

Table 1
Marginal Costs of Energy from PMDAM (1995\$, m/kwh)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	
Hour of Day:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1	Month: October																									
2	Day: Sunday																									
3	1996	14.99	14.74	14.53	14.45	14.59	14.94	15.2	15.48	15.67	15.83	15.83	15.82	15.64	15.63	15.58	15.59	15.66	15.75	15.88	15.89	15.82	15.59	15.31	14.26	
4	1997	15.93	15.64	15.5	15.41	15.44	15.84	16.3	16.7	16.88	16.99	17.02	16.97	16.85	16.81	16.76	16.76	16.82	16.96	17.03	17.1	16.99	16.8	16.38	15.04	
5	1998	15.29	15.09	14.99	14.89	14.99	15.2	15.47	15.75	15.93	16.04	16.06	16.04	15.9	15.87	15.86	15.84	15.88	15.95	16.12	16.1	16	15.89	15.56	14.67	
6	1999	14.36	14.12	14.01	13.97	14.01	14.29	14.59	14.86	15.02	15.13	15.14	15.12	15.04	14.99	14.95	14.92	15.01	15.1	15.24	15.24	15.18	14.99	14.65	13.91	
7	2000	13.19	13.07	12.97	12.98	12.98	13.14	13.42	13.69	13.87	14	13.96	13.96	13.83	13.84	13.75	13.77	13.83	13.93	14.06	14.07	14.01	13.8	13.43	12.96	
8	Levelized:	14.1	13.9	13.8	13.7	13.8	14.1	14.4	14.6	14.8	14.9	14.9	14.9	14.8	14.8	14.7	14.7	14.8	14.9	15.0	15.0	14.9	14.8	14.4	13.6	
9	Month: October																									
10	Day: Weekday																									
11	1996	14.8	14.53	14.36	14.36	14.78	15.33	15.86	16.18	16.17	16.18	16.15	16.09	15.96	15.95	15.92	15.87	15.89	15.96	16.08	16.06	15.89	15.68	15.37	14.66	
12	1997	15.9	15.64	15.56	15.54	15.84	16.49	17.08	17.37	17.38	17.39	17.37	17.28	17.18	17.15	17.14	17.11	17.1	17.19	17.29	17.29	17.11	16.91	16.55	15.7	
13	1998	15.18	15	14.88	14.92	15.08	15.64	16.11	16.37	16.41	16.38	16.33	16.32	16.2	16.15	16.15	16.13	16.12	16.19	16.32	16.3	16.14	15.92	15.64	14.95	
14	1999	14.24	14.04	13.96	13.95	14.18	14.69	15.2	15.46	15.55	15.54	15.53	15.47	15.35	15.35	15.32	15.26	15.25	15.31	15.46	15.45	15.31	15.07	14.76	14.17	
15	2000	13.12	12.99	12.92	12.96	13.14	13.57	14.06	14.35	14.39	14.41	14.38	14.29	14.19	14.18	14.18	14.11	14.13	14.2	14.3	14.31	14.18	13.93	13.62	13.09	
16	Levelized:	14.0	13.8	13.7	13.7	14.0	14.5	15.0	15.3	15.3	15.3	15.3	15.2	15.1	15.1	15.1	15.1	15.0	15.1	15.2	15.2	15.1	14.8	14.5	13.9	
17	Month: October																									
18	Day: Saturday																									
19	1996	15.12	14.85	14.76	14.6	14.71	15.04	15.25	15.55	15.8	15.93	15.93	15.84	15.73	15.65	15.58	15.55	15.64	15.68	15.81	15.8	15.68	15.5	15.28	14.45	
20	1997	16.14	15.8	15.71	15.61	15.66	16.01	16.38	16.75	17	17.12	17.12	17.05	16.93	16.87	16.82	16.76	16.83	16.9	17.03	16.98	16.91	16.7	16.39	15.39	
