEDURE SORT used 0.15 seconds.


proc means data=comb  n mean std min max var uss ;
  by Quantile ;
  var LgPrRat0 ;
title3 "Stats By Quantile for Logarithms of 'Empirical CDF rel. to Fitted CDF' values by Models to calc. RMSE of Prop. Model Spec" ;
run ;

NOTE: The PROCEDURE MEANS used 0.01 seconds.


proc means data=comb  n mean std min max var uss ;
  by Quantile ;
  var LgPrRat0 ;
title3 "Stats By Quantile for Logarithms of 'Empirical CDF rel. to Fitted CDF' values by Models to calc. RMSE of Prop. Model Spec" ;
run ;

NOTE: The PROCEDURE MEANS used 0.01 seconds.


quit ;
```

IX. Attachment 2: SAS Program Output

CONTENTS PROCEDURE

Data Set Name:	OUT2.SAVGSDGE	Observations:	14335
Member Type:	DATA	Variables:	6
Engine:	V612	Indexes:	0
Created:	11:31 Friday, April 8, 2011	Observation Length:	48
Last Modified:	11:31 Friday, April 8, 2011	Deleted Observations:	0
Protection:		Compressed:	NO
Data Set Type:		Sorted:	NO
Label:			

-----Engine/Host Dependent Information-----

Data Set Page Size:	8192
Number of Data Set Pages:	85
File Format:	607
First Data Page:	1
Max Obs per Page:	169
Obs in First Data Page:	147

-----Alphabetic List of Variables and Attributes-----

#	Variable	Type	Len	Pos	Format	Informat	Label
2	AVG	Num	8	8			Syst-Avg. Avg
6	CDD	Num	8	40			Syst-Avg. Cdd
1	DATE	Num	8	0	DATE9.	DATE12.	
5	HDD	Num	8	32			Syst-Avg. Hdd
3	MAX	Num	8	16			Syst-Avg. Max
4	MIN	Num	8	24			Syst-Avg. Min

Fit GEV Probability Model to Empirical CDF using NL-OLS Regression Methods.
Monthly MAXIMUM NEGATIVE-Temperature (Deg-F) from 1972 thru 2010.

YEAR	MXTYR	MXT_1	MXT_2	MXT_3	MXT_4	MXT_5	MXT_6	MXT_7	MXT_8	MXT_9	MXT_10	MXT_11	MXT_12
1972	-46.7838	-47.0885	-50.2291	-54.6692	-56.7239	-59.1406	-63.6120	-69.3308	-67.6953	-66.0000	-55.5026	-54.1979	-46.7838
1973	-46.1979	-46.1979	-54.1145	-52.9739	-56.1145	-57.6953	-63.6692	-67.6953	-69.0000	-66.0000	-61.8098	-52.1145	-52.0312
1974	-44.2291	-48.2291	-51.0573	-52.4192	-57.5598	-60.0573	-64.3880	-67.0261	-69.2761	-66.9427	-57.5598	-54.7838	-44.2291
1975	-44.1979	-44.1979	-49.0885	-48.3124	-51.1406	-57.1145	-60.3620	-66.3880	-68.0833	-66.0000	-60.1145	-50.0312	-50.1718
1976	-45.0885	-45.0885	-54.1145	-49.8098	-55.0573	-60.0000	-63.0573	-69.4974	-68.6692	-68.1979	-61.7265	-49.8671	-52.6744
1977	-50.6692	-51.7838	-52.1979	-50.6692	-54.0312	-58.5547	-65.5547	-68.8594	-71.6953	-68.0312	-63.1145	-56.1718	-56.2291
1978	-42.7265	-52.2291	-53.1718	-55.5598	-55.0885	-60.1145	-66.3620	-68.0000	-68.4192	-66.5026	-65.0573	-54.6171	-42.7265
1979	-45.1718	-45.1718	-50.1145	-51.0885	-58.1145	-60.4453	-63.6953	-67.6953	-70.7651	-71.3880	-61.0211	-52.0312	-52.4765
1980	-53.8098	-53.8098	-56.0312	-54.0312	-55.7526	-58.7265	-64.0000	-69.3308	-70.0261	-67.6692	-60.1979	-55.8671	-54.8410
1981	-49.8671	-49.8671	-53.0859	-53.2761	-56.1718	-61.7239	-66.6380	-71.6380	-72.2474	-68.3906	-58.5051	-54.5338	-53.4479
1982	-48.8385	-49.4479	-54.3333	-53.7526	-53.1145	-60.4192	-62.0573	-67.0000	-70.9714	-64.0859	-61.5051	-55.4479	-48.8385
1983	-51.5051	-51.5051	-53.2291	-55.7812	-54.1432	-60.1718	-62.2004	-67.9427	-70.0573	-67.8671	-66.7526	-51.8957	-52.5624
1984	-48.4765	-51.5624	-51.8385	-58.7526	-57.6120	-59.4479	-65.3906	-72.6094	-73.6667	-72.1145	-61.0286	-53.1718	-48.4765
1985	-46.1145	-48.8385	-46.8385	-49.4479	-58.4192	-60.3620	-62.6667	-71.6953	-68.6094	-65.3906	-63.0573	-50.8385	-46.1145
1986	-50.1145	-56.3620	-50.1145	-53.4192	-57.3333	-58.7812	-65.9714	-67.5808	-70.2474	-60.1145	-60.7239	-58.1145	-53.1432
1987	-41.5051	-42.4192	-49.1432	-53.0859	-56.0573	-60.3620	-63.8855	-64.6094	-64.3333	-66.9714	-63.5051	-54.4479	-41.5051
1988	-45.4479	-49.1432	-52.4192	-55.2004	-55.6667	-57.0573	-59.6953	-68.5521	-68.5521	-63.3333	-62.3047	-53.3906	-45.4479
1989	-45.1718	-45.1718	-45.8098	-51.7239	-56.7239	-58.4192	-62.0000	-68.0000	-69.0286	-62.7239	-61.0286	-56.7812	-51.5051
1990	-43.7812	-48.1145	-43.7812	-50.1145	-58.7239	-58.1145	-63.0286	-68.7996	-68.9714	-68.0000	-65.0286	-55.1432	-43.7812
1991	-48.7812	-51.6953	-54.6667	-48.7812	-57.9427	-58.0000	-61.3047	-66.4949	-67.8855	-65.0000	-58.0000	-51.1432	-50.5051
1992	-47.1718	-52.0573	-56.3906	-56.0000	-63.0859	-64.2761	-65.3333	-68.1329	-68.3906	-69.9427	-64.4192	-55.1432	-47.1718
1993	-46.7812	-46.7812	-52.3906	-54.4192	-58.6667	-59.8098	-61.3620	-67.9427	-67.6953	-64.3906	-62.4192	-55.6953	-52.0573
1994	-48.0573	-51.7526	-52.1718	-53.7239	-55.3333	-59.2761	-64.6094	-67.8855	-70.2474	-66.6667	-61.3906	-48.0573	-50.4765
1995	-51.1718	-52.4192	-56.0859	-52.4479	-53.3906	-56.0859	-60.9714	-66.6094	-70.0000	-66.7239	-62.6094	-60.1145	-51.1718
1996	-48.7812	-50.3906	-48.7812	-54.9714	-58.3620	-61.6380	-64.6094	-68.1902	-69.2188	-67.0286	-55.0859	-53.3906	-52.1145
1997	-49.0859	-51.0000	-50.8957	-52.3620	-53.0859	-64.6667	-63.9427	-67.6094	-70.5521	-69.5808	-62.0573	-57.6953	-49.0859
1998	-46.7812	-51.4479	-52.7812	-50.0573	-51.0859	-57.4479	-62.0573	-66.4949	-71.2188	-64.0000	-61.2761	-56.3333	-46.7812
1999	-48.8098	-48.8098	-49.7526	-50.1145	-49.2577	-56.9714	-58.3620	-64.1902	-67.1615	-63.6094	-64.2474	-54.3906	-51.0573
2000	-50.3620	-50.3620	-52.6667	-50.3906	-57.7239	-62.3333	-64.3047	-66.9714	-67.6667	-67.2761	-59.0286	-50.8098	-52.3906
2001	-47.6953	-47.6953	-49.0859	-52.3906	-51.4479	-60.2188	-62.4192	-66.9714	-66.8568	-67.9427	-64.2474	-50.8957	-50.3906
2002	-45.7526	-45.7526	-47.7812	-52.7239	-57.2761	-57.6380	-61.6667	-66.5808	-67.2188	-64.4192	-59.6380	-57.3333	-50.1145
2003	-49.0573	-54.6953	-52.7812	-52.8385	-53.4765	-57.4479	-61.3333	-67.8855	-70.8855	-68.2188	-61.3906	-54.7812	-49.0573
2004	-47.7526	-51.0286	-53.0859	-54.8385	-58.3620	-63.3620	-64.9714	-67.3906	-69.5808	-66.0000	-57.3333	-47.7526	-49.4192
2005	-47.8098	-47.8098	-53.9530	-55.8098	-58.0000	-60.7239	-64.0000	-67.7027	-69.4376	-64.6667	-60.7526	-55.0859	-52.6667
2006	-48.3620	-51.0000	-49.1145	-48.8098	-55.6953	-61.0859	-66.2761	-73.6953	-70.3333	-66.8568	-59.8098	-51.9427	-48.3620
2007	-43.3620	-43.3620	-51.3333	-50.6667	-54.9714	-60.0000	-61.9427	-68.6094	-70.6094	-63.6953	-61.2188	-57.0286	-48.4479
2008	-48.7239	-49.6667	-49.7526	-50.7239	-53.6667	-57.0573	-60.9141	-68.4949	-69.2761	-67.3333	-59.6953	-59.0859	-48.7239
2009	-48.4192	-49.0859	-48.4192	-53.3906	-54.4765	-60.9714	-63.0286	-67.7709	-68.2761	-67.6380	-57.0859	-55.1432	-49.5051
2010	-48.2004	-51.3906	-51.1432	-50.8385	-53.0000	-57.6667	-62.0000	-63.2188	-65.3333	-64.9141	-59.1432	-51.1432	-48.2004

Fit GEV Probability Model to Empirical CDF using NL-OLS Regression Methods.

Calc. Means and Standard Deviantions to use as Starting Values in Non-Linear Estimations.

Variable	N	Mean	Std Dev	Minimum	Maximum
MXT_1	39	-49.3443666	3.1429806	-56.3619655	-42.4192299
MXT_2	39	-51.3780834	2.8114484	-56.3905977	-43.7811954
MXT_3	39	-52.5740073	2.3866542	-58.7525632	-48.3123907
MXT_4	39	-55.6886033	2.6863860	-63.0858965	-49.2576896
MXT_5	39	-59.5739640	2.0203989	-64.6666667	-56.0858965
MXT_6	39	-63.1703375	1.9350431	-66.6380345	-58.3619655
MXT_7	39	-67.9767179	2.0115536	-73.6952988	-63.2188046
MXT_8	39	-69.1835683	1.7981917	-73.6666667	-64.3333333
MXT_9	39	-66.4519832	2.3618924	-72.1145287	-60.1145287
MXT_10	39	-61.0357029	2.6040714	-66.7525632	-55.0858965
MXT_11	39	-54.0105620	2.8959304	-60.1145287	-47.7525632
MXT_12	39	-49.6073074	3.2704112	-56.2290574	-41.5051264
MXTYR	39	-47.4516643	2.6014162	-53.8098275	-41.5051264

Fit GEV Probability Model to Empirical CDF using NL-OLS Regression Methods.
Calc. Means and Standard Deviantions to use as Starting Values in Non-Linear Estimations.

OBS	_TYPE_	_FREQ_	MEAN1	MEAN2	MEAN3	MEAN4	MEAN5	MEAN6	MEAN7	MEAN8	MEAN9	MEAN10	MEAN11	MEAN12
1	0	39	-49.3444	-51.3781	-52.5740	-55.6886	-59.5740	-63.1703	-67.9767	-69.1836	-66.4520	-61.0357	-54.0106	-49.6073

OBS	MEANYR	STDEV1	STDEV2	STDEV3	STDEV4	STDEV5	STDEV6	STDEV7	STDEV8	STDEV9	STDEV10	STDEV11	STDEV12	STDEVYR
1	-47.4517	3.14298	2.81145	2.38665	2.68639	2.02040	1.93504	2.01155	1.79819	2.36189	2.60407	2.89593	3.27041	2.60142

Fit GEV Probability Model to Empirical CDF using NL-OLS Regression Methods.
Calc. Means and Standard Deviantions to use as Starting Values in Non-Linear Estimations.

OBS	MXTYR	RANKYR	PRMXTYR	ALPHA	YEAR
1	-53.8098	1	0.01592	0.375	1980
2	-51.5051	2	0.04140	0.375	1983
3	-51.1718	3	0.06688	0.375	1995
4	-50.6692	4	0.09236	0.375	1977
5	-50.3620	5	0.11783	0.375	2000
6	-50.1145	6	0.14331	0.375	1986
7	-49.8671	7	0.16879	0.375	1981
8	-49.0859	8	0.19427	0.375	1997
9	-49.0573	9	0.21975	0.375	2003
10	-48.8385	10	0.24522	0.375	1982
11	-48.8098	11	0.27070	0.375	1999
12	-48.7812	12	0.29618	0.375	1991
13	-48.7812	13	0.32166	0.375	1996
14	-48.7239	14	0.34713	0.375	2008
15	-48.4765	15	0.37261	0.375	1984
16	-48.4192	16	0.39809	0.375	2009
17	-48.3620	17	0.42357	0.375	2006
18	-48.2004	18	0.44904	0.375	2010
19	-48.0573	19	0.47452	0.375	1994
20	-47.8098	20	0.50000	0.375	2005
21	-47.7526	21	0.52548	0.375	2004
22	-47.6953	22	0.55096	0.375	2001
23	-47.1718	23	0.57643	0.375	1992
24	-46.7838	24	0.60191	0.375	1972
25	-46.7812	25	0.62739	0.375	1993
26	-46.7812	26	0.65287	0.375	1998
27	-46.1979	27	0.67834	0.375	1973
28	-46.1145	28	0.70382	0.375	1985
29	-45.7526	29	0.72930	0.375	2002
30	-45.4479	30	0.75478	0.375	1988
31	-45.1718	31	0.78025	0.375	1979
32	-45.1718	32	0.80573	0.375	1989
33	-45.0885	33	0.83121	0.375	1976
34	-44.2291	34	0.85669	0.375	1974
35	-44.1979	35	0.88217	0.375	1975
36	-43.7812	36	0.90764	0.375	1990
37	-43.3620	37	0.93312	0.375	2007
38	-42.7265	38	0.95860	0.375	1978
39	-41.5051	39	0.98408	0.375	1987

Fit GEV Probability Model to Empirical CDF using NL-OLS Regression Methods.
Non-linear Estimation of 2-parameter T-Dist Model.: for Maximum NEGATIVE Temperature (Deg-F).

MODEL Procedure

Model Summary

Model Variables	1
Parameters	3
RANGE Variable	YEAR
Equations	1
Number of Statements	4

Model Variables: PRMXTYR

Parameters: GAMMA: -47.45 THETA: 2.601 MXTNLO

Equations: PRMXTYR

MODEL Procedure

NOTE: A finite difference approximation is used for the derivative of the PROBT function at line 381 column 101.

Fit GEV Probability Model to Empirical CDF using NL-OLS Regression Methods.
Non-linear Estimation of 2-parameter T-Dist Model.: for Maximum NEGATIVE Temperature (Deg-F).

MODEL Procedure

The Equation to Estimate is:

PRMXTYR = F(GAMMA, THETA)

MODEL Procedure
OLS Estimation

OLS Estimation Summary

Dataset Option	Dataset
DATA=	MXTDATA
OUT=	FITO
OUTEST=	ESTO

Parameters Estimated	2

RANGE Processed	YEAR
First	1972
Last	2010

Minimization Summary

Method	GAUSS
Iterations	3

Final Convergence	Criteria
R	0.00005863
PPC(THETA)	0.000011
RPC(THETA)	0.000066
Object	1.13223E-6
Trace(S)	0.00127596
Objective Value	0.00121052

Observations Processed

Read	39
Solved	39

Fit GEV Probability Model to Empirical CDF using NL-OLS Regression Methods.
Non-linear Estimation of 2-parameter T-Dist Model.: for Maximum NEGATIVE Temperature (Deg-F).

MODEL Procedure
OLS Estimation

Nonlinear OLS Summary of Residual Errors

Equation	DF Model	DF Error	SSE	MSE	Root MSE	R-Square	Adj R-Sq	Durbin Watson
PRMXTYR	2	37	0.04721	0.0012760	0.03572	0.9853	0.9849	1.891

Nonlinear OLS Parameter Estimates

Parameter	Estimate	Approx. Std Err	'T' Ratio	Approx. Prob>|T|
GAMMA	-47.548536	0.04896	-971.18	0.0001
THETA	2.563150	0.08560	29.94	0.0001

Number of Observations		Statistics for System	
Used	39	Objective	0.001211
Missing	0	Objective*N	0.0472

RANGE of Fit: YEAR = 1972 TO 2010

Correlations of Estimates

CorrB	GAMMA	THETA
GAMMA	1.0000	0.1095
THETA	0.1095	1.0000

Fit GEV Probability Model to Empirical CDF using NL-OLS Regression Methods.
Non-linear Estimation of 2-parameter T-Dist Model.: for Maximum NEGATIVE Temperature (Deg-F).

MODEL Procedure

Model Summary

Model Variables	1
Parameters	3
RANGE Variable	YEAR
Equations	1
Number of Statements	5

Model Variables: PRMXTYR

Parameters: MXTNLO GAMMA: -47.55(-971) THETA: 2.563(30)

Equations: PRMXTYR

Fit GEV Probability Model to Empirical CDF using NL-OLS Regression Methods.
Non-linear Estimation of 2-parameter T-Dist Model.: for Maximum NEGATIVE Temperature (Deg-F).

OBS	YEAR	_ESTYPE_	_TYPE_	_WEIGHT_	PRMXTYR	MXTYR
1	1972	OLS	ACTUAL	1	0.60191	-46.7838
2	1972	OLS	PREDICT	1	0.61646	-46.7838
3	1972	OLS	RESIDUAL	1	-0.01455	-46.7838
4	1973	OLS	ACTUAL	1	0.67834	-46.1979
5	1973	OLS	PREDICT	1	0.69932	-46.1979
6	1973	OLS	RESIDUAL	1	-0.02097	-46.1979
7	1974	OLS	ACTUAL	1	0.85669	-44.2291
8	1974	OLS	PREDICT	1	0.89834	-44.2291
9	1974	OLS	RESIDUAL	1	-0.04165	-44.2291
10	1975	OLS	ACTUAL	1	0.88217	-44.1979
11	1975	OLS	PREDICT	1	0.90040	-44.1979
12	1975	OLS	RESIDUAL	1	-0.01824	-44.1979
13	1976	OLS	ACTUAL	1	0.83121	-45.0885
14	1976	OLS	PREDICT	1	0.82830	-45.0885
15	1976	OLS	RESIDUAL	1	0.00291	-45.0885
16	1977	OLS	ACTUAL	1	0.09236	-50.6692
17	1977	OLS	PREDICT	1	0.11556	-50.6692
18	1977	OLS	RESIDUAL	1	-0.02320	-50.6692
19	1978	OLS	ACTUAL	1	0.95860	-42.7265
20	1978	OLS	PREDICT	1	0.96609	-42.7265
21	1978	OLS	RESIDUAL	1	-0.00749	-42.7265
22	1979	OLS	ACTUAL	1	0.78025	-45.1718
23	1979	OLS	PREDICT	1	0.82010	-45.1718
24	1979	OLS	RESIDUAL	1	-0.03985	-45.1718
25	1980	OLS	ACTUAL	1	0.01592	-53.8098
26	1980	OLS	PREDICT	1	0.00973	-53.8098
27	1980	OLS	RESIDUAL	1	0.00619	-53.8098
28	1981	OLS	ACTUAL	1	0.16879	-49.8671
29	1981	OLS	PREDICT	1	0.18577	-49.8671
30	1981	OLS	RESIDUAL	1	-0.01698	-49.8671
31	1982	OLS	ACTUAL	1	0.24522	-48.8385
32	1982	OLS	PREDICT	1	0.30888	-48.8385
33	1982	OLS	RESIDUAL	1	-0.06366	-48.8385
34	1983	OLS	ACTUAL	1	0.04140	-51.5051
35	1983	OLS	PREDICT	1	0.06559	-51.5051
36	1983	OLS	RESIDUAL	1	-0.02419	-51.5051
37	1984	OLS	ACTUAL	1	0.37261	-48.4765
38	1984	OLS	PREDICT	1	0.35969	-48.4765
39	1984	OLS	RESIDUAL	1	0.01292	-48.4765
40	1985	OLS	ACTUAL	1	0.70382	-46.1145
41	1985	OLS	PREDICT	1	0.71039	-46.1145
42	1985	OLS	RESIDUAL	1	-0.00657	-46.1145
43	1986	OLS	ACTUAL	1	0.14331	-50.1145
44	1986	OLS	PREDICT	1	0.16164	-50.1145
45	1986	OLS	RESIDUAL	1	-0.01833	-50.1145
46	1987	OLS	ACTUAL	1	0.98408	-41.5051
47	1987	OLS	PREDICT	1	0.98811	-41.5051
48	1987	OLS	RESIDUAL	1	-0.00403	-41.5051
49	1988	OLS	ACTUAL	1	0.75478	-45.4479
50	1988	OLS	PREDICT	1	0.79114	-45.4479
51	1988	OLS	RESIDUAL	1	-0.03637	-45.4479
52	1989	OLS	ACTUAL	1	0.80573	-45.1718
53	1989	OLS	PREDICT	1	0.82010	-45.1718
54	1989	OLS	RESIDUAL	1	-0.01437	-45.1718
55	1990	OLS	ACTUAL	1	0.90764	-43.7812
56	1990	OLS	PREDICT	1	0.92497	-43.7812
57	1990	OLS	RESIDUAL	1	-0.01732	-43.7812
58	1991	OLS	ACTUAL	1	0.29618	-48.7812
59	1991	OLS	PREDICT	1	0.31670	-48.7812
60	1991	OLS	RESIDUAL	1	-0.02053	-48.7812
61	1992	OLS	ACTUAL	1	0.57643	-47.1718
62	1992	OLS	PREDICT	1	0.55803	-47.1718
63	1992	OLS	RESIDUAL	1	0.01840	-47.1718

Fit GEV Probability Model to Empirical CDF using NL-OLS Regression Methods.