21	1998	15.42	15.24	15.16	15.09	15.15	15.28	15.54	15.82	16.05	16.13	16.16	16.12	15.98	15.92	15.85	15.86	15.88	15.96	16.06	16.03	15.96	15.82	15.59	14.84	
22	1999	14.49	14.29	14.17	14.05	14.11	14.38	14.65	14.91	15.19	15.29	15.32	15.24	15.13	15.05	15.01	14.96	15	15.07	15.21	15.22	15.11	14.93	14.66	14.11	
23	2000	13.37	13.2	13.14	13.05	13.05	13.28	13.5	13.75	13.99	14.14	14.12	14.08	13.97	13.9	13.87	13.87	13.87	13.92	14.08	14.03	13.93	13.77	13.51	13.08	
24	Levelized:	14.3	14.1	14.0	13.9	13.9	14.2	14.4	14.7	14.9	15.1	15.1	15.0	14.9	14.8	14.8	14.7	14.8	14.8	15.0	15.0	14.9	14.7	14.4	13.8	
25	Month: November																									
26	Day: Sunday																									
27	1996	15.18	15.06	15.01	14.99	15.01	15.13	15.31	15.63	15.87	15.97	15.97	15.92	15.78	15.7	15.65	15.67	15.89	16.17	16.11	16.06	15.94	15.7	15.4	14.86	
28	1997	16.19	16.06	15.91	15.89	15.94	16.2	16.48	16.73	16.93	17.05	17.02	17.01	16.85	16.79	16.76	16.81	16.99	17.2	17.15	17.07	17	16.8	16.5	15.81	
29	1998	15.44	15.32	15.25	15.26	15.31	15.43	15.56	15.84	16.1	16.18	16.2	16.19	16	15.95	15.9	15.9	16.15	16.34	16.28	16.24	16.12	15.93	15.67	15.09	
30	1999	14.48	14.36	14.25	14.25	14.27	14.42	14.68	15	15.19	15.34	15.28	15.27	15.09	15.03	14.99	14.98	15.22	15.47	15.43	15.32	15.21	15.03	14.72	14.18	
31	2000	13.48	13.35	13.23	13.2	13.25	13.44	13.62	13.95	14.13	14.28	14.29	14.27	14.08	14.02	13.99	14.01	14.22	14.44	14.42	14.33	14.23	14.05	13.7	13.23	
32	Levelized:	14.3	14.2	14.1	14.1	14.1	14.3	14.5	14.8	15.0	15.1	15.1	14.9	14.8	14.8	14.8	14.8	15.0	15.2	15.2	15.1	15.0	14.8	14.6	14.0	
33	Month: November																									
34	Day: Weekday																									
35	1996	15.1	14.99	14.97	14.96	15.08	15.47	16.02	16.38	16.39	16.37	16.34	16.2	16.04	15.99	15.98	15.96	16.19	16.48	16.42	16.26	16.05	15.82	15.53	14.98	
36	1997	16.1	15.99	15.92	15.94	16.12	16.57	17.13	17.43	17.45	17.35	17.32	17.25	17.12	17.11	17.04	17.03	17.27	17.53	17.45	17.32	17.17	16.92	16.64	16.02	
37	1998	15.36	15.3	15.17	15.25	15.38	15.69	16.21	16.48	16.54	16.48	16.44	16.37	16.23	16.19	16.17	16.14	16.35	16.58	16.52	16.42	16.28	16.04	15.76	15.21	
38	1999	14.39	14.27	14.24	14.24	14.4	14.79	15.32	15.63	15.69	15.64	15.59	15.46	15.39	15.36	15.3	15.28	15.47	15.76	15.7	15.55	15.42	15.15	14.84	14.32	
39	2000	13.36	13.22	13.18	13.21	13.34	13.77	14.29	14.59	14.63	14.6	14.57	14.47	14.34	14.34	14.27	14.3	14.5	14.72	14.65	14.54	14.38	14.16	13.83	13.34	
40	Levelized:	14.2	14.1	14.1	14.1	14.2	14.6	15.1	15.4	15.5	15.4	15.4	15.3	15.2	15.1	15.1	15.1	15.3	15.5	15.5	15.3	15.2	15.0	14.7	14.1	
41	Month: November																									
42	Day: Saturday																									
43	1996	15.22	15.12	15.08	15.02	15.07	15.24	15.4	15.75	16	16.12	16.11	16.04	15.84	15.73	15.7	15.69	15.95	16.2	16.08	15.97	15.84	15.66	15.46	14.92	
44	1997	16.2	15.98	15.89	15.85	15.94	16.2	16.46	16.85	17.04	17.13	17.17	17.03	16.87	16.8	16.76	16.79	17.02	17.21	17.12	17.03	16.92	16.71	16.48	15.68	
45	1998	15.52	15.4	15.37	15.32	15.41	15.49	15.67	16	16.21	16.3	16.31	16.23	16.11	16.02	15.97	15.94	16.19	16.36	16.28	16.2	16.09	15.92	15.72	15.21	
46	1999	14.49	14.4	14.33	14.28	14.35	14.5	14.71	15.09	15.32	15.39	15.41	15.31	15.18	15.09	15.01	15.06	15.29	15.48	15.42	15.29	15.18	15.06	14.73	14.22	
47	2000	13.49	13.36	13.27	13.25	13.27	13.49	13.72	14.03	14.3	14.4	14.4	14.34	14.14	14.05	14	14.03	14.25	14.46	14.36	14.27	14.17	14.01	13.71	13.21	
48	Levelized:	14.3	14.2	14.2	14.1	14.2	14.3	14.5	14.9	15.1	15.2	15.2	15.1	15.0	14.9	14.8	14.8	15.1	15.3	15.2	15.1	15.0	14.8	14.6	14.0	
49	Month: December																									
50	Day: Sunday																									
51	1996	14.74	14.62	14.63	14.6	14.61	14.7	14.8	15.08	15.32	15.38	15.37	15.34	15.18	15.11	15.07	15.1	15.35	15.51	15.49	15.37	15.34	15.15	14.95	14.5	
52	1997	16.24	16.14	16.03	16.05	16.07	16.19	16.34	16.57	16.82	16.94	16.9	16.84	16.7	16.6	16.56	16.62	16.84	17.01	16.95	16.88	16.8	16.67	16.42	15.98	
53	1998	15.65	15.51	15.44	15.46	15.47	15.59	15.74	15.98	16.25	16.34	16.28	16.23	16.08	16.01	15.97	15.94	16.23	16.44	16.37	16.31	16.19	16.04	15.82	15.41	
54	1999	14.76	14.62	14.55	14.54	14.59	14.7	14.86	15.11	15.37	15.46	15.46	15.4	15.22	15.19	15.08	15.1	15.4	15.58	15.52	15.44	15.32	15.2	14.97	14.47	
55	2000	13.41	13.31	13.27	13.25	13.3	13.39	13.52	13.82	14.08</																

Table 1
Marginal Costs of Energy from PMDAM (1995\$, m/kwh)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	
Hour of Day:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
86	1999	14.09	14.01	13.97	13.94	13.98	14.1	14.29	14.5	14.75	14.84	14.84	14.81	14.63	14.56	14.46	14.48	14.66	14.95	14.92	14.91	14.77	14.55	14.28	13.82	
87	2000	17.67	17.53	17.48	17.49	17.53	17.62	17.84	18.09	18.32	18.42	18.41	18.39	18.22	18.12	18.08	18.05	18.24	18.52	18.49	18.46	18.32	18.09	17.8	17.37	17.37