Non-linear Estimation of 2-parameter T-Dist Model.: for Maximum NEGATIVE Temperature (Deg-F).

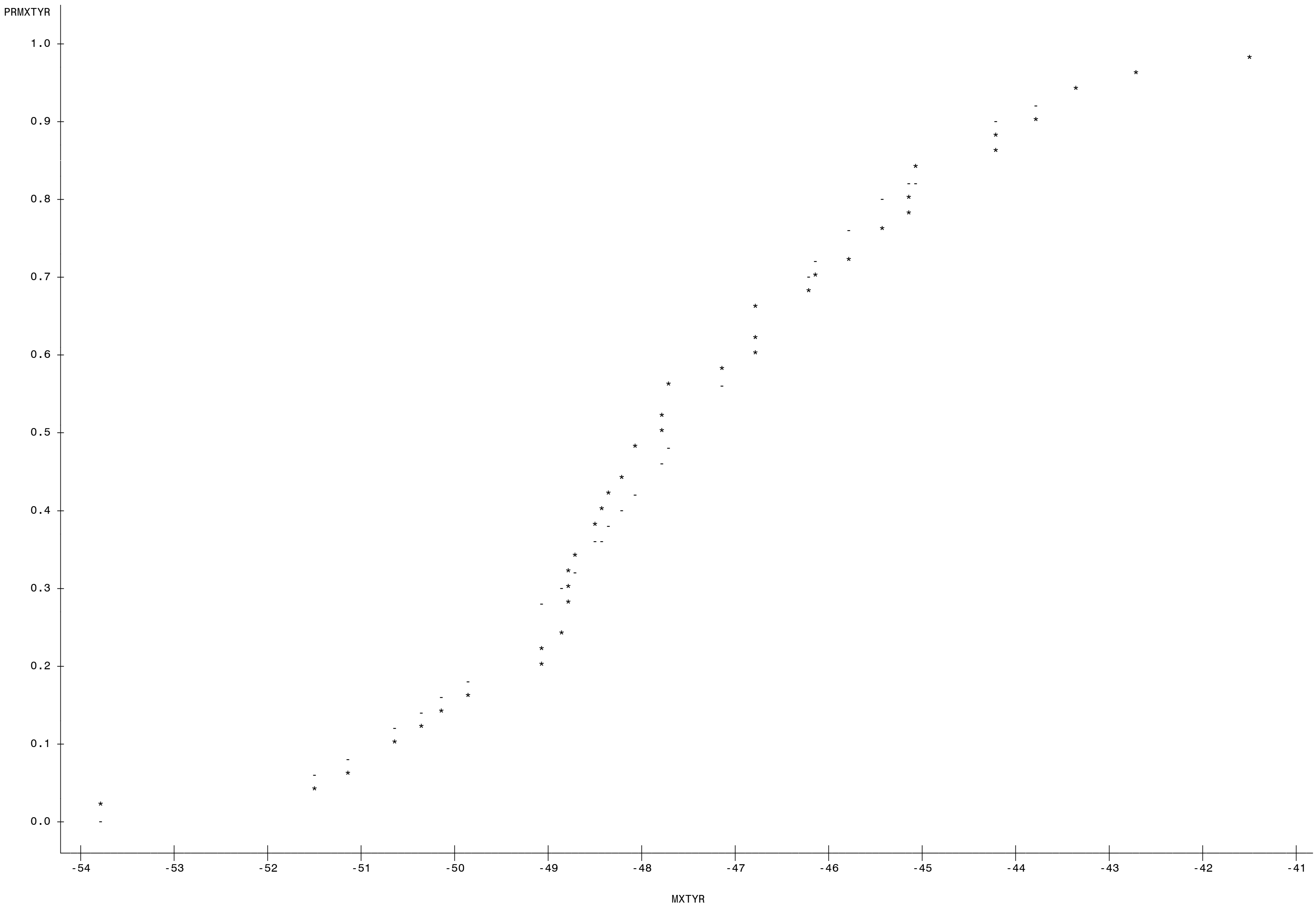
OBS	YEAR	_ESTYPE_	_TYPE_	_WEIGHT_	PRMXTYR	MXTYR
64	1993	OLS	ACTUAL	1	0.62739	-46.7812
65	1993	OLS	PREDICT	1	0.61684	-46.7812
66	1993	OLS	RESIDUAL	1	0.01055	-46.7812
67	1994	OLS	ACTUAL	1	0.47452	-48.0573
68	1994	OLS	PREDICT	1	0.42188	-48.0573
69	1994	OLS	RESIDUAL	1	0.05264	-48.0573
70	1995	OLS	ACTUAL	1	0.06688	-51.1718
71	1995	OLS	PREDICT	1	0.08292	-51.1718
72	1995	OLS	RESIDUAL	1	-0.01604	-51.1718
73	1996	OLS	ACTUAL	1	0.32166	-48.7812
74	1996	OLS	PREDICT	1	0.31670	-48.7812
75	1996	OLS	RESIDUAL	1	0.00495	-48.7812
76	1997	OLS	ACTUAL	1	0.19427	-49.0859
77	1997	OLS	PREDICT	1	0.27615	-49.0859
78	1997	OLS	RESIDUAL	1	-0.08188	-49.0859
79	1998	OLS	ACTUAL	1	0.65287	-46.7812
80	1998	OLS	PREDICT	1	0.61684	-46.7812
81	1998	OLS	RESIDUAL	1	0.03603	-46.7812
82	1999	OLS	ACTUAL	1	0.27070	-48.8098
83	1999	OLS	PREDICT	1	0.31278	-48.8098
84	1999	OLS	RESIDUAL	1	-0.04208	-48.8098
85	2000	OLS	ACTUAL	1	0.11783	-50.3620
86	2000	OLS	PREDICT	1	0.13973	-50.3620
87	2000	OLS	RESIDUAL	1	-0.02189	-50.3620
88	2001	OLS	ACTUAL	1	0.55096	-47.6953
89	2001	OLS	PREDICT	1	0.47732	-47.6953
90	2001	OLS	RESIDUAL	1	0.07363	-47.6953
91	2002	OLS	ACTUAL	1	0.72930	-45.7526
92	2002	OLS	PREDICT	1	0.75606	-45.7526
93	2002	OLS	RESIDUAL	1	-0.02676	-45.7526
94	2003	OLS	ACTUAL	1	0.21975	-49.0573
95	2003	OLS	PREDICT	1	0.27985	-49.0573
96	2003	OLS	RESIDUAL	1	-0.06010	-49.0573
97	2004	OLS	ACTUAL	1	0.52548	-47.7526
98	2004	OLS	PREDICT	1	0.46849	-47.7526
99	2004	OLS	RESIDUAL	1	0.05699	-47.7526
100	2005	OLS	ACTUAL	1	0.50000	-47.8098
101	2005	OLS	PREDICT	1	0.45968	-47.8098
102	2005	OLS	RESIDUAL	1	0.04032	-47.8098
103	2006	OLS	ACTUAL	1	0.42357	-48.3620
104	2006	OLS	PREDICT	1	0.37638	-48.3620
105	2006	OLS	RESIDUAL	1	0.04719	-48.3620
106	2007	OLS	ACTUAL	1	0.93312	-43.3620
107	2007	OLS	PREDICT	1	0.94456	-43.3620
108	2007	OLS	RESIDUAL	1	-0.01144	-43.3620
109	2008	OLS	ACTUAL	1	0.34713	-48.7239
110	2008	OLS	PREDICT	1	0.32461	-48.7239
111	2008	OLS	RESIDUAL	1	0.02252	-48.7239
112	2009	OLS	ACTUAL	1	0.39809	-48.4192
113	2009	OLS	PREDICT	1	0.36800	-48.4192
114	2009	OLS	RESIDUAL	1	0.03009	-48.4192
115	2010	OLS	ACTUAL	1	0.44904	-48.2004
116	2010	OLS	PREDICT	1	0.40032	-48.2004
117	2010	OLS	RESIDUAL	1	0.04872	-48.2004

Fit GEV Probability Model to Empirical CDF using NL-OLS Regression Methods.
Non-linear Estimation of 2-parameter T-Dist Model.: for Maximum NEGATIVE Temperature (Deg-F).

OBS	YEAR	MXTYR	PRMXTYR	PROBP
1	1972	-46.7838	0.60191	0.61646
2	1973	-46.1979	0.67834	0.69932
3	1974	-44.2291	0.85669	0.89834
4	1975	-44.1979	0.88217	0.90040
5	1976	-45.0885	0.83121	0.82830
6	1977	-50.6692	0.09236	0.11556
7	1978	-42.7265	0.95860	0.96609
8	1979	-45.1718	0.78025	0.82010
9	1980	-53.8098	0.01592	0.00973
10	1981	-49.8671	0.16879	0.18577
11	1982	-48.8385	0.24522	0.30888
12	1983	-51.5051	0.04140	0.06559
13	1984	-48.4765	0.37261	0.35969
14	1985	-46.1145	0.70382	0.71039
15	1986	-50.1145	0.14331	0.16164
16	1987	-41.5051	0.98408	0.98811
17	1988	-45.4479	0.75478	0.79114
18	1989	-45.1718	0.80573	0.82010
19	1990	-43.7812	0.90764	0.92497
20	1991	-48.7812	0.29618	0.31670
21	1992	-47.1718	0.57643	0.55803
22	1993	-46.7812	0.62739	0.61684
23	1994	-48.0573	0.47452	0.42188
24	1995	-51.1718	0.06688	0.08292
25	1996	-48.7812	0.32166	0.31670
26	1997	-49.0859	0.19427	0.27615
27	1998	-46.7812	0.65287	0.61684
28	1999	-48.8098	0.27070	0.31278
29	2000	-50.3620	0.11783	0.13973
30	2001	-47.6953	0.55096	0.47732
31	2002	-45.7526	0.72930	0.75606
32	2003	-49.0573	0.21975	0.27985
33	2004	-47.7526	0.52548	0.46849
34	2005	-47.8098	0.50000	0.45968
35	2006	-48.3620	0.42357	0.37638
36	2007	-43.3620	0.93312	0.94456
37	2008	-48.7239	0.34713	0.32461
38	2009	-48.4192	0.39809	0.36800
39	2010	-48.2004	0.44904	0.40032

Fit GEV Probability Model to Empirical CDF using NL-OLS Regression Methods.
Non-linear Estimation of 2-parameter T-Dist Model.: for Maximum NEGATIVE Temperature (Deg-F).

Plot of PRMXTYR*MXTYR. Symbol used is '*'.
Plot of PROBP*MXTYR. Symbol used is '-'.



NOTE: 13 obs hidden.

Fit GEV Probability Model to Empirical CDF using NL-OLS Regression Methods.
Non-linear Estimation of 2-parameter T-Dist Model.: for Maximum NEGATIVE Temperature (Deg-F).

OBS	_NAME_	_TYPE_	_NUSED_	GAMMA	THETA
1		OLS	39	-47.5485	2.56315
2	GAMMA	OLS	39	0.0024	0.00046
3	THETA	OLS	39	0.0005	0.00733

Data Analysis for Maximum/Minimum Daily SysAvg Temperatures (Un-Rounded).
Fit GEV Probability Model to Empirical CDF using NL-OLS Regression Methods.
Est'd CDFs and Logarithms of 'Empirical CDF rel. to Fitted CDF' values by Models.

OBS	YEAR	MXTYR	QUANTILE	PRMXTYR	PROBPO	LGPRRATO
1	1972	-46.7838	2	0.60191	0.61646	-0.02388
2	1973	-46.1979	3	0.67834	0.69932	-0.03045
3	1974	-44.2291	3	0.85669	0.89834	-0.04748
4	1975	-44.1979	3	0.88217	0.90040	-0.02046
5	1976	-45.0885	3	0.83121	0.82830	0.00350
6	1977	-50.6692	1	0.09236	0.11556	-0.22410
7	1978	-42.7265	3	0.95860	0.96609	-0.00779
8	1979	-45.1718	3	0.78025	0.82010	-0.04981
9	1980	-53.8098	1	0.01592	0.00973	0.49218
10	1981	-49.8671	1	0.16879	0.18577	-0.09587
11	1982	-48.8385	1	0.24522	0.30888	-0.23080
12	1983	-51.5051	1	0.04140	0.06559	-0.46015
13	1984	-48.4765	2	0.37261	0.35969	0.03529
14	1985	-46.1145	3	0.70382	0.71039	-0.00929
15	1986	-50.1145	1	0.14331	0.16164	-0.12034
16	1987	-41.5051	3	0.98408	0.98811	-0.00409
17	1988	-45.4479	3	0.75478	0.79114	-0.04706
18	1989	-45.1718	3	0.80573	0.82010	-0.01768
19	1990	-43.7812	3	0.90764	0.92497	-0.01891
20	1991	-48.7812	1	0.29618	0.31670	-0.06701
21	1992	-47.1718	2	0.57643	0.55803	0.03245
22	1993	-46.7812	2	0.62739	0.61684	0.01696
23	1994	-48.0573	2	0.47452	0.42188	0.11759
24	1995	-51.1718	1	0.06688	0.08292	-0.21499
25	1996	-48.7812	1	0.32166	0.31670	0.01552
26	1997	-49.0859	1	0.19427	0.27615	-0.35171
27	1998	-46.7812	2	0.65287	0.61684	0.05677
28	1999	-48.8098	1	0.27070	0.31278	-0.14450
29	2000	-50.3620	1	0.11783	0.13973	-0.17040
30	2001	-47.6953	2	0.55096	0.47732	0.14346
31	2002	-45.7526	3	0.72930	0.75606	-0.03604
32	2003	-49.0573	1	0.21975	0.27985	-0.24177
33	2004	-47.7526	2	0.52548	0.46849	0.11479
34	2005	-47.8098	2	0.50000	0.45968	0.08408
35	2006	-48.3620	2	0.42357	0.37638	0.11811
36	2007	-43.3620	3	0.93312	0.94456	-0.01219
37	2008	-48.7239	2	0.34713	0.32461	0.06708
38	2009	-48.4192	2	0.39809	0.36800	0.07859
39	2010	-48.2004	2	0.44904	0.40032	0.11485

Fit GEV Probability Model to Empirical CDF using NL-OLS Regression Methods.
Stats for Logarithms of 'Empirical CDF rel. to Fitted CDF' values by Models to calc. RMSE of Prop. Model Spec

Analysis Variable : LGPRRATO Log(PrMxTYr/ProbPO)- T-Dist

N	Mean	Std Dev	Minimum	Maximum	Variance	USS
39	-0.0296284	0.1572266	-0.4601535	0.4921843	0.0247202	0.9736032

Fit GEV Probability Model to Empirical CDF using NL-OLS Regression Methods.

Stats By Quantile for Logarithms of 'Empirical CDF rel. to Fitted CDF' values by Models to calc. RMSE of Prop. Model Spec

Analysis Variable : LGPRRATO Log(PrMxTYr/ProbPO)- T-Dist

QUANTILE=1

N	Mean	Std Dev	Minimum	Maximum	Variance	USS
13	-0.1395327	0.2256587	-0.4601535	0.4921843	0.0509218	0.8641641

QUANTILE=2

N	Mean	Std Dev	Minimum	Maximum	Variance	USS
13	0.0735498	0.0487563	-0.0238785	0.1434592	0.0023772	0.0988507

QUANTILE=3

N	Mean	Std Dev	Minimum	Maximum	Variance	USS
13	-0.0229024	0.0177241	-0.0498095	0.0035032	0.000314143	0.0105885

Fit GEV Probability Model to Empirical CDF using NL-OLS Regression Methods.
Stats By Quantile for Logarithms of 'Empirical CDF rel. to Fitted CDF' values by Models to calc. RMSE of Prop. Model Spec

Analysis Variable : LGPRRATO Log(PrMxTYr/ProbPO)- T-Dist

QUANTILE=1

N	Mean	Std Dev	Minimum	Maximum	Variance	USS
13	-0.1395327	0.2256587	-0.4601535	0.4921843	0.0509218	0.8641641

QUANTILE=2

N	Mean	Std Dev	Minimum	Maximum	Variance	USS
13	0.0735498	0.0487563	-0.0238785	0.1434592	0.0023772	0.0988507

QUANTILE=3

N	Mean	Std Dev	Minimum	Maximum	Variance	USS
13	-0.0229024	0.0177241	-0.0498095	0.0035032	0.000314143	0.0105885

EUForecaster User's Guide

I. Introduction

End Use Forecaster is a market-segmentation and modeling framework that forecasts the impacts of competitive strategies and market scenarios on sales, revenues, and market shares. **EUForecaster is used to prepare the demand forecasts for the residential, core commercial and industrial, and noncore commercial and industrial markets.**

The object of this chapter is to familiarize you with the overall End Use Forecaster modeling structure and to describe how the system relates to common business issues concerning demand forecasting and market assessment. This chapter also serves to explain how the various modules within End Use Forecaster relate to one another. Subsequent chapters define the contents and features of each individual module.

End Use Forecaster: An Overview

End Use Forecaster, formerly known as Quant.sim, is a market segmentation, competitive assessment, and sales projection application developed to respond to market needs and overcome the limitations of existing demand forecasting and market planning tools. The application, originally developed in 1993, is constructed using SAS software.

We have found that each utility's market structure and competitive environment is unique and that a major shortcoming of other tools has been an inability to accurately capture this diversity. End Use Forecaster's Market Segmentation module provides the ability to update the model to reflect new strategies without writing SAS programming code. Unique market conditions translate into an inherently flexible, dynamic modeling framework that can rapidly adapt to new market conditions.

This flexibility is afforded through a model development approach that separates specific market issues from theoretical modeling constructs:

- ***Logic and theory***, the portion of the system comprised of the programming code and data structures, is stored and managed in one location
- ***Market data***, which are unique for every company and strategy, are stored in a separate location

This structure makes market segmentation and analyses relatively easy tasks compared to adapting spreadsheet models or rewriting "black box" programming code. As an example, consider the "DSM planning" and "competitive assessment" market dimensions in the Table 1 below. The DSM dimensions show a standard end-use forecast model design for the utility industry, while the competitive assessment dimensions illustrate another way to set up End Use Forecaster to analyze new retail competition if retail choice is present in the jurisdiction.

Table 1. Alternative Market Segmentation Designs – Utility Industry Example

Market Dimension	DSM Planning	Competitive Assessment
Dimension 1	Market sector (residential, commercial, industrial, agricultural)	Risk of switching
Dimension 2	Customer type (dwelling, building, industry segments)	Customer value (to energy provider)
Dimension 3	End uses	Products and services
Dimension 4	Fuel types	Provider choices
Dimension 5	Efficiency levels	Product choices

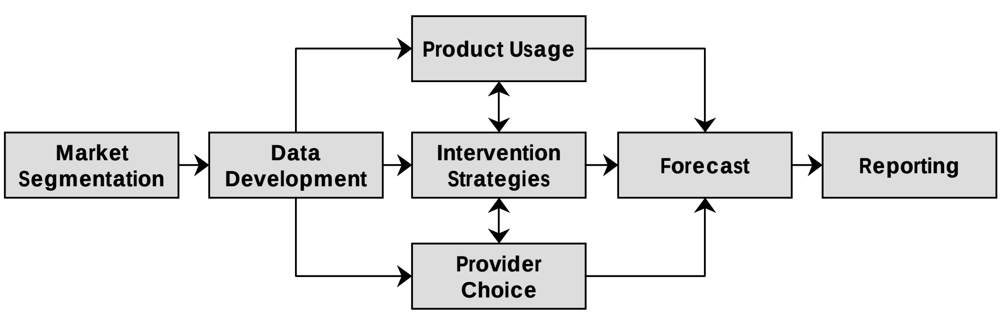
End Use Forecaster has other dimensions that capture factors affecting product demands. Perhaps the most important of these is End Use Forecaster's "vintaging" capability. Vintaging refers to product or service turnover that is a function of either physical lives or contract period. Accurate assessments of product turnover are crucial to obtaining accurate forecasts for any product where purchases are derived from a fraction of the population in the market at a moment of time. An example of vintaging would be accounting for energy-consuming equipment such as motors, boilers, water heaters, chillers, etc., where demand over a given time interval is the sum of demands from new customers plus those customers replacing existing equipment.

The effective use of the inherent multidimensionality of most business forecasting issues is a key strength of the End Use Forecaster framework. Critical dimensions of business issues (e.g., geography, customers, products, competitors, equipment lives, etc.) are included in every forecast, along with dimensions users can modify to resolve a variety of business issues. For example, forecasters may be interested in the price elasticity of demand, marketing staff may want to study market shares across various scenarios, and corporate finance may need the bottom line revenue forecast. All these (and more) are immediately available in every forecast due to the concentration of rich and flexible dimensionality.

Seven primary modules form the heart of the End Use Forecaster framework: Market Segmentation, Data Development, Product Usage, Provider Choice, Intervention Strategies, Forecasting, and Reporting. .

Figure 1 depicts the relationships between these modules. Each is summarized below and in the remaining chapters of this Reference Guide.

Figure 1. End Use Forecaster Modules and Structure



Interface Design

The user interface to the End Use Forecaster model is constructed using SAS/AF (Applications Facility). SAS/AF software provides dozens of predefined "classes" that enabled the development of End Use Forecaster. These classes include a wide selection of both visual and non-visual aspects. The visual classes, or widgets, define objects that are placed on the screen, including icons, push buttons, text boxes tables, etc. The non-visual classes use screen control language (SCL) that define the objects controlling End Use Forecaster behind the scenes. Figure 2 and Figure 3 show the first two screens users see after starting End Use Forecaster.

Figure 2. Welcome Screen

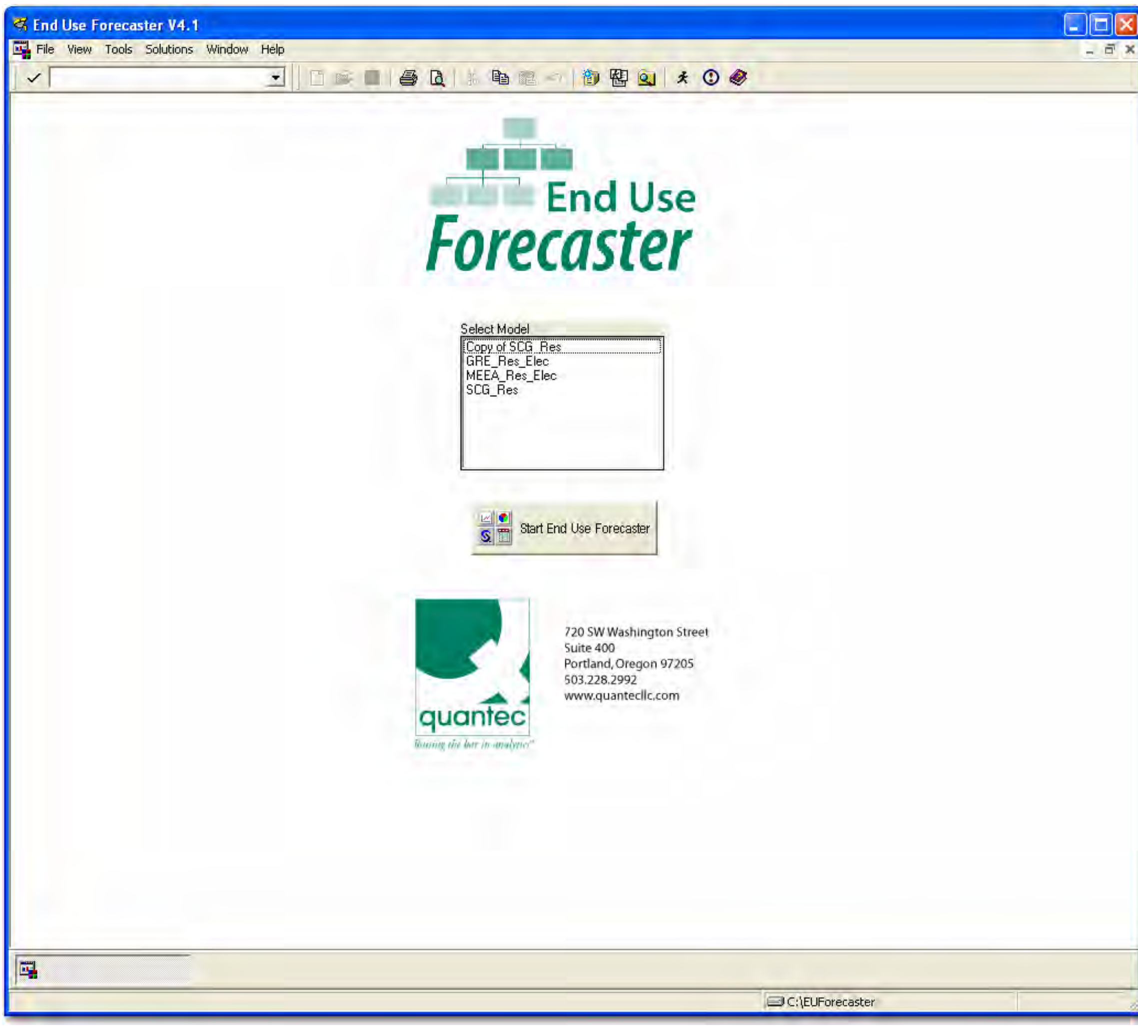
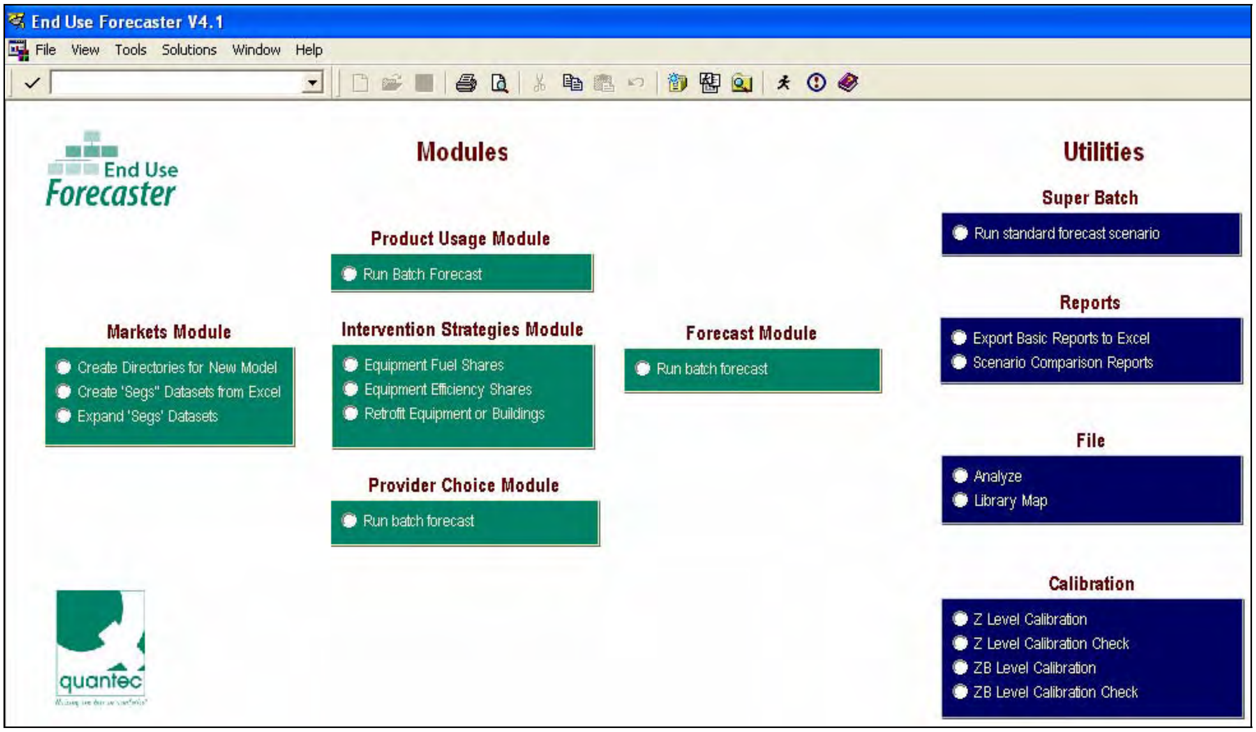


Figure 3. Main Dashboard



The interface is the only part of the End Use Forecaster framework that is compiled. All of the mathematical operations are in open SAS code, and End Use Forecaster's SAS/AF interface can also be edited and recompiled. This is a true "open architecture" design that allows users to modify and extend the End Use Forecaster framework.

In addition to End Use Forecaster's customized sets of tools, there is also a wide variety of data management, analysis, and reporting tools that are packaged with the SAS System.

Data Exchange

End Use Forecaster uses SAS/ACCESS software to provide direct and transparent access to various databases such as:

- DB2 Under UNIX and PC Hosts
- ORACLE
- SYBASE
- SQL/DS
- ODBC
- PC File Formats (Excel, Access)
- SYSTEM 2000 software

Since data access functions are separated from End Use Forecaster's logic, underlying data sources may change, but the model's capabilities will not be affected.

Market Segmentation

Market Segments

The primary goal of any market segmentation design in End Use Forecaster is to disaggregate the overall market into meaningful portions of customer types that behave similarly in terms of product demands and the set of choices they face. These disaggregations are arranged hierarchically, with Dimension 1 at the top of the "tree." Each Dimension 1 class can have one or more Dimension 2 classes, each Dimension 2 class can have one or more Dimension 3 classes, and so on.

Strategic Information Needs

A secondary goal of the market segmentation design is to designate groups of customers and products for which sufficient data are available to be fed into End Use Forecaster's forecasting framework. It may not be desirable to disaggregate the market into segments for which little or no data are available or where there is little distinction between two or more groups. Every new market segment requires additional disk storage space and more time to assemble the required End Use Forecaster data inputs. The objective should be to ***optimize*** the number of market segments: create enough market sectors to provide differentiation on answers to important questions but not so many that they become a burden to the overall process.

Data Development and Entry

Successful implementation of the End Use Forecaster model relies on highly integrated sets of information. Data entry is closely related to the market segmentation process, and both are addressed in this Reference Guide. Each set of input data uses different dimensions, so highly structured templates were designed to minimize redundancy and eliminate error at the same time.

End Use Forecaster uses market segmentation information and templates to set up all the required SAS datasets such that they are entirely consistent with the segmentation design.

Data Entry Formats

End Use Forecaster's datasets can be populated in several ways. The most common methods are:

- Exporting/importing data using SAS/ACCESS for PC file formats
- Programmatic data entry through simple SAS programs

As users gradually increase the number of distinct market segments from dozens to hundreds to thousands, it is anticipated that they will take advantage of SAS/ACCESS links to other company databases. Such links would allow for real-time forecast updates as database information is updated.

Product Usage Module: Modeling Equipment Consumption

End Use Forecaster tracks consumption of resources (such as natural gas, electricity, water, minutes of telephone or Internet use, gasoline, etc.) through the Product Usage module. This module is only used when there are secondary, derived demands from customers' product choices. For example, a utility would be interested in the use of energy from appliances to generate natural gas or electricity forecasts, but other types of manufacturers may not need this information to develop sales forecasts. If certain parts of the model are not needed in a given application, you may assign default values (usually a 0 or 1) that essentially turn off that portion of the model.

Product usage can vary with a variety of factors such as weather, non-weather seasonal factors, customer characteristics, prices, and other product attributes. Several modeling techniques explain and predict product usage, including scalars (exogenous estimates), econometric functions, and other statistical models.

Regardless of the approach taken, the Product Usage module provides a forecast of the predicted consumption by combining (1) a forecast of consumption factors or drivers (i.e., independent or exogenous variables) and (2) a set of coefficients associated with each exogenous variable.

Provider Choice Module: Modeling Customer Service and Purchase Decisions

Types of Choices: The Provider Choice module analyzes customer choice decisions among competitors and product options. For example, a commercial building operator chooses between fuel (provider) types for HVAC systems, and then from various equipment efficiency levels (product options) within the fuel type. Purchase decisions are represented by a nested structure of provider and product option choices.

Modes of Choice Modeling

The Provider Choice module is designed for two types of modeling: (1) the estimation of choice parameters, and (2) the forecast of market shares given these choice parameters. More specifically, the Provider Choice Module:[1]

- ***Simulates parameter estimates*** relating to customer choice in markets where micro-(customer) level information is not available, but aggregate cost and market share figures are known, or
- ***Uses parameter estimates*** from the application of logistic regression, or other models of customer choice, to micro-level customer data.

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1 The Provider Choice Module can be bypassed in some applications such as DSM potential analysis. In this type of framework, the base line fuel and efficiency shares are held constant and are determined outside the model. The Intervention Strategies Module is then used to view alternate market shares associated with, for example, technical and achievable DSM potential.

If primary market research is used to develop the micro data necessary for parameter estimates, the Provider Choice module essentially transforms a “static” market research report into a dynamic what-if analysis structure. This can significantly extend the usefulness and life of company market research resources.

After model parameters are simulated or input into the Provider Choice Module, it then forecasts the market share associated with each product and service alternative over the planning horizon.

Average versus Marginal Shares

The comparison of average versus marginal shares and associated trends is a key result of incorporating dynamic choice functions in the End Use Forecaster forecasting framework.

For example, the infusion of new energy consumption technologies (such as condensing furnaces) may be reaching 35% of new construction buildings, but if new construction in a given year only represents 2% of the total market, then the total impact on the market is merely 0.7%. As these rates of change accelerate and decelerate through the future, and as simulated what-if scenarios impact these forecasts of consumer choice, markedly different forecasts are possible over the longer term, while at the same time maintaining a realistic short-term profile.

Intervention Strategies Module: Analyzing Marketing Scenarios and DSM Potential

The Intervention Strategies module – a generic term to apply to activities typically associated with demand-side management (DSM) – is intended to capture the impacts of marketing, energy efficiency potential, and other programs designed to influence customer behavior. This module makes available a series of program designs that simulate the “what-if” impacts on the market shares, usage, and the resulting demand forecast. Three general types of program designs are available:

- ***Provider (fuel) substitution scenarios***. These scenarios modify the forecasted choices or market shares among provider (fuel) sources. Separate sets of assumptions apply to existing buildings and new construction buildings, permitting different types of programs to be designed.
- ***Product option (equipment efficiency) scenarios***. These scenarios modify efficiency or product option shares. For example, an efficiency program usually favors the highest available efficiency level for each market sector. These impacts affect choices at the point of new construction or replacement of existing end uses, and different assumptions can apply to each market. A technical potential scenario normally assigns a 100% share to the most efficient option. An achievable potential scenario assigns less than a 100% share to the most efficient option, with the level determined by experience with similar program designs or market research.
- ***Usage retrofit program scenarios***. These programs encourage consumers to change their product usage given the equipment they already have (e.g., improve the efficiency of existing equipment by installing efficiency measures or through better O&M procedures).

Examples include measures to tighten residential and commercial building envelopes, industrial process changes, and pipe and duct insulation.

Intervention strategies are incorporated directly into the relevant Product Usage or Provider Choice forecasts.

Forecast Module: Putting It All Together

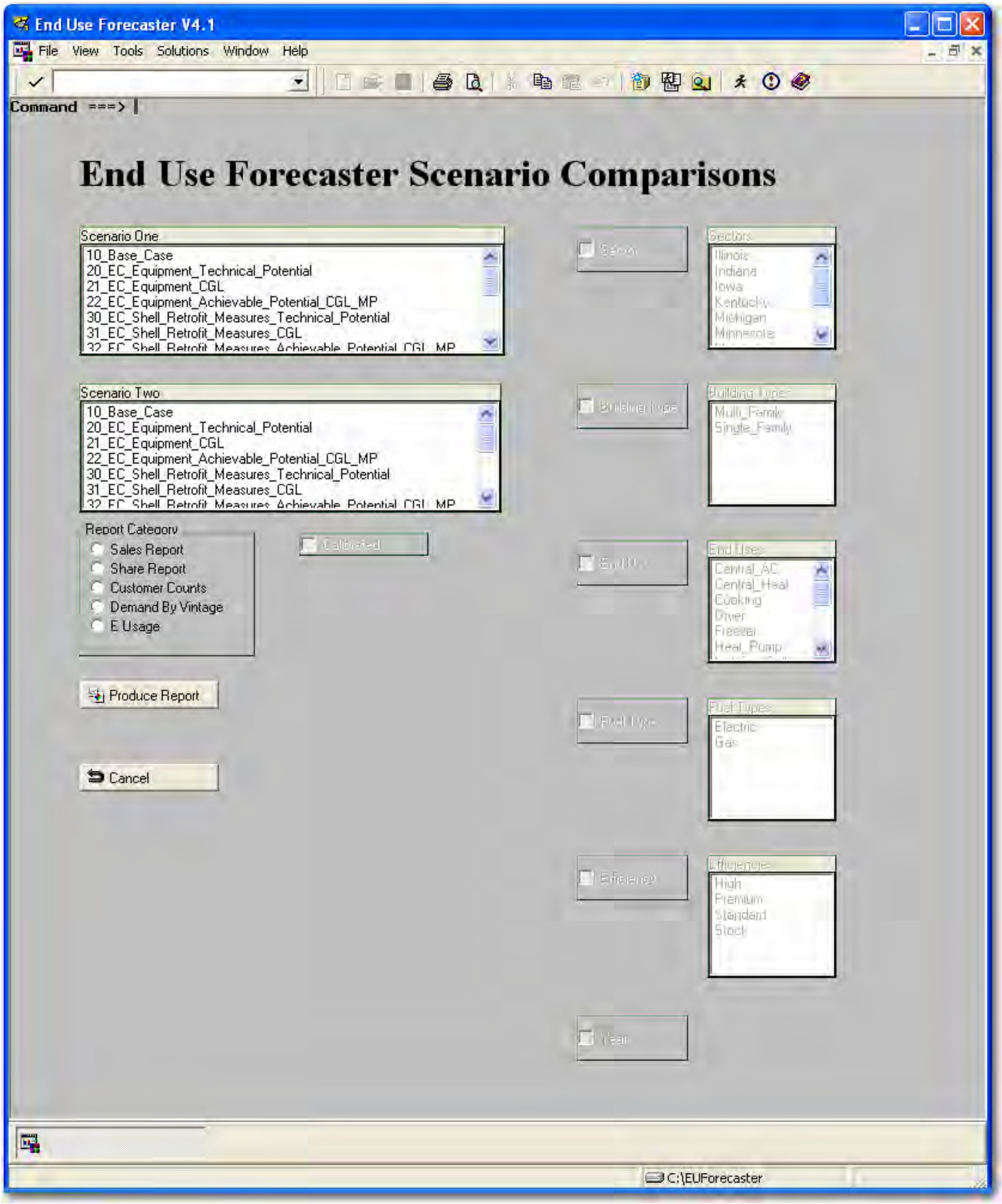
The Forecast Module incorporates all the information compiled from the other modules – Usage, Choice, and Intervention Strategies – related to the overall economic growth of the market segment and equipment lifetime (decay) functions to create the final forecast for a given scenario.

This module produces sales and market share reports that provide quick access to all forecast details. The reports produce forecast outputs in a “flat” matrix format, providing the ability to review the data for reasonability before pronouncing the forecast final.

Reporting: Getting the Projections Out to Decision-Makers

End Use Forecaster also produces reports that can be customized based upon the user’s choice of segmentation combinations to analyze. These reports summarize and/or compare forecasts for two forecast scenarios specified by the user in the Scenario Comparison interface, as shown in Figure 4.

Figure 4. Report Customization



The user specifies the Report Category (sales, market share, customer counts or demand by vintage) and, based on the category selected, the user is given the option of selecting different combinations of segments to summarize and/or compare. Additionally, the user is given the option of summarizing the forecast data across all years within the forecast horizon or generating results on a year-by-year basis.

II. Application Structure

A solid understanding of how End Use Forecaster is organized will help users to understand the logic of the model and greatly improve the efficiency with which they use the application. The latest revisions to End Use Forecaster focused almost exclusively on consolidating libraries and datasets to make the model easier to use; the model's logic, repeatedly validated over its history, was left intact. Underlying the updates was an emphasis on consistency in the naming and organization of datasets and variables so as to maximize the intuitiveness of the model. This Chapter describes the model's organization with the intent of helping the user be a more effective modeler.

Hardware and Software

End Use Forecaster is a Windows application developed in PC-SAS. The code and datasets can easily be migrated to other platforms (UNIX, etc.), should the user desire, but the interfaces will not provide the same functionality on other systems. If a user desires a non-PC hardware/software solution, The Cadmus Group, formerly known as Quantec, will work with the SAS Institute to ensure compatibility and develop a customized solution.

Hardware

The minimum recommended hardware configuration slightly exceeds SAS Institute requirements to ensure that forecast simulations can be performed in a timely manner. The vast majority of PCs purchased since 2000 exceed these recommendations:

- Pentium 866 MHZ CPU
- 512 MB RAM
- SVGA compatible color monitor
- 10 GB hard disk drive of free space
- CD-ROM drive (for installation purposed only)

End Use Forecaster's performance (i.e., speed) increases significantly if the system is equipped with more advanced processors (e.g., Pentium III or better), additional RAM (1 GB RAM or more), and additional disk space (for storage).

Software

End Use Forecaster is designed for the Microsoft Windows operating system (compatible with Windows 95 and 98, Windows NT Workstation 4.0, Windows XP, and Windows 2000 Professional). It is currently configured for SAS version 9.1 and version 8.2. Seven SAS software products are required:

- Base SAS

- Full Screen Product (SAS/FSP)
- Econometrics and Time Series (SAS/ETS)
- Statistics (SAS/STAT)
- High-Resolution Graphics (SAS/GRAPH)
- Interactive Data Analysis (SAS/INSIGHT)
- Direct Database Access (SAS/ACCESS)

An additional module, Applications Facility (SAS/AF), is used in developing End Use Forecaster's graphical user interface. These modules are based on a special SAS code subset called SAS Control Language (SCL). This portion of End Use Forecaster is stored (compiled) within the model and does not require user modification.

If any of the required SAS products are missing from the site license, the software can be added for little additional cost. For organizations that do not yet have SAS, The Cadmus Group (Quantec) will be happy to work with the SAS Institute to ensure that you obtain a solution that will allow End Use Forecaster to run smoothly and cost effectively.

Installation of End Use Forecaster is site-specific because it is dependent on the location of SAS on your PCs. However, there is minimal customization. For each user we only need to modify two files in the End Use Forecaster\Config directory: autoexec.sas and EUForecaster.cfg. These files 'point' End Use Forecaster to your SAS installation and take advantage of the hard drive on your computer with the most disk space. These customized files are developed during installation, consistent with the installation of SAS on individual workstations.

Conventions

The majority of the nomenclature in this documentation comes directly from the SAS application in which End Use Forecaster was developed. The various components of SAS and the conventions used in referring to them throughout the documentation are:

- ***SAS libraries***, the logical names that refer to the physical locations where SAS datasets are stored, are referred to using all uppercase letters (CONFIG, MODELCODE, etc.).
- ***SAS code***, which contain the routines for End Use Forecaster's modules, are referred to in normal text using the 'camelBack' syntax with the .sas suffix appended, such as choiceBatch.sas.
- ***SAS datasets*** are referred to using bold-face type using the 'camelBack' syntax, such as **equipmentAge_10**.
- ***SAS variables*** are referred to in italic type using the 'camelBack' syntax, such as *usageEquationStatus*.