88	2001	20.61	20.34	20.17	20.15	20.32	20.69	20.98	21.32	21.57	21.65	21.67	21.66	21.46	21.34	21.23	21.22	21.45	21.78	21.76	21.67	21.53	21.29	20.93	20.12	20.12
89	Levelized:	14.7	14.6	14.5	14.5	14.6	14.7	14.9	15.1	15.4	15.5	15.5	15.4	15.3	15.2	15.1	15.1	15.3	15.6	15.6	15.5	15.4	15.2	14.9	14.4	14.4
90	Month:	January																								
91	Day:	Weekday																								
92	1997	13.07	12.99	13.03	13	13.13	13.49	13.97	14.32	14.36	14.31	14.22	14.14	13.97	13.94	13.89	13.87	14.03	14.29	14.26	14.13	14.01	13.8	13.51	12.97	12.97
93	1998	12.25	12.19	12.16	12.17	12.29	12.66	13.2	13.54	13.6	13.53	13.44	13.35	13.22	13.15	13.1	13.13	13.25	13.52	13.49	13.32	13.2	12.99	12.72	12.13	12.13
94	1999	14	13.94	13.92	13.94	14.03	14.38	14.92	15.28	15.32	15.25	15.19	15.06	14.92	14.85	14.85	14.81	14.97	15.26	15.2	15.09	14.97	14.73	14.44	13.92	13.92
95	2000	17.56	17.44	17.4	17.43	17.6	17.94	18.49	18.85	18.83	18.81	18.71	18.61	18.44	18.38	18.33	18.35	18.48	18.82	18.78	18.64	18.51	18.27	17.96	17.52	17.52
96	2001	20.13	19.9	19.84	19.93	20.25	20.99	21.67	22.09	22.13	22.12	21.96	21.86	21.68	21.58	21.53	21.53	21.72	22.09	22.03	21.89	21.69	21.46	21.06	20.2	20.2
97	Levelized:	14.5	14.4	14.4	14.4	14.6	15.0	15.5	15.9	15.9	15.9	15.8	15.7	15.5	15.5	15.4	15.4	15.6	15.9	15.8	15.7	15.5	15.3	15.0	14.5	14.5
98	Month:	January																								
99	Day:	Saturday																								
100	1997	13.21	13.12	13.1	13.05	13.11	13.22	13.44	13.7	13.98	14.08	14.1	14.04	13.84	13.71	13.65	13.64	13.77	14.05	13.99	13.89	13.82	13.64	13.42	12.96	12.96
101	1998	12.39	12.28	12.19	12.2	12.22	12.39	12.57	12.87	13.11	13.24	13.25	13.17	12.98	12.87	12.81	12.77	12.96	13.22	13.16	13.05	12.95	12.77	12.56	12.1	12.1
102	1999	14.16	14.04	14.03	14.02	14.05	14.16	14.38	14.61	14.91	15.06	15.06	14.94	14.77	14.67	14.53	14.54	14.74	15.01	14.97	14.82	14.73	14.58	14.33	13.94	13.94
103	2000	17.71	17.58	17.56	17.57	17.6	17.72	17.89	18.19	18.48	18.59	18.58	18.51	18.33	18.21	18.08	18.08	18.29	18.5	18.5	18.38	18.26	18.13	17.86	17.51	17.51
104	2001	20.51	20.23	20.05	20.06	20.25	20.62	21.02	21.37	21.7	21.87	21.82	21.73	21.53	21.38	21.25	21.26	21.47	21.76	21.75	21.6	21.46	21.23	20.94	20.22	20.22
105	Levelized:	14.7	14.6	14.5	14.5	14.6	14.7	15.0	15.2	15.5	15.6	15.6	15.5	15.4	15.3	15.2	15.1	15.3	15.6	15.5	15.4	15.3	15.2	14.9	14.5	14.5
106	Month:	February																								
107	Day:	Sunday																								
108	1997	15.21	15.12	15.1	15.08	15.1	15.23	15.39	15.65	15.85	15.9	15.83	15.82	15.68	15.62	15.54	15.54	15.63	15.9	15.97	15.96	15.81	15.63	15.42	14.99	14.99