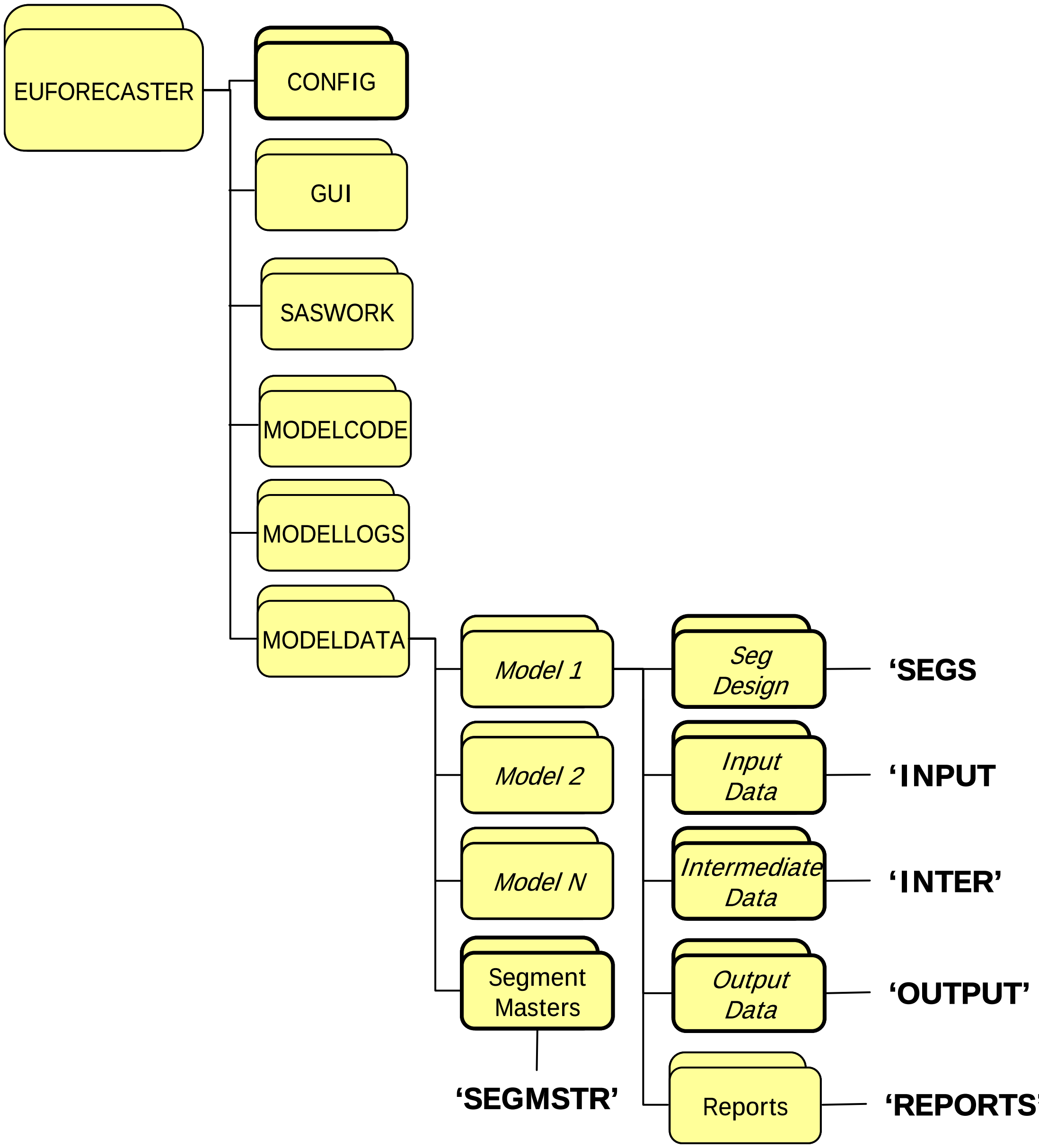
End Use Forecaster's modules run user-specified scenarios. To differentiate among these scenarios, scenario-specific datasets have a numeric suffix, such as **priceForecast_10**. In general cases, where the documentation does not refer to a specific scenario, datasets are referred to with an **"_xx"** suffix, such as **saturations_xx**.

Model Organization

The logic and theory underlying End Use Forecaster are separated from the data, which vary by individual segmentation design (model). This differentiation drives the structural organization of the model as well, and these two components are stored in different physical locations. The initial organization takes place in the underlying Windows folder structure, which serves as the basis for the SAS libraries that hold both the datasets and catalogs that dictate the model logic and data structure, as well as those datasets specific to individual segmentation designs.

As shown in Figure 5, the folder hierarchy begins with the folder 'EUFORECASTER.' With the exception of the SAS application itself, the entire model – all code, interfaces, and datasets – resides within this folder. Folders with bold outlines represent the physical locations of SAS libraries, the names of which are designated in single quotes. The folders with names in italics – note that they are all within the data folder – represent those libraries that will vary by individual model. The 'MODELDATA' folder will contain individual folders for every model created by a user. Each of these individual model folders will also contain the same set of subfolders as those shown within 'Model 1.' Because these folder serve as SAS libraries, the group of folders that will serve as 'Segs,' 'Input,' etc., will depend on which model the operator happens to be working with in a given session. The data for individual models will not be available at the same time.

Figure 5. End Use Forecaster Folder Structure



This organization can have implications for the user. For example, if a user has a data source that applies to more than one model, the 'MODELCODE' library can serve as a good place to store the raw data to avoid keeping copies in each of the model-specific libraries. Detailed descriptions of these folders and their contents are provided in Table 2.

Table 2. End Use Forecaster Folders

Folder	Full Path	SAS Library	Description
EUFORECASTER	EUFORECASTER	N/A	Root application folder.
GUI	EUFORECASTER\ GUI	App	Folder containing all the underlying application catalogs and GUIs.
MODELLOGS	EUFORECASTER\ MODELLOGS	N/A	Directory where logs of model operations are stored.
MODELCODE	EUFORECASTER\ MODELCODE	N/A	Contains all the SAS code underlying the different End Use Forecaster modules.
CONFIG	EUFORECASTER\ CONFIG	N/A	Contains SAS configuration files in which site-specific modifications are established.
MODELDATA	EUFORECASTER\ MODELDATA	N/A	Contains data for all of the user-created segmentation designs.
"Model_Name"	EUFORECASTER\ MODELDATA \ "Model_Name"	N/A	A folder with all data for a model based on a user-defined name.
SegDesign	EUFORECASTER\ MODELDATA \ "Model_Name" \ segDesign	SEGS	For each model, contains the SAS datasets that establish the specific segmentation design.
InputData	EUFORECASTER \MODELDATA\ "Model_Name"\ inputData	INPUT	For each model, contains all of the user-populated datasets that are necessary to run the different modules.
IntermediateData	EUFORECASTER\ MODELDATA \ "Model_Name"\ intermediateData	INTER	For each model, contains all of the intermediate, model-generated outputs from the usage and choice modules that are necessary to run other modules.
OutputData	EUFORECASTER\ MODELDATA \ "Model_Name"\ outputData	OUTPUT	For each model, contains the various final output sets generated by the forecast module.
Reports	EUFORECASTER\ MODELDATA \ "Model_Name"\ Reports	N/A	Contains the reports and excel files created by End Use Forecaster's Reporting Engine.
SegmentMasters	EUFORECASTER\ MODELDATA \ segmentMasters	SEGMSTR	Contains datasets with all of the necessary variables and structure for every model dataset. A SAS program combines these datasets with a specific segmentation design to generate all the datasets (unpopulated) necessary for a given model.

III. Market Segmentation and Data Entry Modules

End Use Forecaster's Market Segmentation module governs two distinct tasks: 1) the development of customized market segmentation designs; and 2) the population of the model with the necessary data. While the first consists of formal, specific steps, the nature of the second depends on a number of factors, including the complexity of the segmentation design, the format of the various data sources, as even as the technical skills of the operator. This chapter provides extensive detail on the first followed by a brief discussion of issues surrounding the second.

Development of Market Segmentation Design

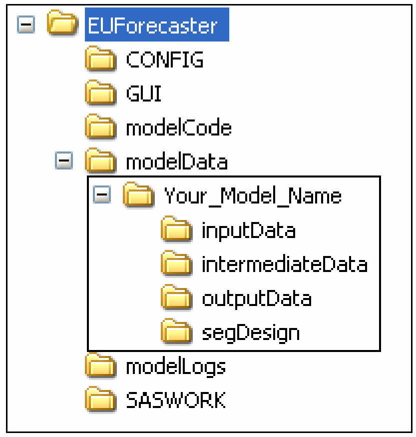
The execution of the first task – creation of a customized market segmentation design – is based on four steps, listed briefly below and then described in greater detail.

1) ***Creation of Model Data Folders*** – Creation of a specific directory structure for each model is necessary to perform subsequent steps.
2) ***Population of the Excel workbook*** **Seg_Design_Template.xls** – A step to define the various segments and their relationship with one another.
3) ***Creation of the Segs Library Datasets*** – This takes the Excel workbook and populates the "segs" library with the necessary segmentation design data sets.
4) ***Expansion of the Segmentation Design*** – This takes the segmentation design data sets in the "segs" library and merges them with the data set templates in the "segmstr" library, expanding them to create all the necessary – but still unpopulated! – data sets to run the basecase ("10") scenario in End Use Forecaster.

Creation of Model Data Folders

A prerequisite to setting up a new model is the creation of the necessary folders to contain the model-specific segmentation design and data. This means that within the c:\EUForecaster\modelData directory, you must have a folder with your model's name and within that folder you must have four folders called "inputData," "intermediateData," "outputData," and "segDesign," as shown in the interior boxed portion of Figure 6 below.

Figure 6. Data Folder Structure



There are multiple ways to create these folders. First, the user can manually create them in Windows Explorer. Alternately, one can copy the folder for an existing model and rename the root data folder to the preferred name, in which case subsequent steps will overwrite the existing datasets for the from model that was copied. Finally, the interface has an option in the Markets Module called "Create Directories for New Model." Selection of this option will prompt the user to enter the name for the new model and End Use Forecaster will create the desired folders.

Population of Seg_Design_Template.xls

The file ***Seg_Design_Template.xls***, a read-only file located in the root directory for End Use Forecaster (generally C:\EUForecaster) is the starting point for creating a custom segmentation design. It is here where you define the levels for the five primary dimensions that must exist in every segmentation design. While the experienced user will be very familiar with these dimensions, they deserve detailed discussion here. Starting at the top of the hierarchy, Dimensions 1 through 3 identify unique market segments. Dimensions 4 and 5 refer to the available product/service suppliers competing in the marketplace and product/service options, respectively. Although the actual use of these dimensions can vary, in and energy model the general use is as follows:

- Dimension 1: geographic region or sector
- Dimension 2: customer segment (home type, business type, or SIC)
- Dimension 3: end use
- Dimension 4: fuel type
- Dimension 5: efficiency level

In all designs, the first three dimensions define the basic market segmentation structure.

Dimension 1 always refers to geography, customer size, customer behavior, customer class, and/or any other features that separate groups of customers. Note that all of the aforementioned factors can be used within Dimension 1 (e.g., north-residential, north-commercial, south-residential, south-commercial, etc.).

Dimension 2 is reserved for factors that affect a particular group of customers in a similar manner, such as an exogenous rate of economic growth, building lives, or contract lives. In an end-use model, for example, this dimension might include various types of residential (single family, duplexes, multifamily, etc.) and commercial (office buildings, restaurants, hospitals, etc.) customers.

Dimension 3 refers to the products and services being marketed to each customer type, such as heating, cooling, or water heating. In a telecom model, this dimension would refer to basic service, Internet service, custom calling features, etc. As with the second dimension, each third dimension level has an associated physical or contract life. In an end-use energy model, each equipment type has a life span.

Dimensions 4 and 5 describe the product/competitive options within the major market categories that are defined by Dimensions 1 – 3. In an end-use model, fuel types are typically represented as Dimension 4 and various efficiency levels are represented by Dimension 5. In a competitive energy market, the fifth dimension could be used to represent various levels of retail services such as power quality or equipment maintenance offered by a provider.

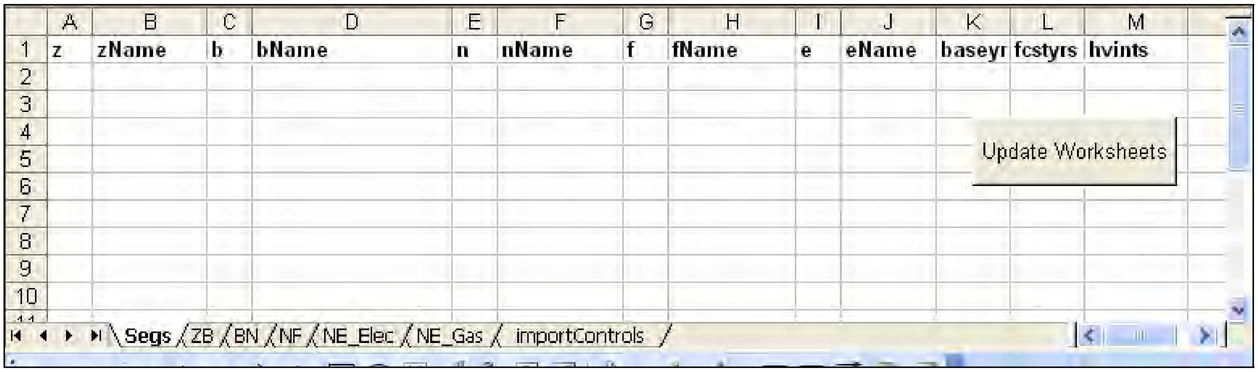
Table 3 summarizes the intended use of each of these dimensions. Note that while the model must include all five dimension, you are not required to use all of them. For example, suppose you want a design with alternative providers at Dimension 4 and do not wish to complicate the model with product/service options. In this case, you would assign only one alternative to Dimension 5, which effectively eliminates this dimension from the analysis. You could assign the same name to the single Dimension 5 alternative as that of the Dimension 4 to signify that in the design, this dimension has essentially been eliminated.

Table 3. End Use Forecaster Dimension Use Summary

Dimension	End Use Forecaster Dimension Name	End Use Forecaster Descriptive Name	End Use Forecaster Function	Special Features	No. Segment Levels in End Use Forecaster
One	z	zName	Factors that separate groups of customers		999
Two	b	bName	Additional factors that separate groups of customers	Building or contract life can be used to allow existing customers to decay over time	999
Three	n	nName	Equipment, products, services potentially purchased by Dimensions 1 – 2	Equipment or contract life can be used to allow existing equipment to decay over time	999
Four	f	fName	Providers of Dimension 3	Provider Choice module forecasts market shares	4
Five	e	eName	Service Options within Dimension 4	Provider Choice module forecasts product option shares	4

Open ***Seg_Design_Template.xls***. Excel will prompt you to either enable or disable macros and ***you will want to enable the macros***. Of the workbooks seven tabs, the first of interest is called "Segs," which is used for the definition of the different dimensions (z, b, n, f, and e) as well as the base year and years in the forecast horizon. That sheet should look like the image below, with no values for any of the dimensions:

Figure 7. Empty "Segs" Tab in Seg_Design_Template.xls



On this tab, first establish the base year of the forecast, the number of forecast years, and the number of historical vintages in columns K, L, and M below the headers baseyr, fcstyrs, and hvints, respectively. Next, the recommended first step is to fill in the columns for zName, bName, nName, fName, and eName with whatever zones, segments, end uses, fuels, and efficiency levels (or however you want to define the dimensions) that you want to include in the segmentation design. Once you have filled in the desired descriptive names, they then need to have their corresponding model values. ***These format for these is critical***. For z, b, and n the format is three-character numeric values. That is, they are a numeric values from 1 to 999 with leading zeros for all values below 100. In Excel, it is necessary to type an apostrophe (" ' ") prior to entering the value or else Excel will convert the cell to a numeric value and you will lose the leading zeros. For f and e, these are one-character numeric values. That is, they will have value of 1, 2, 3, or 4, but they must be in a character format. Again, a leading apostrophe will tell Excel to make these character. Figure 8 shows a fully populated "Segs" tab.

> A Note on Naming Conventions – It is best to restrict the names of the different levels in each dimension used in the segmentation design to valid SAS variable names. According to SAS documentation, these names "can be up to 32 characters long. The first character must be a letter (A, B, C, . . . , Z) or underscore (_). Other characters can be letters, numbers (0, 1, . . . , 9), or underscores. Blanks cannot appear in SAS names, and special characters (for example, $, @, #), except underscores, are not allowed." While it is not an explicit requirement, using these names will greatly facilitate the process of model population because it will allow for the import and manipulation of data using names that need no modification to be applied directly to the model.

Figure 8. Example of Populated "Segs" Tab in Seg_Design_Template.xls

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	z	zName	b	bName	n	nName	f	fName	e	eName	baseyr	fcstyrs	hvints
2	001	Residential	001	Single_Family	001	Space_Heat	1	Natural_Gas	1	Stock	2003	22	3
3			002	MF2_2_TO_4_Un	002	Water_Heat	2	Electric	2	Standard			
4			003	MF3_GE_5_Units	003	Cooking			3	High			
5			004	MM_Master_Mete	004	Drying			4	Premium			
6			005	SM_Sub_Meter	005	Pool							
7					006	Spa							
8					007	Fireplace							
9					008	Barbecue							
10					009	Other							
11													
12													

Update Worksheets

Segs / ZB / BN / NF / NE_Elec / NE_Gas / importControls

Once you have completed the "Segs" tab, selecting the Update Worksheets button will then populate the tabs "ZB," "BN," "NF," "NE_Elec," and "NE_Gas" with the desired segments in the correct format for the user to then fill out. For example, Figure 9 shows the "BN" tab as it will appear after activation of the Update Worksheets button.

Figure 9. Example of Unpopulated "BN" Tab in Seg_Design_Template.xls

Seg_Design_Template.xls [Read-Only]

	A	B	C	D	E	F
1	nName	Single_Family	MF2_2_TO_4_Units	MF3_GE_5_Units	MM_Master_Meter	SM_Sub_Meter
2	Space_Heat					
3	Water_Heat					
4	Cooking					
5	Drying					
6	Pool					
7	Spa					
8	Fireplace					
9	Barbecue					
10	Other					
11						

Segs / ZB / BN / NF / NE_Elec / NE_Gas / importControls

Again, the segmentation is hierarchical. The purpose of the newly-populated tabs ("ZB," "BN," "NF," "NE_Elec," and "NE_Gas") is to allow the specification of which dimensions belong together – starting at the top of the hierarchy and moving down – in the segmentation design. For example, with the ZB tab, the purpose might be to define which building belong in each geographic area. The key here is that the design need not be symmetrical. You might have Z represent two geographic areas, one extremely urban that would not have manufactured housing and rural that would need this home type.

The population of these tabs is based on filling the relevant cells with "TRUE" or "FALSE," with the former indicating where the dimensional relationship should exist in the segmentation design. The relationships defined in these tabs is as follows:

- **ZB** – Define which levels of the second (b) dimension belong in each level of the first (z) dimension.
- **BN** – Define which levels of the third (n) dimension belong in each level of the second (b) dimension.
- **NF** – Define which levels of the fourth (f) dimension belong in each level of the third (n) dimension.
- **NE_Elec** – Define which levels of the fifth (e) dimension belong in each level of the third (n) dimension for the electric fuel type.
- **NE_Gas** – Define which levels of the fifth (e) dimension belong in each level of the third (n) dimension for the gas fuel type.

Figure 10 presents a fully-populated "NE_Elec" tab. Note the pattern of "TRUE" and "FALSE" indicating which of the efficiency levels apply to the different end uses.

Figure 10. Example of Populated "NE_Elec" Tab in Seg_Design_Template.xls

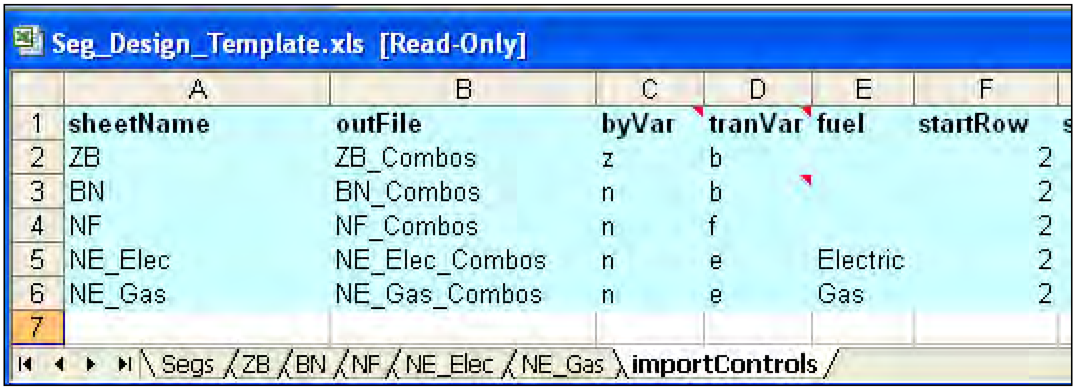
	A	B	C	D	E
1	nName	Stock	Standard	High	Premium
2	Space_Heat	TRUE	FALSE	FALSE	FALSE
3	Water_Heat	TRUE	TRUE	TRUE	TRUE
4	Cooking	TRUE	TRUE	FALSE	FALSE
5	Drying	TRUE	TRUE	FALSE	FALSE
6	Pool	TRUE	FALSE	FALSE	FALSE
7	Spa	TRUE	FALSE	FALSE	FALSE
8	Fireplace	TRUE	FALSE	FALSE	FALSE
9	Barbecue	TRUE	FALSE	FALSE	FALSE
10	Other	TRUE	FALSE	FALSE	FALSE
11					

Note that in filling in all of these sheets, make every effort to keep the data "clean." That is, there can be no data in adjoining rows or columns that is extraneous to the segmentation design. If there has been any work done in cells, it might be best to delete all the rows to the right of the last relevant column and all the rows below the last relevant row.

Finally, the last tab - importControls – tells SAS in the next step how to bring in the data contained on various tabs in the segmentation design workbook. Other than two cells, this entire workbook will populated itself dynamically based on the other tabs. Those two cells are E5 and

E6 – shown in Figure 11 with the values “Electric” and “Gas,” respectively – and the values the contain must be identical to whatever you have specified on the original “Segs” tab. That is, if you’ve called your fuels “Electricity” and “Natural Gas,” the values in those cells must be identical.

Figure 11. A portion of the importControls Tab in Seg_Design_Template.xls


Seg_Design_Template.xls [Read-Only]

	A	B	C	D	E	F
1	sheetName	outFile	byVar	tranVar	fuel	startRow
2	ZB	ZB_Combos	z	b		2
3	BN	BN_Combos	n	b		2
4	NF	NF_Combos	n	f		2
5	NE_Elec	NE_Elec_Combos	n	e	Electric	2
6	NE_Gas	NE_Gas_Combos	n	e	Gas	2
7						

Segs / ZB / BN / NF / NE_Elec / NE_Gas / importControls

Once you are done populating Seg_Design_Template.xls, you will have to save the workbook with a very specific name in the data folder for the model under creation (C:\EUForecaster\modelData*yourModelname*). That name must be whatever your model name is with “_Segments” appended at the end. For example, if you’ve created the a model for small commercial customers for a utililty’s end-use model, you might call the model “Small_Com.” Accordingly, you’d save the workbook as “Small_Com_Segments.xls.” Again, the file is read-only, so it will prompt you to save it under another name should you try to save it normally.

Creation of the Segs Library Datasets

After completing the Seg_Design_Template.xls and workbook and saving it under another name, the next step is convert this information into the various Segs library datasets. To do this, under the Market Module on the main dashboard, select the “Create ‘Segs’ Datasets from Excel” option. The interface will prompt you to say ‘OK’ or to cancel. If you are confident in your segmentation design, select ‘OK.” To check that this code has run correctly, you should see the all of the segmentation design datasets in the “Segs” library, as shown in Figure 12, and they should all have a modified date reflecting the time when the code was submitted.

Figure 12. Contents of Segs Library

Contents of 'Segs'

Name	Size	Type	D.	Modified
B_dim	5.0KB (2 Cols X 14 Rows…	Table		10Jan06:10:19:30
E_dim	5.0KB (2 Cols X 4 Rows) …	Table		10Jan06:10:19:32
F_dim	5.0KB (2 Cols X 2 Rows) …	Table		10Jan06:10:19:32
Initparm	5.0KB (2 Cols X 1 Rows) …	Table		10Jan06:10:19:28
N_dim	5.0KB (2 Cols X 11 Rows…	Table		10Jan06:10:19:31
Z	5.0KB (3 Cols X 1 Rows) …	Table		10Jan06:10:19:40
Zb	5.0KB (6 Cols X 14 Rows…	Table		13Jan06:10:43:41
Zbn	9.0KB (8 Cols X 87 Rows…	Table		13Jan06:10:43:41
Zbnf	17.0KB (10 Cols X 160 R…	Table		11Jan06:16:49:08
Zbnfe	33.0KB (11 Cols X 376 R…	Table		10Jan06:10:19:39
Z_dim	5.0KB (2 Cols X 1 Rows) …	Table		10Jan06:10:19:29

Expansion on the Segmentation Design

Once the Segs library is populated with the desired segmentation design, the next step is to expand the Segs library datasets to create all of datasets necessary to run the model. Select “Expand ‘Segs’ Datasets” under the Markets Module on the main dashboard and say ‘OK.” Once this code has run, you should be able to look in the “Input” library and see datasets it has created, as shown in Figure 13.

Figure 13. Contents of the Input Library

Contents of 'Input'

Name	Size	Type	Modified
Accountdecay_10	17.0KB (10 Cols X 115 R...	Table	08Feb06:13:44:38
Calibrationzb_10	9.0KB (7 Cols X 105 Row...	Table	08Feb06:13:44:40
Calibrationz_10	5.0KB (5 Cols X 21 Rows...	Table	08Feb06:13:44:40
Choicebatchcontrol	9.0KB (10 Cols X 1 Rows...	Table	08Feb06:13:44:39
Choicedrivers_10	301.0KB (15 Cols X 2646...	Table	08Feb06:13:44:38
Choiceparameters_10	65.0KB (21 Cols X 282 R...	Table	08Feb06:13:44:38
Customercountsactual_10	9.0KB (9 Cols X 15 Rows...	Table	08Feb06:13:44:39
Customercountsforecast_10	17.0KB (9 Cols X 100 Ro...	Table	08Feb06:13:44:39
Dsmechoice_10	49.0KB (17 Cols X 183 R...	Table	08Feb06:13:44:38
Dsmfchoice_10	33.0KB (14 Cols X 99 Ro...	Table	08Feb06:13:44:38
Dsmretrofit_10	33.0KB (20 Cols X 122 R...	Table	08Feb06:13:44:38
Echoicestatus_10	9.0KB (10 Cols X 61 Row...	Table	08Feb06:13:44:39
Equipmentage_10	17.0KB (9 Cols X 99 Row...	Table	08Feb06:13:44:39
Equipmentdecay_10	25.0KB (14 Cols X 122 R...	Table	08Feb06:13:44:38
Esharesinitial_10	25.0KB (15 Cols X 126 R...	Table	08Feb06:13:44:39
Fchoicestatus_10	9.0KB (8 Cols X 33 Rows...	Table	08Feb06:13:44:39
Forecastbatchcontrol	9.0KB (11 Cols X 1 Rows...	Table	08Feb06:13:44:39
Fsharesinitial_10	9.0KB (12 Cols X 61 Row...	Table	08Feb06:13:44:39
Intro	5.0KB (2 Cols X 1 Rows) ...	Table	08Feb06:13:44:39
Priceforecast_10	105.0KB (10 Cols X 1281...	Table	08Feb06:13:44:38
Saturations_10	641.0KB (9 Cols X 9009 ...	Table	08Feb06:13:44:38
Usagebatchcontrol	5.0KB (4 Cols X 1 Rows) ...	Table	08Feb06:13:44:39
Usagedrivers_10	7.9MB (33 Cols X 31752 ...	Table	08Feb06:13:44:39
Usageparameters_10	769.0KB (34 Cols X 2898...	Table	08Feb06:13:44:39

Note that this step will often be used more than once, as it also serves as a means of "refreshing" the model. Throughout the process of populating the model, any number of operator error-based issues can corrupt the structure of these input data sets, which will lead to questionable results during operation of the model. For example, necessary rows might be lost during an incorrect merge or a typo will lead to an incorrect variable name. When this happens, the easiest to way to recover is to perform this step, which will re-create all the datasets in the required structure.

Model Population

Once the starting datasets in the Input library have been created, you must enter data into the SAS datasets that were automatically created by building the segment master. Table 4 shows all the datasets that are created in the INPUT library and the module with which they are associated. The table also provides a brief outline of the information to be entered in each dataset with more detailed information provided in subsequent chapters.

Table 4. Starting Datasets in INPUT Library

Module	Dataset	Contents
Usage	usageBatchControl	See Batch Control Usage below
Usage	usageDrivers_10	Equipment usage equation forecast drivers
Usage	usageParameters_10	Coefficients describing how usage varies by weather, customer characteristics, prices, and other variables
Choice	choiceBatchControl	See Batch Control Usage below
Choice	choiceDrivers_10	Choice forecast drivers, including capital costs for equipment in existing, conversion, and new construction buildings, plus future availability of each equipment type
Choice	choiceParameters_10	Provider Choice function initialization parameters for Dimension 4 and 5 purchase choices
Choice	eChoiceStatus_10	A status variable that tells the Choice Module how to model shares for Dimension 5. Set this variable to "1" to hold the initial market shares constant over the forecast horizon.
Choice	eSharesInitial_10	Average and marginal market shares for existing, conversion, and new customers for Dimension 5
Choice	fChoiceStatus_10	A status variable that tells the Choice Module how to model shares for Dimension 4. Set this variable to "1" to hold the initial market shares constant over the forecast horizon.
Choice	fSharesInitial_10	Average and marginal market shares for existing, conversion, and new customers for Dimension 4
Choice	priceForecast_10	Fuel, product, or service price forecasts in native units (e.g., therms, kWh, gallons, cubic meters)
Forecast	ForecastBatchControl	See Batch Control Usage below
Forecast	accountDecay_10	Decay functional form indicator and parameters for existing, conversion, and new accounts
Forecast	customerCountsActual_10	Number of existing accounts, non-accounts on main, and non-accounts off main
Forecast	customerCountsForecast_10	Forecast of new construction (economic activity driving demand), capture rates, units per account, and number of units (i.e., units are a scale of measurement consistent with results of the usage forecast, such as buildings, square footage, apartments, etc.)
Forecast	equipmentAge_10	Mean age of end uses by historical vintage in the baseline (i.e., 0th) year of the forecast, used to initialize the age dimension in the turnover/vintage module
Forecast	equipmentDecay_10	Decay functional form indicator and parameters for equipment (end-uses) in existing, conversion, and new buildings
Forecast	saturations_10	Saturation (percentage of accounts that have the equipment) independent of fourth dimension market shares
N/A	calibrationZ_10	Total actual sales in base year for Dimension 1
N/A	calibrationZB_10	Total actual sales in base year for Dimension 2
Intervention Strategies	dsmEChoice_10	Exogenous parameters that change Dimension 5 market shares for existing, conversion, and/or new customers through 'what if' intervention strategies
Intervention Strategies	dsmFChoice_10	Exogenous parameters that change Dimension 4 market shares for existing, conversion, and/or new customers through 'what if'' intervention strategies
Intervention Strategies	dsmRetrofit_10	Exogenous parameters that adjust product usage through 'what if' convention strategies

The method for populating these datasets, however, depends on the interaction of several factors. If the operators SAS skills are limited and the overall segmentation design is simple enough that that datasets do not exceed Excel's row limits, the data can be exported, populated manually, and then re-imported. If the data that will go into the model already exist in an electronic format and the operator has SAS skills that cover basic merges and data manipulation, the datasets can be populated via SAS code. Another option is to create data entry templates that conform to the format of the various data sources that will then be imported into SAS, manipulated to take on the correct format for the model, and then used to populate the datasets via SAS code. The final and best solution will often be a combination of multiple methods.

Batch Control Usage

The INPUT library includes three "batch processing" datasets that describe how various datasets (input scenarios, or the "**_xx**" suffix) are jointly processed within End Use Forecaster forecast output scenarios. These datasets are:

- **usageBatchControl**: selects input scenarios for each set of input files for forecasting equipment purchase choices
- **choiceBatchControl**: "packages" sets of expected market shares as a result of customer service programs with those segments that are unaffected by these activities into one cohesive group
- **forecastBatchControl**: combines chosen product usage equations, usage drivers, and historical vintage adjustment scenarios

End Use Forecaster automatically creates the base case scenario, denoted by "_10," for each of these datasets. Additional scenarios can be designated in each batch dataset by:

- Adding a new row worksheet in each dataset through SAS/FSP and changing the relevant scenario indicators
- Writing SAS code to create the datasets with the desired scenario inputs
- Managing the batch controls in an Excel workbook and importing them via SAS

Batch processing datasets allow the user to specify all the input datasets for a given scenario. The strength of this approach is that it allows the analyst to mix and match datasets from different scenarios, which avoids having to keep identical datasets for different scenarios. Figure 14 presents a hypothetical **choiceBatchControl** dataset. In the example, the user has set up three different scenarios (10, 20, and 30), which pull mostly the same datasets, with a couple of exceptions. First, Scenario 20 pulls an alternate price forecast, ostensibly one with high gas prices. Second, Scenario 30 utilizes the price forecast produced for Scenario 20 and also pulls in an alternate usage forecast.

Figure 14. Example choiceBatchControl Dataset

scenario	choiceDrivers	priceForecast	choiceParameters	usageAnnual	eSharesInitial	fSharesInitial	eChoiceStatus	fChoiceStatus	scenarioName
10	10	10	10	10	10	10	10	10	Base Case
20	10	20	10	10	10	10	10	10	High Gas Price Forecast
30	10	20	10	30	10	10	10	10	Low Usage

Scenario 20 pulls a different price scenario.

Scenario 30 pulls different usage and price forecasts, but utilizes the same dataset used for Scenario20.

IV. Product Usage Module

End Use Forecaster tracks consumption of resources (natural gas, electricity, etc.) through the Product Usage module. The module provides a forecast of the predicted consumption by combining (1) a monthly forecast of consumption factors or drivers (i.e., independent or exogenous variables), stored in the SAS dataset **usageDrivers_xx**, and (2) a set of coefficients associated with each exogenous variable, stored in **usageParameters_xx**.

The Product Usage module merges the **usageParameters_xx** dataset with the usage forecast drivers (**usageDrivers_xx**) and sums the results over all variables in order to obtain usage forecasts at the unit level (e.g., per customer, per square foot). The results then become inputs into the Provider Choice and Forecast modules.

If the *usageEquationStatus* variable in **usageParameters_xx** equals 1, usage is a linear combination of the coefficients and forecast drivers:

(1) $$usageMonthly\_xx_m = \Sigma_c \, usageParameters\_xx_c * usageDrivers\_xx_{cm}$$

where:

- **usageParameters_xx** $_c$ = usage coefficients c, where the default has 21 slots (B0 through B20)
- **usageDrivers_xx** $_{cm}$ is the monthly forecast (m) of each forecast driver (independent variable) associated with coefficient c (X0 through X20)

If *usageEquationStatus* is set equal to 2, then the Product Usage Module assigns a log-log function:

(2) $$usageMonthly\_xx_m = exp(\Sigma_c \, usageParameters\_xx_c * log(usageDrivers\_xx_{cm}))$$

The default structure is a linear model with *usageEquationStatus* equal to 1.[2]

The final step in this module is to aggregate usage to an annual figure (usageAnnual_xx). Both monthly and annual forecasts for a given scenario are stored in the INTER library.

The **usageBatchControl** dataset in the INPUT library has the following variables that define the input datasets associated with each output scenario:

- *scenario*: The Product Usage module output scenario
- *usageParameters*: The input scenario associated with the product usage equations (**usageParameters_xx**)

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[2] As discussed further below under Calibration, End Use Forecaster's automatic sales calibration routine is designed to work with the linear model where *usageEquationStatus* is set equal to 1. Calibration routines for more complex usage equation structures defined by the log-log or other status indicators (3, 4, etc.) can be developed by The Cadmus Group (Quantec) on request.

- *usageDrivers*: The input scenario associated with the product usage drivers (**usageDrivers_xx**)

Figure 15 shows the program flow, including input and output datasets. Table 5 describes the data sets and their key attributes in more detail.

Figure 15. Product Usage Module Program Flow for "usageBatch.sas"

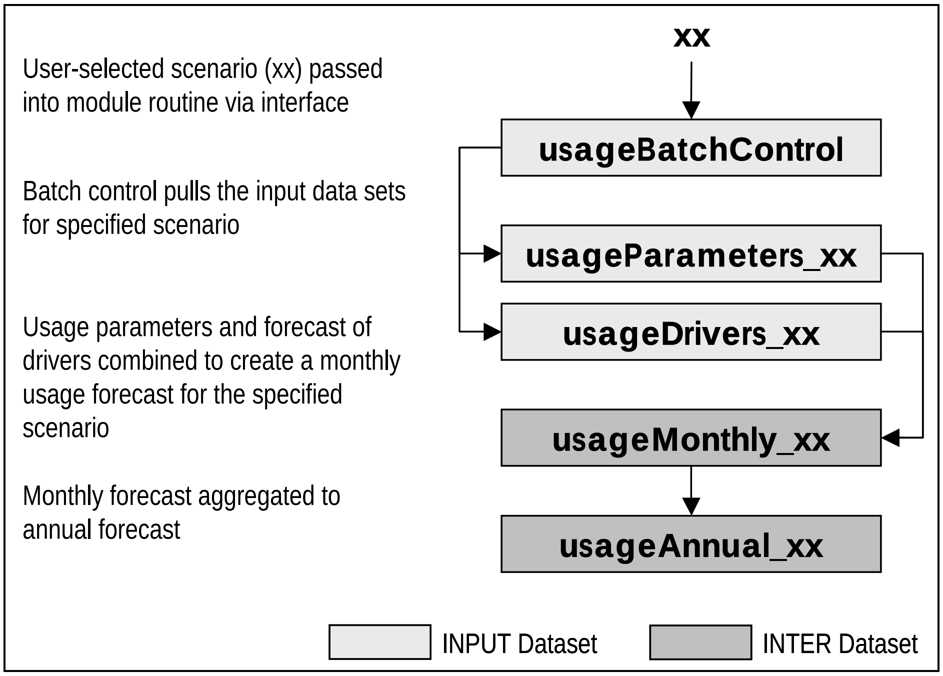


Table 5. Product Usage Module Data Library

Library	Dataset	Description	File/Record Dimensions	Variables/Attributes
INPUT	usageBatchControls	Usage forecast input scenarios	1 record per Output scenario	Usage equation input scenario, forecast driver input scenario, vintage adjustment input scenario, output scenario
INPUT	UsageParameters_xx	Usage forecast equation parameters	Dimensions 1, 2, 3, 4, 5, and vintage	Usage equation parameters B0 through B0 for input scenario Sxx
INPUT	usageDrivers_xx	Usage forecast drivers	Dimensions 1, 2, 3, 4, and 5, year, month	Usage forecast drivers X0 through X0 for input scenario Sxx

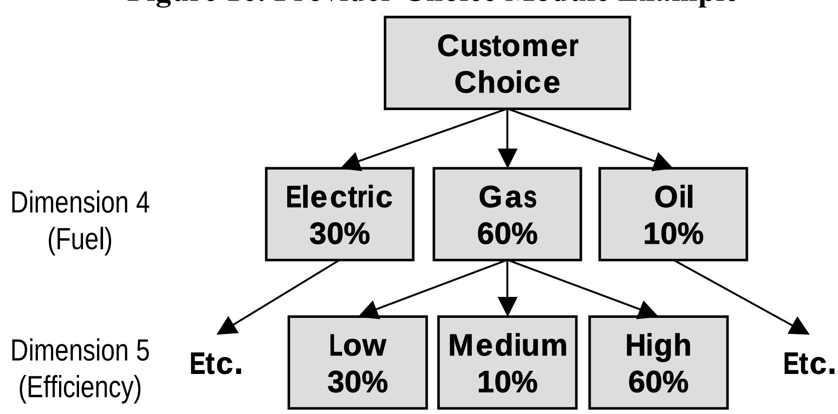
V. Provider Choice Module

The Provider Choice module analyzes customer choice decisions among competitors and product options. For example, customers choose their end-use equipment from various fuel types and efficiency levels. Purchase decisions are represented by a nested structure of provider (fuel) and product (efficiency) option choices.

The nested structure of the Provider Choice module is illustrated in Figure 16 below. This figure represents fourth and fifth dimension choices. The customer in this example faces a choice of gas vs. electricity vs. oil at the fourth dimension, and low vs. medium vs. high efficiency at the fifth dimension. Analysts often think of this problem as "efficiency choice conditional on fuel choice," hence the downward arrows in the figure. But customer choice theory and the Provider Choice Module actually work in the opposite direction, with the fourth dimension conditional upon fifth dimension choices. In reality, the customer makes a simultaneous choice across these dimensions, and the model structure shown in Figure 16 is just a convenient way of modeling this behavior.

The Provider Choice module first estimates the fifth dimension (efficiency) parameters and forecasts its market shares. The model then calculates the weighted average operating and capital costs for each fourth dimension (fuel) alternative, estimates the choice equation coefficients, and then produces a forecast for the fourth dimension.

Figure 16. Provider Choice Module Example



Note that the structure of the tree need not be symmetric. For example, single fuel energy companies and water utilities may want to focus on multiple efficiency levels for customers using their products. A single efficiency level can be specified for the remaining fuels.

The application of choice coefficients and forecast drivers form a discrete choice-type model that is applied to individual customer data. These models are analogous to regression models for equipment usage. The estimated discrete choice model parameters describe how equipment costs, operating costs, equipment characteristics, and customer characteristics affect equipment choices. For each choice level there are capital and operating cost parameters (called betas) and alternative-specific intercepts (called alphas).

The alphas and betas are developed through one or more of the available Provider Choice algorithms in End Use Forecaster:

1. Using individual customer level survey and equipment usage data, discrete choice models consistent with the segmentation design are estimated. Note that like usage equation modeling, this estimation is conducted outside of End Use Forecaster, but may be conducted using the same SAS procedures as those used by End Use Forecaster.
2. If individual customer data are not available for discrete choice modeling, End Use Forecaster can use aggregate market data to simulate a simple choice model from equipment capital costs and operating costs.
3. If individual customer data are not available for discrete choice modeling, End Use Forecaster can calculated use apply approximate, solutions calculated using Mathematica. [Note: this feature is not currently available, but will be added by May 2006]

These alternatives are summarized in Table 6.

Table 6. Provider Choice Equation Status Variable Definitions

Status Variable	Description	Beta Parameters	Alpha (Intercept) Parameters	Potential Applicability to Choice Model
1	Exogenous Market Shares Specified	N/A	N/A	Yes
2	Logit: estimated	Estimated Outside End Use Forecaster	Estimated Outside End Use Forecaster	Yes
3	Logit: estimated	Estimated	Starting values: to be calibrated	Yes
4	Logit: simulated	Starting values: to be estimated & calibrated	Starting values: to be estimated & calibrated	Yes
5	Logit: calculated	Calculated	Calculated	Yes

Model Parameterization

Estimation Mode (Status 2 and 3)

Customer choice parameters can be estimated when sufficient micro-level customer choice data are available to estimate regression coefficients for actual consumer decisions. The Cadmux Group (Quantec) customizes and estimates choice equations for companies who request this approach or uses choice model parameters from previous research conduct by the company.

The choice equation status variables are set equal to 2 or 3 if this approach is used. If status equals 2, all parameters have been estimated outside the model, and no further calibration is necessary. If status equals 3, a logit functional form has been used to estimate operating and capital cost parameters and the model is being calibrated to base year market shares by adjusting the intercept terms.

Simulation Mode (Status 4)

The simulation of consumer choice is useful when customer-level data are not available. Most users of End Use Forecaster find themselves in this position before they can conduct primary market research. In simulation mode, this module estimates parameters of the choice function based on available data for:

- Operating and capital costs
- Marginal (most recent) equipment market shares
- Customer discount rates
- An estimate of the proportion of customer preferences or "utility" that is related to non-price factors

Provider Choice module coefficients are developed by solving a system of equations within the SAS Model procedure.

Exogenous Mode (Status 1)

If neither micro-level customer choice data nor aggregate data are available, or if poor data quality prevents choice equations from being estimated (simulated), the status variable can be set equal to 1 in order to bypass the Provider Choice Module. In such a cases, market shares are set equal to the values in **fSharesInitial_xx** and **eSharesInitial_xx**.