109	1998	10.97	10.89	10.87	10.84	10.88	10.98	11.13	11.41	11.62	11.68	11.66	11.6	11.46	11.38	11.28	11.3	11.42	11.7	11.79	11.76	11.58	11.43	11.17	10.67	10.67
110	1999	14.96	14.85	14.77	14.82	14.87	15.04	15.22	15.46	15.69	15.72	15.72	15.63	15.54	15.44	15.33	15.33	15.45	15.68	15.77	15.75	15.64	15.47	15.22	14.8	14.8
111	2000	19.32	18.96	18.8	18.89	19.13	19.42	19.64	19.9	20.15	20.18	20.16	20.09	19.91	19.83	19.74	19.76	19.89	20.09	20.22	20.17	20.06	19.94	19.62	18.92	18.92
112	2001	19.57	19.3	19.18	19.18	19.31	19.79	20.29	20.71	20.95	21.05	21.05	20.93	20.72	20.55	20.44	20.38	20.56	20.93	21.1	21.03	20.91	20.64	20.23	19.27	19.27
113	Levelized:	15.1	15.0	14.9	14.9	15.0	15.2	15.4	15.7	15.9	16.0	16.0	15.9	15.7	15.7	15.6	15.6	15.7	15.9	16.0	16.0	15.9	15.7	15.4	14.9	14.9
114	Month:	February																								
115	Day:	Weekday																								
116	1997	15.15	15.1	15.08	15.09	15.24	15.48	16.01	16.24	16.32	16.2	16.14	15.99	15.9	15.86	15.8	15.79	15.86	16.13	16.17	16.07	15.99	15.77	15.55	15.08	15.08
117	1998	10.98	10.89	10.88	10.9	11	11.31	11.84	12.22	12.21	12.1	11.96	11.89	11.76	11.73	11.65	11.65	11.69	11.95	12.08	11.98	11.83	11.59	11.33	10.84	10.84
118	1999	14.96	14.87	14.89	14.89	15.01	15.38	15.89	16.14	16.17	16.12	16.04	15.91	15.79	15.71	15.67	15.63	15.71	15.98	16.06	15.95	15.83	15.64	15.38	14.98	14.98
119	2000	19.25	19.05	19.05	19.11	19.37	19.73	20.24	20.61	20.61	20.57	20.47	20.32	20.19	20.11	20.03	20.01	20.07	20.39	20.53	20.38	20.25	20.02	19.75	19.35	19.35
120	2001	19.53	19.33	19.31	19.42	19.81	20.46	21.1	21.51	21.5	21.43	21.27	21.15	21.03	20.95	20.81	20.77	20.93	21.23	21.36	21.25	21.09	20.84	20.5	19.8	19.8
121	Levelized:	15.1	15.0	15.0	15.0	15.2	15.6	16.1	16.4	16.4	16.3	16.2	16.1	16.0	15.9	15.9	15.8	15.9	16.2	16.3	16.2	16.1	15.8	15.6	15.1	15.1
122	Month:	February																								
123	Day:	Saturday																								
124	1997	15.21	15.15	15.07	15.1	15.14	15.26	15.41	15.7	15.94	16.01	15.99	15.88	15.72	15.66	15.57	15.53	15.62	15.83	15.9	15.86	15.71	15.63	15.41	15.01	15.01
125	1998	11.06	10.96	10.91	10.92	10.95	11.05	11.22	11.51	11.72	11.82	11.77	11.7	11.55	11.44	11.37	11.33	11.42	11.66	11.74	11.68	11.56	11.4	11.21	10.79	10.79
126	1999	15.13	15.01	14.95	14.97	15.06	15.13	15.34	15.57	15.82	15.91	15.85	15.77	15.6	15.47	15.39	15.39	15.48	15.73	15.76	15.71	15.61	15.49	15.28	14.98	14.98
127	2000	19.31	19.01	18.92	18.94	19.08	19.43	19.68	19.96	20.16	20.31	20.27	20.11	19.95	19.86	19.74	19.73	19.84	20.07	20.2	20.1	19.98	19.86	19.6	19.19	19.19