Forecasting

The Provider Choice model produces forecasts over the planning horizon by applying a forecast of equipment capital costs, equipment energy consumption (from the Product Usage module), and fuel price forecasts to the estimated (simulated) choice parameters.

If modes 2 through 4 are used, these variables will affect market shares over the forecast horizon. If the exogenous mode (status 1) is used, market shares are held constant at their base year values over the forecasting horizon. Exogenous forecasts can also be modified via alternative market share forecast scenarios that are specified in the Intervention Strategies module (see Chapter VI).

Market Availability

End Use Forecaster can adjust forecasted efficiency market shares to reflect changes in regulations by removing the market availability of specified alternatives in the future. In this adjustment procedure, End Use Forecaster shifts any market shares designated for efficiency alternatives to be removed from the market to the remaining alternatives, proportional to their *a priori* market shares. This approach to market availability can also be adapted to situations where an efficiency level has become obsolescent in the market, such as the market availability of alternatives of superior consumer value at lower cost.

End Use Forecaster includes a variable called *available* that is entered in the **choiceDrivers_xx** dataset. *Available* is equal to 1 when the configuration is available on the market and zero when it is no longer available. When the choice model finds an unavailable configuration, it will reassign that configuration's shares (at the efficiency level) to the remaining configurations.

Provider Choice Module Analysis and Data Flow

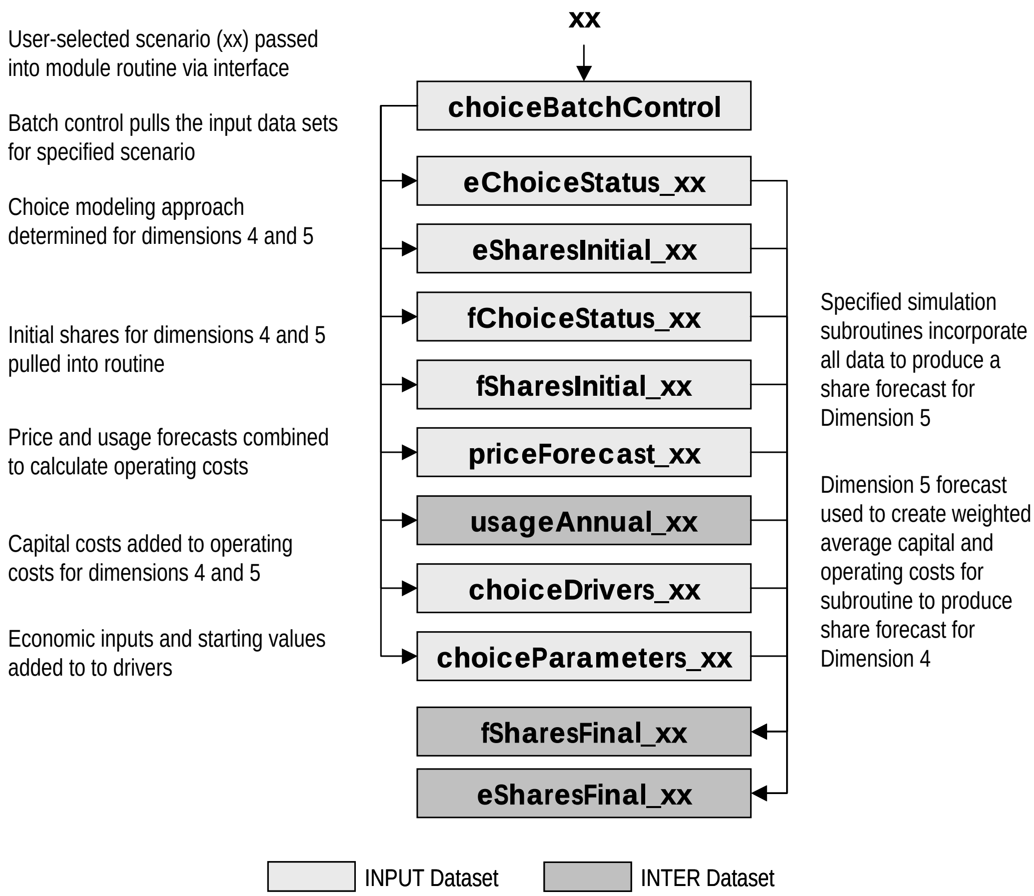
Figure 17 shows the data and analysis flow through the Provider Choice Module.

The dataset **choiceBatchControl** in the input library describes any scenario in terms of the following:

- Equipment capital costs and future availability (**choiceDrivers_xx**)
- Initial simulation (or estimation) parameters (**choiceParameters_xx**)
- Forecasted energy prices (**priceForecast_xx**)
- Product Usage output forecast scenario (**usageAnnual_xx**)
- Initial base-year efficiency (dimension 5) shares (**eSharesInitial_xx**)
- Initial base-year fuel (dimension 4) shares (**fSharesInitial_xx**)
- Indicator for efficiency (dimension 5) choice simulation (**eChoiceStatus_xx**)
- Indicator for fuel (dimension 4) choice simulation (**fChoiceStatus_xx**)

The simulation subroutines in choiceBatch.sas calibrate Provider Choice module coefficients to the baseline market shares in **fSharesInitial_xx** and **eSharesInitial_xx**. The program derives a simultaneous solution for all the qualitative choice coefficients using PROC MODEL from SAS/ETS. The first step in this subroutine is to integrate usage module information (consumption per configuration) with forecasted prices per unit of use to generate forecasted operating costs. Along with forecasted capital costs and other variables used in the qualitative choice models, this information serves as the forecast dataset for choice for each market segment. End Use Forecaster's default choice structure considers up to four alternatives at each level of the nest. The Cadmus Group (Quantec) can customize and modify the code if more than four alternatives are needed.

Figure 17. Provider Choice Module Program Flow for "choiceBatch.sas"



Initial Values

The initial value datasets from **choiceParameters_xx** are merged with the other datasets described above. Initial values and other parameters include:

- Equipment life
- Customer discount rate
- Share of customer preferences ("utility") associated with non-price attributes
- Initial values for alternative-specific constants and model coefficients

In some cases, the subroutine can be sensitive to the initial values, particularly for capital and operating cost coefficients. This problem can generally be mitigated by using initial values that are very small numbers, such as $1E^{-8}$.

Single-Alternative Choices

Choice estimation is not required for one-alternative situations; the choice forecasting routine assigns a 100% market share to these single alternative situations in the choice nest.

Confirming Calibration Results (Status 3 or 4)

A final step in the choice calibration process is to confirm that all equation coefficients have been solved correctly and that the coefficient values are reasonable. The nature of "solving" each choice equation for the appropriate coefficients requires an iterative process, where PROC MODEL begins with user-specified starting values of each coefficient and iterates toward a solution based on the input assumptions.

If the coefficient starting values are inappropriate, the calibration process may not reach a solution or it may reach one that is not in an economically feasible region. For example, starting values of coefficients need to be sufficiently low, such that, when they are multiplied by the independent variables, the result is not "out of the ballpark." Additionally, if the relative comparison of operating costs and capital costs are contrary to the user-specified discount rate, the calibration routine may find a solution where one of the coefficients may be positive (i.e., indicating that as costs rise, so do purchases, which is a clearly non-economic decision).

To check calibration results:

Certain files require inspecting as part of the forecasting process. Missing values in these forecasted market shares indicate a calibration problem.

- Look for the problem segment(s) in the EUFORECASTER\MODELLOGS directory. The choiceBatch.log file will let you know whether the model was ever "in the ballpark" by noting at what point in the solution-seeking process the SAS/ETS MODEL procedure failed.
- If there is a problem with the scale of a variable, the model will fail at iteration zero and the "hill climbing" optimization never begins.
- If the model fails during subsequent iterations, a systematic change in the initial parameters in **choiceDrivers_xx** is recommended until convergence is achieved. Using the final parameter values from another, similar, segment can help in the calibration process.

Table 7 summarizes the Provider Choice Module along with a description of the data and libraries.

Table 7. Provider Choice Module Data Libraries and Files

Library	Dataset	Description
INPUT	choiceBatchControl	Choice parameter input scenario, choice forecast driver input scenario, fuel price input scenario, output scenario
INPUT	choiceDrivers_xx	Capital cost equipment replacement, capital cost equipment conversion, capital cost new construction equipment, availability
INPUT	priceForecast_xx	Price forecast
INPUT	choiceParameters_xx	Description, NumAlternatives, Lifetime, Discount Rate, PriceShare, Alpha, A1-A4, B1-B2
INTER	usageAnnual_xx	Usage forecast
INPUT	eSharesInitial_xx	Dimension 5 base year average stock share, base year marginal share existing/replacement, base year marginal share conversion, base year marginal share new construction
INPUT	fSharesInitial_xx	Dimension 4 base year average stock share, base year marginal share existing/replacement, base year marginal share conversion, base year marginal share new construction
INPUT	fChoiceStatus_xx	Indicator for method of estimation/simulation for dimension 4 (fuel).
INPUT	eChoiceStatus_xx	Indicator for method of estimation/simulation for dimension 5 (efficiency)
INTER	fSharesFinal_xx	Shares forecast for dimension 4 (fuel) for existing, conversion, and new customers
INTER	eSharesFinal_xx	Shares forecast for dimension 5 (efficiency) for existing, conversion, and new customers

VI. Intervention Strategies Module

The Intervention Strategies module is intended to capture the impacts of a customer rebate or marketing program. These strategies are modeled as "what-if" scenarios. Depending upon the design of the service or program, these impacts combine specified market acceptance patterns with equipment characteristics to estimate impacts on forecasted choices and per-unit usage.

Substitution Programs

Provider (fuel) substitution strategies encourage consumers to purchase equipment from one provider over other providers. For existing equipment, this change can be done either immediately (early replacement) or at the point of existing equipment retirement (normal replacement). The **dsmFChoice_xx** dataset in the input directory controls how a market intervention will affect shares for a given scenario. The inputs in this dataset, summarized in Table 8, vary by the first, second, and third dimensions and can apply differently to existing, conversion, and new customers.

Table 8. Provider (Fuel) Substitution Program Drivers

Variable	Description	Minimum Value	Maximum Value
yearIntroduced	Year of program introduction activity	1	Last year of forecast horizon
programLife	Duration of program (years)	1	Years in forecast horizon
adoptionPath	Years to Full Adoption	1	7
applicability	Percent of customers to which the program applies	0*	1
marketShare	Percent of market share (%)	0*	1
earlyReplacement	Binary flag for whether early adoption applies to program	0	1
description	Program Description	{text}	{text}

* A zero value implies that the program will have no market impact, so the smallest practical value is 0.01 (1%).

** Early adoption applies to existing buildings only. A value of 1 implies that all applicable consumers (applicability * market share * adoption path %) switch immediately, whether or not the equipment fails. A zero implies that all adoption follows the normal equipment and/or building retirement schedule.

Equipment Efficiency Programs

Product (efficiency) option strategies encourage consumers to purchase a particular option (e.g., equipment with a certain efficiency rating). Either early or normal replacement may apply to existing equipment. Table 9 presents the drivers of purchasing programs and their usage.

Table 9. Product (Efficiency) Program Drivers

Variable	Description	Minimum Value	Maximum Value
yearIntroduced	Year of program introduction activity	1	Last year of forecast horizon
programLife	Duration of program (years)	1	Years in forecast horizon
adoptionPath	Years to Full Adoption	1	7
applicability	Percent of customers to which the program applies	0*	1
eLevel	Efficiency level to which program applies	1	4
marketShare	Percent of market share (%)	0*	1
earlyReplacement	Binary flag for whether early adoption applies to program	0	1
description	Program Description	{text}	{text}

* A zero value implies that the program will have no market impact, so the smallest practical value is 0.01 (1%).

** This represents the maximum efficiency level affected by the program for each end use, and is a supplementary type of applicability factor. The variable EL should be specified to be less than or equal to the maximum number of efficiency levels available for that market sector.

*** This represents the maximum vintage level affected by the program for each end use, and is a supplementary type of applicability factor. The variable V should be specified to be less than or equal to the maximum number of vintages for that market sector. Usually it is set equal to zero to denote an existing building or equipment retrofit strategy.

Equipment Retrofit and Operating & Maintenance (O&M) Service Programs

Usage retrofit strategies encourage consumers to change their product usage given the equipment they already have (e.g., improve the efficiency of existing equipment by installing measures such as weatherization or water heater retrofit kits). Table 10 presents the drivers of these programs.

Table 10. Equipment Efficiency Retrofit and O&M Program Drivers

Variable Name	Description	Minimum Value	Maximum Value
yearIntroduced	Year of program introduction activity	1	Last year of forecast horizon
programLife	Duration of program (years)	1	Years in forecast horizon
adoptionPath	Years to full adoption	1	7
applicability	Percent of customers to which the program applies	0*	1
eLevel	Lowest efficiency level to which program applies	1	4
marketShare	Percent of market share (%)	0*	1
eImprovement	Efficiency improvement (%)	0*	1
MeasureLife	Measure life (years)	1	Years in forecast horizon
vintageApplicability	Applicable vintages***	Lowest vintage	Years (vintages) in forecast horizon
description	Program Description	{text}	{text}

* A zero value implies that the program will have no market impact, so the smallest practical value is 0.01 (1%).

** This represents the maximum efficiency level affected by the program for each end use, and is a supplementary type of applicability factor. The variable EL should be specified to be less than or equal to the maximum number of efficiency levels available for that market sector.

*** This represents the maximum vintage level affected by the program for each end use, and is a supplementary type of applicability factor. The variable V should be specified to be less than or equal to the maximum number of vintages for that market sector. Usually it is set equal to zero to denote an existing building or equipment retrofit strategy.

Intervention Strategies Module Operations

You can create many types of Intervention Strategies programs for all market sectors sequentially and automatically, rather than creating each one manually. This batch processing is done via the following datasets, where the scenario indicator "yy" denotes a scenario that differs from "xx."

- **dsmFChoice_yy** – Dimension 4 (fuel) choice substitution for existing, conversion, and/or new customers, based on user specifications
- **dsmEChoice_yy** – Dimension 5 (efficiency) choice substitution for existing, conversion, and/or new customers, based on user specifications
- **dsmRetrofit_yy** – Equipment retrofit or O&M programs

Each of these files contains a row for each Dimension 1 – 3 combination and data inputs associated with Table 24 (**dsmFChoice_xx**), Table 23 (**dsmEChoice_xx**), or Table 25 (**dsmRetrofit_xx**).

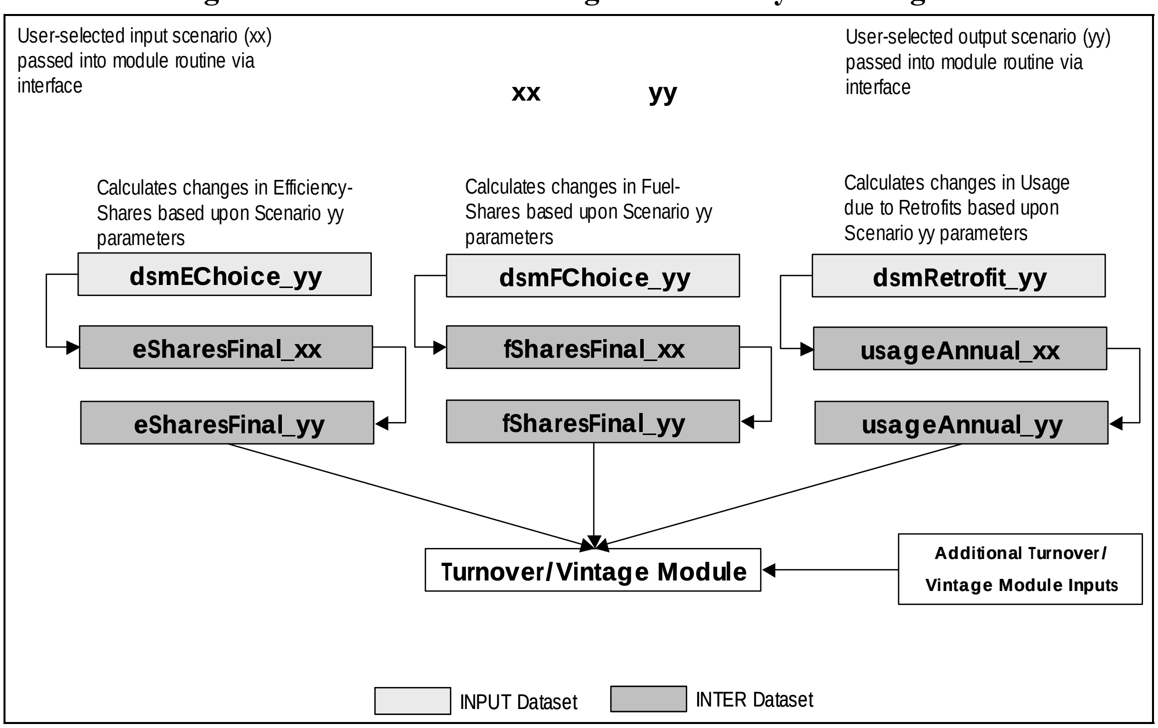
The Market Segmentation module creates base case files ("_10" files) where there is no intervention for each of these program categories. These files serve as templates that allow the user to create different scenarios of interest. To create strategies, you must copy these files to another scenario number and then make changes consistent with the desired intervention strategy over the forecast horizon. It is recommended that these designs be completed by individuals with marketing or demand-side management experience. Alternatively, The Cadmus Group (Quantec**)** can assist with the development of the first set of intervention strategies.

Figure 18 illustrates how the Intervention Strategies module modifies the Product Usage and/or Provider Choice output files and how these outputs are then used to develop an alternative forecast. Table 11 summarizes the data files used by this module.

Table 11. Intervention Strategies Module Data Library and Files

Directory	File Name	Description	File/Record Dimensions	Variables/Attributes
INPUT	dsmEChoice_xx	Existing/New Dimension 5 (efficiency) program parameters	Dimensions 1-4	Year introduced, program life, applicability, market share, adoption path, early adoption
INPUT	dsmFChoice_xx	Existing/New Dimension 4 (fuel choice) program parameters	Dimensions 1-4	Year introduced, program life, applicability, market share, adoption path, early adoption
INPUT	dsmRetrofit_xx	Product Usage retrofit parameters	Dimensions 1-4	Year introduced, program life, applicability, market share, adoption path, measure life, efficiency improvement, efficiency levels affected, vintages affected

Figure 18. Intervention Strategies Module System Diagram



VII. Forecast Module

The Forecast module serves several analytical and system functions, including forecasts of new construction and conversion accounts, decay or turnover of buildings and equipment, integration of Product Usage, Provider Choice and Intervention Strategies module results, and "internal" forecast reports for use by the End Use Forecaster analyst. Other reports from End Use Forecaster are described in Chapter 8.

The analytical portion of this module uses information on equipment saturation, average and marginal market shares, building and equipment decay, building account stocks and decay, customer conversions, and new construction to determine changes in the usage mix over time. The final forecast is equal to the number of units [indexed by year, building vintage, equipment age, fuel (provider), and efficiency (product)] multiplied by the consumption per the indexed equipment configuration.

Forecast Inputs

There are several sets of inputs in each Turnover/Vintage module forecast, which are described in Table 12 below. Alternative forecast scenarios using new estimates (scenarios) for new construction, account conversion, usage, choice, account decay, building decay, and any combinations of these can be conducted using the Turnover/Vintage module.

Table 12. Turnover/Vintage Forecast Inputs

Input Type	Dataset
Account Decay Parameters	accountDecay_xx
Equipment Decay Parameters	equipmentDecay_xx
Existing Equipment Age	equipmentAge_xx
Dimension 3 (End Use) Saturation	saturations_xx
Historical Accounts	customerCountsActual_xx
Account Forecast	customerCountsForecast_xx
Product Usage Forecast	usageAnnual_xx
Dimension 4 (Fuel) Shares Forecast	fSharesFinal_xx
Dimension 5 (Efficiency) Shares Forecast	eSharesFinal_xx

Historical and New Construction Building Stocks

Historical accounts are segmented into the number of total accounts in the base year and their distribution among the historical vintages as determined by the user in the segmentation design. Accounts are defined in terms of both buildings and building units (i.e., accounts, apartments, square feet, etc.). Building units are the level of measurement at which the Product Usage module estimates are rendered.

The total building stock in any forecast year is not the simple difference between the total building stock in the current year and the previous year because some buildings will have been destroyed, completely gutted, or removed from the system in the course of a year. The number of existing buildings replaced each year is dependent on the stock of vintages and the overall decay rate.

Forecasting Equipment Stocks

Dimension 3 (i.e., end use) equipment stocks are forecasted through similar methods as buildings. Initial base year equipment stock levels are estimated utilizing equipment saturation estimates for existing and new construction building vintages in the **saturations_xx** dataset. Market shares of new equipment over the forecast horizon are generated in the Provider Choice or Intervention Strategies module and passed to the Turnover/Vintage module via the series of market share forecasts in the **eSharesInitial_xx** and **fSharesInitial_xx** datasets. You may provide the average age of equipment in existing buildings in the base year in order to initialize the equipment age dimension (**equipmentAge_xx**). Generally, this average age is specified as the mean technical lifetime of the equipment.

The forecast simulation then estimates equipment stocks for Dimensions 3-5 (i.e., end use, fuel, and efficiency level) for each Dimension 1-2 combination. The new equipment stock installed each year is dependent on the growth and decay of building stocks, the natural replacement cycle of the equipment, the saturation rates of the end use in new construction, and the market shares of technology types.

End Use Forecaster contains a vintage hierarchy where Dimension 2 (buildings) dominates Dimension 3 (end uses). For example, an older dwelling may have a relatively new furnace and water heater, but these end uses effectively "disappear" if the building is demolished or undergoes a major renovation.

Building and Equipment Decay Functions

The user may specify decay rates of existing stocks of buildings and equipment, as well as new stock constructed or installed in subsequent years. Decay functions and parameters can differ for the existing and new stocks. Some analysts specify different decay functions for existing and new building stocks as the existing base year building stock is an amalgam of unknown vintages and new building stock is tracked as discreet homogenous annual blocks.