128	2001	19.79	19.35	19.15	19.2	19.43	19.98	20.33	20.75	21.08	21.16	21.13	21.03	20.78	20.56	20.45	20.41	20.58	20.92	21.03	20.97	20.76	20.53	20.27	19.61	19.61
129	Levelized:	15.2	15.0	14.9	15.0	15.1	15.3	15.5	15.8	16.0	16.1	16.1	16.0	15.8	15.7	15.6	15.6	15.7	15.9	16.0	15.9	15.8	15.7	15.5	15.0	15.0
130	Month:	March																								
131	Day:	Sunday																								
132	1997	15.88	15.73	15.62	15.61	15.69	15.82	16.13	16.37	16.58																

Table 1
Marginal Costs of Energy from PMDAM (1995\$, m/kwh)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	
Hour of Day:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
256	1998	8.51	8.35	8.29	8.28	8.29	8.46	8.8	9.13	9.34	9.43	9.53	9.52	9.36	9.39	9.4	9.34	9.35	9.34	9.25	9.21	9.18	9.14	8.9	8.3	
257	1999	8.81	8.68	8.61	8.57	8.6	8.77	9.08	9.39	9.58	9.67	9.72	9.76	9.62	9.63	9.62	9.62	9.61	9.57	9.52	9.46	9.45	9.35	9.21	8.66	
258	2000	9.9	9.79	9.69	9.69	9.71	9.86	10.16	10.43	10.61	10.72	10.8	10.81	10.74	10.76	10.75	10.7	10.68	10.62	10.54	10.51	10.44	10.22	9.8		
259	2001	10.26	10.12	10.08	10.07	10.06	10.21	10.51	10.75	10.96	11.07	11.18	11.16	11.06	11.09	11.1	11.07	11.06	10.99	10.94	10.87	10.84	10.76	10.58	10.15	
260	Levelized:	8.9	8.8	8.7	8.7	8.7	8.9	9.2	9.5	9.6	9.7	9.8	9.8	9.7	9.7	9.7	9.7	9.7	9.7	9.6	9.5	9.5	9.5	9.3	8.8	
261																										
262	Month:	July																								
263	Day:	Saturday																								
264	1997	9.43	9.31	9.19	9.14	9.11	9.13	9.28	9.51	9.75	9.95	10.05	10.07	10	9.97	9.93	9.95	9.95	9.96	9.92	9.88	9.85	9.8	9.65	9.03	
265	1999	8.56	8.4	8.31	8.26	8.24	8.24	8.38	8.64	8.9	9.1	9.19	9.19	9.1	9.09	9.07	9.07	9.06	9.09	9.04	9.01	8.97	8.95	8.76	8.15	
266	1999	8.91	8.73	8.65	8.6	8.56	8.6	8.68	8.96	9.24	9.4	9.5	9.5	9.41	9.39	9.35	9.35	9.36	9.37	9.33	9.26	9.28	9.09	8.53		
267	2000	9.97	9.81	9.73	9.72	9.67	9.69	9.78	10.01	10.27	10.44	10.53	10.54	10.46	10.45	10.42	10.43	10.44	10.44	10.37	10.33	10.34	10.28	10.13	9.65	
268	2001	10.35	10.16	10.1	10.08	10.02	10.05	10.17	10.35	10.61	10.82	10.88	10.9	10.79	10.79	10.76	10.75	10.76	10.8	10.74	10.69	10.7	10.64	10.49	10.04	
269	Levelized:	9.0	8.8	8.8	8.7	8.7	8.7	8.8	9.0	9.3	9.5	9.5	9.6	9.5	9.5	9.4	9.4	9.4	9.5	9.4	9.4	9.4	9.3	9.2	8.6	
270																										
271	Month:	August																								
272	Day:	Sunday																								