There are two datasets with decay rate data for each market segmentation design (**accountDecay_xx** and **equipmentDecay_xx**). In each of these decay data files, there are two sets of information to be entered: decay functions and decay parameters.

A numeric indicator ranging from 1 to 3 indicates the selected function. Available functions include exponential (1), logistic (2), and Weibull (3). Exponential functions have one parameter, logistic functions have four, and Weibull functions have two.[3] The logistic and exponential functions tend to be the most popular and are described in more detail below. The

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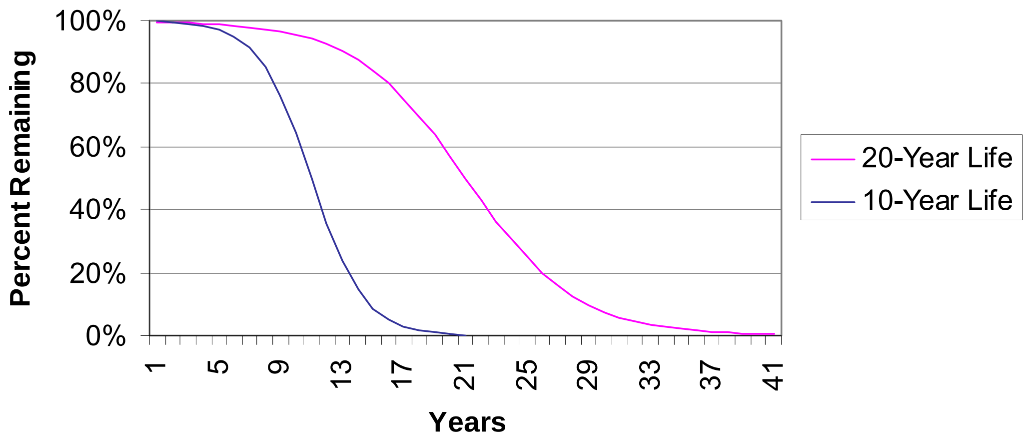
3 These are discrete analogs to the continuous time distributions.

equipmentAge_xx dataset describes the average age of existing equipment in existing facilities. It tells the model where to start the equipment decay function.

Logistic Decay Function

End Use Forecaster uses the logistic function as the recommended decay mechanism for equipment decay construction, as shown in Figure 19. The logistic function is an S-shaped curve that results in a small decay rate for the first years, then increases over time before tapering off.

Figure 19. End Use Forecaster End Use Decay Functions



You may specify the periods and percentages of stock remaining for any two years in the appropriate SAS dataset. For example, to specify that 99% of the building stock remains 20 years after construction and that, 100 years after construction, only 50% of the buildings remain:

- In the SAS dataset, set the functional form indicator to 2
- Set the first parameter to the percent remaining after year X (0.99)
- Set the second parameter to year X (20)
- Set the third parameter to the percent remaining after year Y (0.50)
- Set the fourth parameter to year Y (100)

Exponential Decay Function

An exponential decay function can be used to represent a constant percentage decline for customers, buildings, or equipment. For example, a decay rate of 0.05 would cause 5% of the remaining stock to be removed each year. Since the base becomes progressively smaller, so does the absolute level of decay. If you choose an exponential decay rate:

- Set the functional form indicator equal to 1
- Set the first parameter equal to the specified decay rate
- Set the remaining three parameters equal to zero

Zero Decay

In some cases, decay rates may not be relevant information. This can occur in non end-use End Use Forecaster representations or in certain markets such as "miscellaneous consumption." In these instances, choose the exponential function and set all parameters to zero.

Early Replacement

In some instances, you may specify the "early replacement" of existing equipment within an Intervention Strategies scenario. In these situations, the variable *earadop*, contained in **eChoiceFinal_xx** dataset, will effectively override the equipment decay functions if it is set equal to 1. The default value for *earadop* is zero (no early adoption).

Forecast Operations

The heart of this module is a SAS program called forecastBatch.sas, which completes the following tasks:

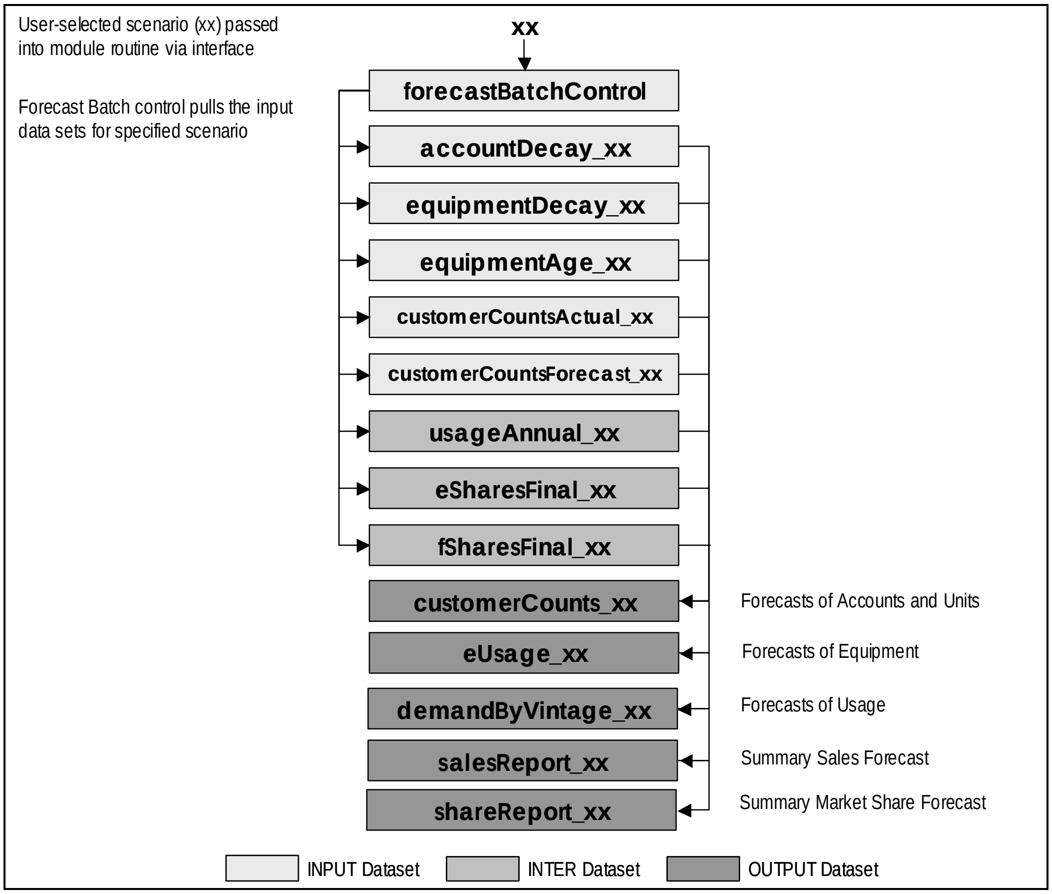
1. Merges all input data across Dimensions 1-3, including:
    - Existing accounts, plus a distribution of accounts across historical building vintages
    - New construction forecast, plus capture rates for new and conversion buildings
    - Dimension 3 saturation, equal to the number of Dimension 2 customers with Dimension 3 divided by total Dimension 2 customers
    - Decay rates for buildings (indexed by year and building vintage) and equipment (indexed by Dimension 4 and equipment age)
    - Product usage forecast (potentially modified by an intervention strategies scenario)
    - Provider choice forecast (potentially modified by an intervention strategies scenario)
2. Solves for output arrays that contain information on number of market segments units per year, indexed by the specified dimensions (e.g., building vintage, equipment age, fuel, and efficiency)
3. Stores the results in datasets of varying dimensions
4. Multiplies the number of units by the respective consumption estimate per unit, again indexed by the appropriate dimension.
5. Summarizes these results in standard report formats

Figure 20 illustrates how the operation of the Turnover module. Table 13 summarizes the programs developed for the Turnover/Vintage module, and Table 13 summarizes the data files used in this module.

Table 13. Forecast Module Data Library and Files

Library	Dataset Name	Description	Record Dimensions	Attributes/Variables
INPUT	ForecastBatchControl	Forecast module input control	One record per output scenario	Account history, distribution and new construction scenarios; decay scenarios; usage scenario, saturation scenarios, and equipment mean age scenario.
INPUT	accountDecay_xx	Decay parameters for Dimension 2	Dimensions 1 and 2, forecast vintages	Decay Function, Decay Parameters 1-4
INPUT	equipmentDecay_xx	New construction Dimension 3 (end use) decay	Dimensions 1, 2, 3 and 4	Decay Function, Decay Parameters 1-4
INPUT	saturations_xx	Existing Dimension 3 (end use) saturation	Dimensions 1, 2, and 3 Year, historical vintages	Saturation
INPUT	customerCountsActual_xx	Base year accounts and non-accounts (potential customers)	Dimensions 1 and 2	Accounts, non accounts
INPUT	equipmentAge_xx	Dimension 3 (end use) mean age in base year	Dimensions 1, 2, and 3, historical vintage	Dimension 3 (end use) mean age in base year
INPUT	customerCountsForecast_xx	New construction / economic driver forecast	Dimensions 1 and 2, Year	Forecasted new construction, capture rate, conversion rate, units per account,
INTER	usageAnnual_xx	Product Usage module output	Dimensions 1, 2, 3, 4 and 5, year, vintage	Annual usage
INTER	eSharesFinal_xx	Provider Choice module output – existing Dimension 5 market share forecast	Dimensions 1, 2, 3, 4 and 5, year	Market share for replacement, early replacement indicator
INTER	fSharesFinal_xx	Provider Choice module output – existing Dimension 4 market share forecast	Dimensions 1, 2, 3 and 4, year	Market share for replacement, early replacement indicator
OUTPUT	customerCounts_xx	Forecast of accounts and units (square footage)	Dimensions 1 and 2, year, vintage	(E/C/N) Accounts, (E/C/N) units, units per account, remaining nonconversion potential
OUTPUT	eUsage__xx	Forecast of equipment (end-uses)	Dimensions 1, 2, 3, 4 and 5, year, vintage	Total number of Dimension 3 (end uses)
OUTPUT	demandByVintage_xx	Forecast of usage (e.g., kWh, therms)	Dimensions 1, 2, 3, 4 and 5, year, vintage	(E/C/N) Accounts, (E/C/N) units, units per account, remaining nonconversion potential; Total number of Dimension 3 (end uses); Break out of dimension 3 by replacement, conversion, and new construction.
OUTPUT	salesReport_xx	Summary Sales Forecast	Dimensions 1, 2, 3 and 4, year	Total usage and equipment sales by Dimension 5
OUTPUT	shareReport_xx	Summary Market Share Forecast	Dimensions 1, 2, 3 and 4, year	Market shares for Dimensions 4 and 5, by existing, conversion, and new construction

Figure 20. Turnover (Vintage) Module System Diagram



VIII. End Use Forecaster Utilities

The main End Use Forecaster analysis modules – Product Usage, Provider Choice, Intervention Strategies, and Forecast – are typically run separately during the calibration and testing phase of any market segmentation and forecasting process. Once this process is complete, however, you can run these modules jointly and generate all relevant analyses with a single click of the mouse (after data are prepared, of course).

This chapter describes the various utilties available in End Use Forecaster: Super Batch, Calibration, Analysis of Data Files, and Reporting.

Super Batch Processing

Some forecasting scenarios lend themselves to super batch processing. When the Product Usage, Provider Choice, and Forecast modules all have the same scenario indicator value, the that scenario can be run across all modules by selecting it in the Super Batch frame.

Calibration

End Use Forecaster can be calibrated to base year energy usage data for the "primary" fuel of interest in the model (f='1'). Calibration may proceed at the Z-Level, or at the Z-B-Level. Base year sales data must be available in the \INPUT**calibrationZ_xx or calibrationZB_xx** datasets. To calibrate the model apply the following procedure:

- Select the level at which the forecasts will be calibrated (the Z-Level vs. the Z-B-Level) from the Calibration Utility
- Select the scenario to be calibrated and the percent of usage to be assigned to the miscellaneous usage category.

The calibration routine works as follows:

1. Residual energy is attributed to the miscellaneous end use. This value should be greater than or equal to zero but generally does not exceed 10% of forecasted energy sales. In fact, the upper limit available through the model interface is 10%. Errors larger than this generally indicate a more fundamental data problem where an investigation of data inputs is required rather than this automated calibration process
2. When non-calibrated total usage is on the high side (miscellaneous would then be negative), the next step is to reduce the per-unit energy usage (i.e., customer or square foot) for each market segment, end use, and efficiency combination. Note that the *relative* energy usage across efficiency levels is unchanged. Conversely, when non-calibrated total usage is on the low side, simply let miscellaneous equal zero (the default value). All other end uses will be adjusted proportionately. Again, we recommend avoiding this procedure if the adjustment is larger than 10%.

The relative size of the calibration adjustment which is ultimately applied to the \INPUT**usageParameters_xx** datasetc can be found in \INTER**initialCalibrationRatio**.[4] The variable (*Zfratio* (*ZBfratio*) shows the percent error results, and how much End Use Forecaster had to change parameters through the calibration routine to match base year sales.

If additional calibration is needed beyond the base year to, for example, match an external econometric forecast over the duration of the forecast horizon, a post-processing adjustment using either SAS or Excel can be applied.[5]

After running the calibration routine, it is necessary to run the Usage, Choice, and Forecast modules (or Super Batch) and produce a new forecast. One can then click on the appropriate "Calibration: Calibration Check" routine to make sure the calibration worked as intended.

Analysis of Data Files

All SAS datasets in across End Use Forecaster libraries can be accessed directly from End Use Forecaster for further analysis in real time by following these steps:

- Click on "File: Analyze" to access SAS/INSIGHT
- Select the library and dataset of interest and perform desired analysis

  OR
- SAS/FSP software tools can also be used to browse the SAS datasets via the pull-down menu item "File: Library Map"

Reporting

Five default SAS output dataset reports are created in the OUTPUT directory by the Forecast module:

- A summary sales report (**salesReport_xx**)
- A summary market share report (**shareReport_xx**)
- Detailed account stock forecast (**customerCounts_xx**)
- Detailed market segment/end use equipment sales forecast (**eUsage_xx**)
- Detailed sales projections (**demandByVintage_xx**)

These reports can be browsed directly as described above, or exported to Excel. To accomplish the latter simply click on "Reports: Export Basic Reports to Excel" and select the Forecast module scenario to export.

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4 Notice that there is no scenario indicator on the **initialCalibrationRatio** dataset. This is because only one scenario per Model should be calibrated; all other scenarios within that model can then be developed from the calibrated **usageParameters_xx** or successor datasets.

5 Please contact The Cadmus Group (Quantec) for more information or to obtain a customized calibration routine

End Use Forecaster also produces reports that can be customized based upon the user's choice of segmentation combinations to analyze. These reports summarize and/or compare forecasts for two forecast scenarios specified by clicking on "Reports: Scenario Comparison Reports." The user specifies the Report Category (sales, market share, customer counts or demand by vintage) and, based on the category selection, is given the option of selecting different combinations of segments to summarize and/or compare.

Appendix: Variable Glossary

This glossary provides definitions for each End Use Forecaster SAS variable, and is organized by the model's libraries and datasets as defined in Chapter III.

Table 14. INPUT\accountDecay_xx

Variable Name	Description
z	The indicator for Dimension 1
b	The indicator for Dimension 2
vintage	Building vintage
accountDecayIndicator	Account decay indicator
accountDecayParm1	Account decay parameter 1
accountDecayParm2	Account decay parameter 2
accountDecayParm3	Account decay parameter 3
accountDecayParm4	Account decay parameter 4

Table 15. INPUT\calibrationZ

Variable Name	Description
z	The indicator for Dimension 1
year	Year of forecast (0 to rorecast horizon)
actualSales	Actual sales in base year

Table 16. INPUT\calibrationZB

Variable Name	Description
z	The indicator for Dimension 1
b	The indicator for Dimension 2
year	Year
actualSales	Actual sales in base year

Table 17. INPUT\choiceBatchControl

Variable Name	Description
scenarioName	Descriptive name of the scenario
scenario	Output scenario number
choiceDrivers	Scenario to select for the choiceDrivers_xx dataset
priceForecast	Scenario to select for the priceForecast_xx dataset
choiceParameters	Scenario to select for the choiceParameters_xx dataset
usageAnnual	Scenario to select for the usageAnnual_xx dataset
eSharesInitial	Scenario to select for the eSharesInitial_xx dataset
fSharesInitial	Scenario to select for the fSharesInitial_xx dataset
eChoiceStatus	Scenario to select for the eChoiceStatus_xx dataset
fChoiceStatus	Scenario to select for the fChoiceStatus_xx dataset

Table 18. INPUT\choiceDrivers_xx

Variable Name	Description
z	The indicator for Dimension 1
b	The indicator for Dimension 2
n	The indicator for Dimension 3
f	The indicator for Dimension 4
e	The indicator for Dimension 5
year	Year
available	Binary switch to indicate availability of the alternative in any given year of the forecast
capitalCostExisting	Capitial cost for equipment in existing (replacement) construction
capitalCostConversion	Capital cost for equipment for conversion customers
capitalCostNew	Capital costs for equipment for new construction

Table 19. INPUT\choiceParameters_xx

Variable Name	Description
Z	The indicator for Dimension 1
B	The indicator for Dimension 2
N	The indicator for Dimension 3
f	The indicator for Dimension 4
eIndicator	Binary switch for choice modeling to indicate the dimension modeled (0 = Dimension 4 and 1 = Dimension 5)
conType	Type of construction or customer (new, existing, or conversion)
lifetime	Equipment or measure lifetime (years)
alpha	Constant
description	Description of Choice
discountRate	Implicit discount rate
priceShare	Price share of customer utility function
a1	Intercept for alternative 1
a2	Intercept for alternative 2
a3	Intercept for alternative 3
a4	Intercept for alternative 4
b1	Operating cost coefficient
b2	Capital cost coefficient

Table 20. INPUT\customerAccountsActual_xx

Variable Name	Description
Z	The indicator for Dimension 1
B	The indicator for Dimension 2
vintage	Building vintage
unitsPerAccount	Units per Dimension 1-2 and vintage combination (square footage, number of apartments, etc.). This should be set to 1 if the unit is the customer
accounts	Number of accounts.
onMainAccounts	Number of accounts on main.
offMainAccounts	Number of accounts off main.

Table 21. INPUT\customerAccountsForecast_xx

Variable Name	Description
z	The indicator for Dimension 1
b	The indicator for Dimension 2
year	Year
unitsPerAccount	Units per Dimension 1-2 and vintage combination (square footage, number of apartments, etc.). This should be set to 1 if the unit is the customer
newConstructionAccounts	New Construction accounts.
newConstructionCaptureRate	The "capture" rate of NEWCONST = the share of new buildings that are customers
conversionCaptureRate	The share (%) of existing non-customers converting or becoming a customer each year

Table 22. INPUT\dimens

Variable Name	Description
DIM	Dimension
DIMNAME	Dimension Name
DIMNUM	Starting Levels

Table 23. INPUT\dsmEChoice_xx

Variable Name	Description
z	The indicator for Dimension 1
b	The indicator for Dimension 2
n	The indicator for Dimension 3
f	The indicator for Dimension 4
conType	Type of construction or customer (new, existing, or conversion)
yearIntroduced	Year of Program Introduction
programLife	Duration of Program (Years)
adoptionPath	Years to Full Adoption
applicability	Percent of Customers Applicable
eLevel	e Level to Which Program Applies
marketShare	Market Share Percent
earlyReplacement	Early Replacement (binary)
description	Program Description

Table 24. INPUT\dsmFChoice_xx

Variable Name	Description
z	The indicator for Dimension 1
b	The indicator for Dimension 2
n	The indicator for Dimension 3
conType	Type of construction or customer (new, existing, or conversion)
yearIntroduced	Year of Program Introduction
programLife	Duration of Program (Years)
adoptionPath	Years to Full Adoption
applicability	Percent of Customers Applicable
marketShare	Market Share Percent
earlyReplacement	Early Replacement (binary)
description	Program Description

Table 25. INPUT\dsmRetrofit_xx

Variable Name	Description
z	The indicator for Dimension 1
b	The indicator for Dimension 2
n	The indicator for Dimension 3
f	The indicator for Dimension 4
yearIntroduced	Year of Program Introduction
programLife	Duration of Program (Years)
measureLife	The average life of Dimension 3 equipment
eImprovement	The efficiency improvement (%) as reflected by the reduction in equipment energy usage.
adoptionPath	Years to Full Adoption
vintageApplicability	Vintages to Which Programs Apply
applicability	Percent of Customers Applicable
marketShare	Market Share Percent
earlyReplacement	Early Replacement (binary)
eLevel	Lowest e Level to Which Program Applies
description	Program Description

Table 26. INPUT\eChoiceStatus_xx

Variable Name	Description
z	The indicator for Dimension 1
b	The indicator for Dimension 2
n	The indicator for Dimension 3
f	The indicator for Dimension 4
eChoiceStatus	This is a "status" variable for Dimension 5. It tells the Provider Choice module which of several possible equation/modeling processing should be followed.
eAlternatives	The number of choice alternatives for Dimension 5, which ranges from 1-4

Table 27. INPUT\eSharesInitial_xx

Variable Name	Description
z	The indicator for Dimension 1
b	The indicator for Dimension 2
n	The indicator for Dimension 3
f	The indicator for Dimension 4
e	The indicator for Dimension 5
baseAvgEShare	The average market share in the historical stock at Dimension 5
baseMargEShareExisting	The marginal (i.e., most recent) market share associated with the replacement of the product or service option by existing customers
baseMargEShareConversion	The marginal market share associated with conversion customers
baseMargEShareNew	The marginal market share associated with the new construction customers
peakDayLoadFactor	The peak demand or peak day load factor associated with annual usage for each Dimension 1-5 combination.

Table 28. INPUT\equipmentAge_xx

Variable Name	Description
z	The indicator for Dimension 1
b	The indicator for Dimension 2
n	The indicator for Dimension 3
equipmentMaxAge	The maximum age of existing equipment for each Dimension 1-3 combination regardless of the historical vintage
equipmentMeanAge	The average age of existing equipment for each Dimension 1-3 combination and each historical vintage
vintage	Building vintage

Table 29. INPUT\equipmentDecay_xx

Variable Name	Description
z	The indicator for Dimension 1
b	The indicator for Dimension 2
n	The indicator for Dimension 3
f	The indicator for Dimension 4
conType	Type of construction or customer (new, existing, or conversion)
equipmentDecayIndicator	Equipment decay indicator
equipmentDecayParm1	Equipment decay paramater 1
equipmentDecayParm2	Equipment decay paramater 2
equipmentDecayParm3	Equipment decay paramater 3
equipmentDecayParm4	Equipment decay paramater 4

Table 30. INPUT\fChoiceStatus_xx

Variable Name	Description
z	The indicator for Dimension 1
b	The indicator for Dimension 2
n	The indicator for Dimension 3
fChoiceStatus	This is a “status” variable for Dimension 4. It tells the Provider Choice module which of several possible equation/modeling processing should be followed.
fAlternatives	The number of choice alternatives for Dimension 4, which ranges from 1-4

Table 31. INPUT\forecastBatchControl

Variable Name	Description
scenarioName	Descriptive name of the output scenario
scenario	Output scenario number
accountDecay	Scenario to select for the accountDecay_xx dataset
equipmentDecay	Scenario to select for the equipmentDecay_xx dataset
equipmentAge	Scenario to select for the equipmentAge_xx dataset
saturations	Scenario to select for the saturations_xx dataset
customerCountsActual	Scenario to select for the customerCountsActual_xx dataset
customerCountsForecast	Scenario to select for the customerCountsForecast_xx dataset
usageAnnual	Scenario to select for the usageAnnual_xx dataset
eSharesFinal	Scenario to select for the eSharesFinal_xx dataset
fSharesFinal	Scenario to select for the fSharesFinal_xx dataset

Table 32. INPUT\fsharesInitial_xx

Variable Name	Description
z	The indicator for Dimension 1
b	The indicator for Dimension 2
n	The indicator for Dimension 3
f	The indicator for Dimension 4
baseAvgFShare	The average market share in the historical stock at Dimension 4.
baseMargFShareExisting	The marginal (i.e., most recent) market share associated with the replacement of the product or service by existing customers
baseMargFShareConversion	The marginal market share associated with the conversion customers
baseMargFShareNew	The marginal market share associated with the new construction customers

Table 33. INPUT\initParm

Variable Name	Description
BASEYR	Base Year
FCSTYRS	Forecast Years

Table 34. INPUT\priceForecast_xx

Variable Name	Description
z	The indicator for Dimension 1
b	The indicator for Dimension 2
n	The indicator for Dimension 3
f	The indicator for Dimension 4
year	Year
price	Price (Native Units)

Table 35. INPUT\saturations_xx

Variable Name	Description
z	The indicator for Dimension 1
b	The indicator for Dimension 2
n	The indicator for Dimension 3
year	Year
vintage	Building vintage
saturation	Presence of End Use (Percent)

Table 36. INPUT\scenarioDescriptions

Variable Name	Description
scenario	Output scenario number
scenarioName	Descriptive name of the scenario

Table 37INPUT\usageBatchControl

Variable Name	Description
scenarioName	Descriptive name of the scenario
scenario	Output scenario number
usageParameters	Scenario to select for the usageParameters_xx dataset
usageDrivers	Scenario to select for the usageDrivers_xx dataset

Table 38. INPUT\usageDrivers_xx

Variable Name	Description
z	The indicator for Dimension 1
b	The indicator for Dimension 2
n	The indicator for Dimension 3
f	The indicator for Dimension 4
e	The indicator for Dimension 5
year	Year
month	Month
X0 - X20	Product Usage module forecast drivers

Table 39. INPUT\usageParameters_xx

Variable Name	Description
Z	The indicator for Dimension 1
B	The indicator for Dimension 2
N	The indicator for Dimension 3
F	The indicator for Dimension 4
E	The indicator for Dimension 5
Vintage	Building vintage
B0 - B20	Product Usage module coefficients
usageEquationStatus	This is a “status” variable for the Product Usage module.

Table 40. INTER\eSharesFinal_xx

Variable Name	Description
z	The indicator for Dimension 1
b	The indicator for Dimension 2
n	The indicator for Dimension 3
f	The indicator for Dimension 4
e	The indicator for Dimension 5
year	Year
eshare	Share for Dimension 5
earadop	A 0/1 binary variable where a value of 1 indicates that the marginal market shares apply to all existing customers, not just those who need to replace retired equipment. The default value is 0; a one will be used if specified in the Intervention Strategies CSFUELE\Sxx dataset.
conType	Type of construction or customer (new, existing, or conversion)

Table 41. INTER\fSharesFinal_xx

Variable Name	Description
z	The indicator for Dimension 1
b	The indicator for Dimension 2
n	The indicator for Dimension 3
f	The indicator for Dimension 4
year	Year
fshare	Fuel Share
earadop	A 0/1 binary variable where a value of 1 indicates that the marginal market shares apply to all existing customers, not just those who need to replace retired equipment. The default value is 0; a one will be used if specified in the Intervention Strategies CSFUELE\Sxx dataset.
conType	Type of construction or customer (new, existing, or conversion)

Table 42. INTER\usageAnnual_xx

Variable Name	Description
z	The indicator for Dimension 1
b	The indicator for Dimension 2
n	The indicator for Dimension 3
year	Year
vintage	Building vintage
f	The indicator for Dimension 4
e	The indicator for Dimension 5
use	Annual usage from the usage module for each Dimension 1-5 combination by year and vintage

Table 43. INTER\usageMonthly_xx

Variable Name	Description
vintage	Building vintage
z	The indicator for Dimension 1
b	The indicator for Dimension 2
n	The indicator for Dimension 3
f	The indicator for Dimension 4
e	The indicator for Dimension 5
year	Year
month	Month
use	Monthly usage from the usage module for each Dimension 1-5 combination by year and vintage

Table 44. OUTPUT\customerCounts_xx

Variable Name	Description
z	The indicator for Dimension 1
b	The indicator for Dimension 2
year	Year
unitsPerAccount	Units per Dimension 1-2 and vintage combination (square footage, number of apartments, etc.). This should be set to 1 if the unit is the customer
vintage	Building vintage
remain	All customers and non-customers remaining for each vintage
totalAccounts	The sum of existing, conversion, and new construction customers
cAccounts	Conversion customers
nAccounts	New construction customers
totalUnits	totalAccounts * units per account
cUnits	cAccounts * units per account
nUnits	nAccounts * units per account

Table 45. OUTPUT\demandByVintage_xx

Variable Name	Description
z	The indicator for Dimension 1
b	The indicator for Dimension 2
vintage	Building vintage
year	Year
n	The indicator for Dimension 3
f	The indicator for Dimension 4
e	The indicator for Dimension 5
fuelSpecificUnits	The energy usage associated with a single unit at the full dimension 1 through 5 (zbnfe) level.
unitsPerAccount	Units per Dimension 1-2 and vintage combination (square footage, number of apartments, etc.). This should be set to 1 if the unit is the customer
use	Annual usage from the usage module for each Dimension 1-5 combination by year and vintage
peakDayLoadFactor	The peak demand or peak day load factor associated with annual usage for each Dimension 1-5 combination.
ereplcs	The total number of new Dimension 3 equipment sales from existing customers (who are replacing retired equipment) by year and vintage for each Dimension 1-5 combination
ceus	The total number of new Dimension 3 equipment sales from conversion customers by year and vintage for each Dimension 1-5 combination
neus	The total number of new Dimension 3 equipment sales from new construction customers by year and vintage for each Dimension 1-5 combination
totalUsage	Annual usage from the usage module for each Dimension 1-5 combination by year and vintage
cUsage	The total number of new Dimension 3 equipment sales from conversion customers by year and vintage for each Dimension 1-5 combination
nUsage	The total number of new Dimension 3 equipment sales from new construction customers by year and vintage for each Dimension 1-5 combination
usagePerUnit	Total usage per unit (e.g., square foot, customer, apartment, etc.) for each Dimension 1-5 combination by year and vintage = USE * EEUS
cuseunit	Total conversion usage per unit (e.g., square foot, customer, apartment, etc.) for each Dimension 1-5 combination by year and vintage = USE * CEUS
nuseunit	Total new construction usage per unit (e.g., square foot, customer, apartment, etc.) for each Dimension 1-5 combination by year and vintage = USE * NEUS

Table 46. OUTPUT\eUsage_xx

Variable Name	Description
z	The indicator for Dimension 1
b	The indicator for Dimension 2
vintage	Building vintage
year	Year
n	The indicator for Dimension 3
f	The indicator for Dimension 4
e	The indicator for Dimension 5
fuelSpecificUnits	The energy usage associated with a single unit at the full dimension 1 through 5 (zbnfe) level.

Table 47. OUTPUT\salesReport_xx

Variable Name	Description
z	The indicator for Dimension 1
b	The indicator for Dimension 2
n	The indicator for Dimension 3
f	The indicator for Dimension 4
year	Year
totalAccounts	The sum of existing, conversion, and new construction customers
totalUnits	totalAccounts * units per account
fuelSpecificUnits	The energy usage associated with a single unit at the full dimension 1 through 5 (zbnfe) level.
totalUsage	Annual usage from the usage module for each Dimension 1-5 combination by year and vintage
peakUsage	Annual peak usage from the usage module for each Dimension 1-5 combination by year and vintage
effeeus1 - effeeus4	This is the average number of fuel specific end-uses (FEUS) across the possible Dimension 5 (efficiency) levels, and is identical to AVGEU(1-4) in VNTFMKSH\Sxx
effuec1 - effuec4	The annual usage for each Dimension 5 level associated with each Dimension 1-4 combination. These estimates come directly from USE is USEANN\Sxx
effuse1 - effuse4	The total usage for each Dimension 1-5 combination by year and vintage. These estimates come directly from EUSE in VNTFDEMD\\Sxx
unitsPerAccount	Units per Dimension 1-2 and vintage combination (square footage, number of apartments, etc.). This should be set to 1 if the unit is the customer
uec	Sales per End Use Unit
fuelSpecificUnitsPerAccount	Fuel-Specific End-Use Units per Account
totalUsagePerAccount	Sales per Account

Table 48. OUTPUT\shareReport_xx

Variable Name	Description
z	The indicator for Dimension 1
b	The indicator for Dimension 2
n	The indicator for Dimension 3
f	The indicator for Dimension 4
year	Year
totalAccounts	The sum of existing, conversion, and new construction customers
totalUnits	totalAccounts * units per account
fuelSpecificUnits	The energy usage associated with a single unit at the full dimension 1 through 5 (zbnfe) level.
effeeus1 - effeeus4	This is the average number of fuel specific end-uses (FEUS) across the possible Dimension 5 (efficiency) levels, and is identical to AVGEU(1-4) in VNTFMKSH\Sxx
averageShareEff1 - averageShareEff4	The average stock share of Dimension 5 for each Dimension 1-4 combination
fshareExisting	The fourth dimension (fuel) market share for existing (replacement equipment) customers
fshareNew	The fourth dimension (fuel) market share for new construction customers
fshareConversion	The fourth dimension (fuel) market share for conversion customers
marginalShareExisting1 - marginalShareExisting4	The marginal (existing equipment) share of Dimension 5 for each Dimension 1-4 combination
marginalShareNew1 - marginalShareNew4	The marginal (new equipment) share of Dimension 5 for each Dimension 1-4 combination
marginalShareConversion1 - marginalShareConversion4	The marginal (conversion equipment) share of Dimension 5 for each Dimension 1-4 combination

The End Use Forecaster's data requirements are extensive and diverse; in practically every case, the set of sources necessary to fulfill them are equally varied. For the five Gas Company models, the data sources fell into four categories.

- Company-specific primary research – Studies conducted by or for the Gas Company help to characterize the market for different segments.
- Company databases – The Gas Company's MAS, for example, and other internal data sources have indispensable historical data on the customer counts and consumption patterns.
- Secondary data sources – Recent state projects by CALMAC, for example, have information on baseline end-use consumption and equipment costs.
- Assumptions – Professional judgment or assumptions based on previous model inputs are necessary to fill in those areas where other data sources are insufficient.

For nearly every input, more than one source was considered during the process of populating the model. The principal criterion for selection of the final source was the "reasonableness" of the results. In cases where alternative source produced similar results, preference was given to more recent and company-specific data. In some cases, multiple sources were used where one complemented another. The specific sources for each individual input are documented in Excel workbooks used during data development or in the SAS code used to populate the model. The final values used in the model are available in the SAS data sets for the various modules.

Residential Model

The residential model had the most consistent and robust set of sources. An analysis of raw data from the Gas Company's most recent RASS provided customized inputs for many of the customer characteristics. Data from CALMAC were available for unit energy consumption and equipment costs for the primary end uses. Gas Company data on customer counts, consumption, and meter forecasts were easily produced in a format consistent with the chosen segmentation design.

Usage Module - Residential

Data Set	Variable	Source	Notes
Input.UsageParameters_10	B0 (UEC)	CALMAC California Statewide Residential Sector Energy Efficiency Potential Study, Volume II: Appendices	Stock or standard efficiency UECs taken from "Base Tech UEC" inputs. UECs for higher efficiencies based on "Energy Savings" inputs.
	B1 (Price Elasticity)	SoCal Gas econometric model outputs	
Input.UsageDrivers_10	X0 (UEC)	Default values.	Forecast drivers
	X1 (Price)	SoCal Gas price forecasts	Marginal price forecast applied in usage module.
Input.UsageParameters_10	ADJUST	SoCal Gas historical customer data	Adjustment to UECs by vintage based on SoCal Gas historical use per customer.

Choice Module - Residential

Data Set	Variable	Source	Notes
Input.ChoiceParameters_10	Lifetime	SoCal Gas RASS	
	DiscountRate	Default	
	PriceShare	Default	
	A1, A2, A3, B1, B2	Default Starting Values	Some initial parameters changed during operation of choice module to allow calibration.
Input.ChoiceDrivers_10	CapitalCostExisting, CapitalCostNew, CapitalCostConversion	CALMAC California Statewide Residential Sector Energy Efficiency Potential Study, Volume II: Appendices	Where costs were not available from CALMAC, values from previous SoCal Gas residential model were adapted to accommodate additional efficiency level in current version
	Available	Assumptions	Stock efficiency level assumed unavailable after base year.
Input.FSharesInitial_10	BaseAvgFShare, BaseMargFShareExisting, BaseMargFShareConversion, BaseMargFShareNew	SoCal Gas RASS	
Input.ESharesInitial_10	BaseAvgEShare, BaseMargEShareExisting, BaseMargEShareConversion, BaseMargEShareNew	Assumptions, previous residential model, and CALMAC *California Statewide Residential Sector Energy Efficiency Potential Study, Volume II: Appendices*	

Forecast Module - Residential

Data Set	Variable	Source	Notes
Input.CustomerCountsActual_10	ACCTSY0	SoCal Gas historical customer data	
Input.CustomerCountsForecast_10	NEWCONST	SoCal Gas residential meter forecasts	
	UPA	Default	Units Per Account: set to one for single- and multi-family dwellings. Master- and sub-metered adjusted to account for customer counts per meter.
Input.AccountDecay_10	AccountDecayIndicator, AccountDecayParm1-4	SoCal Gas	No decay applied to new construction.
Input.EquipmentDecay_10	EquipmentDecayIndicator, EquipmentDecayParm1-4	Assumptions	Exponential decay function applied based on measure life assumptions. Logistic decay function applied based on measure life assumptions.
Input.EquipmentAge_10	EquipmentMeanAge, EquipmentMaxAge	SoCal Gas RASS	
Input.Saturations_10	SAT	SoCal Gas RASS	

Commercial Core and Non-Core Models

The Core and Non-Core Commercial models share the same sources for data. For most of the inputs, these sources provide identical values for both models. That is the sources for data do not show any distinction in the end use intensity (EUI) values, end-use saturations, and fuel and efficiency shares for the two models. The fundamental difference in the models is the Gas Company's customer counts for the different building types. Less significantly, price forecasts, which have an influence on both usage and choice modules, are also different for the two models.

Usage Module – Commercial Core and Noncore

End Use Forecaster's Library and Data Set	End Use Forecaster Variable(s)	Source	Notes
Input.UsageParameters_10	B0 (EUI)	SDG&E 2000 Commercial EUI Study, CALMAC *California Statewide Commercial Sector Natural Gas Energy Efficiency Potential Study, Volume II: Appendices*	Stock efficiency EUIs taken from SDG&E study. EUIs for higher efficiencies based on "Energy Savings" inputs from CALMAC.
	B1 (Price Elasticity)	SoCal Gas econometric model outputs	
Input.UsageDrivers_10	X0 (EUI)	Default values	Forecast drivers
	X1 (Price)	SoCal Gas price forecasts	Marginal price forecast applied in usage module.

Choice Module – Commercial Core and Noncore

Data Set	Variable	Source	Notes
Input. ChoiceParameters_10	Lifetime	So Cal Gas MAS, Assumptions	
	DiscountRate	Default Assumptions – 25%	The 25% customer discount rate stems from the implicit discount rate literature.
	PriceShare	Default Assumptions – 50%	The 50% price share assumption on previous Cadmus Group (formerly Quantec) research on how customers trade off price vs. non price attributes
	A1, A2, A3, B1, B2	Default Starting Values	Some initial parameters changed during operation of choice module to allow calibration.
Input. ChoiceDrivers_10	CapitalCostExisting, CapitalCostConversion, CapitalCostNew	So Cal Gas Average Price Forecast, Assumptions	Operating costs based on equipment usage data and SoCal Gas price forecast, with capital costs calculated based on assumed ratios of operating to capital costs.
	Available	Assumptions	Stock efficiency level assumed unavailable after base year.
Input. FSharesInitial_10	BaseAvgFShare, BaseMargFShareExisting, BaseMargFShareConversion, BaseMargFShareNew	SDG&E 2000 Commercial EUI Study, 1996 SoCal Gas Commercial & Industrial Energy Equipment Market Share Study	
Input. ESharesInitial_10	BaseAvgEShare, BaseMargEShareExisting, BaseMargEShareConversion, BaseMargEShareNew	Assumptions	10% high efficiency share(s) based on professional judgment and DSM free ridership literature.

Forecast Module – Commercial Core and Noncore

Data Set	Variable	Source	Notes
Input.CustomerCountsActual_10	ACCTSY0	SoCal Gas historical customer data	Base year accounts data.
Input.CustomerCountsForecast_10	NEWCONST	SoCal Gas historical customer data, SoCal Gas employment forecasts, and SoCal Gas employment elasticity from econometric model	New Construction.
	UPA	MAS	Units Per Account.
Input.AccountDecay_10	AccountDecayIndicator, AccountDecayParm1-4	Assumptions	No decay applied to existing accounts. No decay applied to new construction.
Input.EquipmentDecay_10	EquipmentDecayIndicator, EquipmentDecayParm1-4	Assumptions	Exponential decay function applied based on measure life assumptions. Logistic decay function applied based on measure life assumptions
Input.EquipmentAge_10	EquipmentMaxAge, EquipmentMeanAge	SoCal Gas MAS	
Input.Saturations_10	SAT	SDG&E 2000 Commercial EUI Study	

Industrial Core and Non-Core Models

The Core and Non-Core Industrial models also share the same data sources. Unlike the sources for the commercial models, the data from the Gas Company's MAS – one of the primary inputs into to calculation of the UECs – are different for core and non-core sectors. Consequently, the final UEC for a given building's end use can vary significantly between the models. As with the commercial models, the Gas Company's historical customer counts also drive differences in the forecasts.

Usage Module – Industrial Core and Noncore

Data Set	Variable	Source	Notes
Input.UsageParameters_10	B0 (EUI)	SoCal Gas MAS, SoCal Gas Commercial & Industrial Energy Equipment Market Share Study	UECs based on a top-down calculation based on historical use per customer, end-use saturations, and fuel shares.
	B1 (Price Elasticity)	SoCal Gas econometric model outputs	
Input.UsageDrivers_10	X0 (EUI)	Default values.	Forecast drivers
	X1 (Price)	SoCal Gas price forecasts	Marginal price forecast applied in usage module.

Choice Module – Industrial Core and Noncore

Data Set	Variable	Source	Notes
Input.ChoiceParameters_10	Lifetime	So Cal Gas MAS, Assumptions	
	DiscountRate	Default	
	PriceShare	Default	
	A1, A2, A3, B1, B2	Default Starting Values	Some initial parameters changed during operation of choice module to allow calibration.
Input.ChoiceDrivers_10	CapitalCostExisting, CapitalCostNew, CapitalCostConversion	So Cal Gas Average Price Forecast, Assumptions	Operating costs based on equipment usage data and SoCal Gas price forecast, with capital costs calculated based on assumed ratios of operating to capital costs.
	Available	Assumptions	Stock efficiency level assumed unavailable after base year.
Input.FSharesInitial_10	BaseAvgFShare, BaseMargFShareExisting, BaseMargFShareConversion, BaseMargFShareNew	SoCal Gas Commercial & Industrial Energy Equipment Market Share Study	
Input.ESharesInitial_10	BaseAvgEShare, BaseMargEShareExisting, BaseMargEShareConversion, BaseMargEShareNew	Assumptions.	

Forecast Module – Industrial Core and Noncore

Data Set	Variable	Source	Notes
Input.CustomerCountsActual_10	ACCTSY0	SoCal Gas historical customer data	
Input.CustomerCountsForecast_10	NEWCONST	SoCal Gas historical customer data, SoCal Gas employment forecasts, and SoCal Gas employment elasticity from econometric model	
	UPA	MAS	Units Per Account
Input.AccountDecay_10	AccountDecayIndicator, AccountDecayParm1-4	Assumptions	No decay applied to existing accounts.
Input.EquipmentDecay_10	EquipmentDecayIndicator, EquipmentDecayParm1-4	Assumptions	Exponential decay function applied based on measure life assumptions. Logistic decay function applied based on measure life assumptions.
Input.EquipmentAge_10	EquipmentMaxAge, EquipmentMeanAge	SoCal Gas MAS	
Input.Saturations_10	SAT	SoCalGas RASS	