273	1997	12.62	12.54	12.43	12.39	12.34	12.36	12.39	12.62	12.84	13.06	13.17	13.26	13.18	13.2	13.21	13.23	13.26	13.22	13.2	13.22	13.22	13.12	12.82	12.31	
274	1998	12.19	12.08	12.01	11.96	11.94	11.93	11.92	12.18	12.42	12.68	12.77	12.81	12.77	12.77	12.78	12.78	12.81	12.83	12.79	12.77	12.84	12.7	12.41	11.89	
275	1999	12.57	12.47	12.38	12.29	12.32	12.29	12.33	12.58	12.8	12.99	13.08	13.16	13.12	13.11	13.15	13.17	13.17	13.16	13.12	13.15	13.14	13.04	12.82	12.32	
276	2000	12.73	12.62	12.54	12.49	12.46	12.5	12.51	12.65	12.96	13.1	13.22	13.29	13.25	13.28	13.25	13.27	13.28	13.3	13.27	13.29	13.32	13.21	12.95	12.54	
277	2001	13.16	13.06	12.99	12.92	12.93	12.92	13.15	13.39	13.54	13.68	13.76	13.69	13.69	13.69	13.69	13.72	13.74	13.72	13.69	13.69	13.71	13.63	13.38	12.99	
278	Levelized:	12.1	12.0	11.9	11.8	11.8	11.8	11.8	12.0	12.3	12.5	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.5	12.3	11.8	
279																										
280	Month:	August																								
281	Day:	Weekday																								
282	1997	12.59	12.46	12.42	12.4	12.41	12.61	12.93	13.18	13.41	13.53	13.66	13.69	13.59	13.65	13.62	13.6	13.59	13.54	13.45	13.43	13.37	13.24	12.94	12.44	
283	1998	12.22	12.07	11.97	11.99	12.03	12.21	12.46	12.8	12.97	13.15	13.25	13.25	13.16	13.18	13.21	13.17	13.16	13.15	13.04	12.99	12.94	12.79	12.51	12	
284	1999	12.54	12.44	12.39	12.37	12.41	12.58	12.84	13.15	13.36	13.5	13.6	13.58	13.55	13.56	13.57	13.58	13.53	13.48	13.38	13.34	13.31	13.15	12.88	12.5	
285	2000	12.68	12.57	12.5	12.51	12.53	12.7	12.97	13.27	13.44	13.61	13.72	13.75	13.62	13.75	13.73	13.68	13.67	13.58	13.51	13.47	13.45	13.3	13.05	12.63	
286	2001	13.16	13.01	12.95	12.96	12.96	13.15	13.38	13.65	13.88	14.02	14.11	14.14	14.07	14.12	14.13	14.08	14.07	14.01	13.89	13.88	13.87	13.69	13.44	13.07	
287	Levelized:	12.1	11.9	11.9	11.9	11.9	12.1	12.3	12.6	12.8	12.9	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	12.9	12.8	12.8	12.6	12.4	11.9	
288																										
289	Month:	August																								
290	Day:	Saturday																								
291	1997	12.69	12.53	12.45	12.44	12.43	12.42	12.52	12.75	13.03	13.23	13.33	13.39	13.31	13.32	13.31	13.28	13.3	13.32	13.22	13.16	13.12	13.07	12.86	12.39	
292	1998	12.28	12.13	12.06	11.99	11.97	12	12.09	12.34	12.6	12.81	12.9	12.95	12.85	12.86	12.88	12.87	12.89	12.88	12.81	12.78	12.79	12.68	12.47	11.94	
293	1999	12.63	12.49	12.41	12.39	12.37	12.35	12.47	12.7	12.95	13.17	13.24	13.31	13.2	13.21	13.21	13.24	13.24	13.22	13.11	13.12	13.11	13.03	12.82	12.37	
294	2000	12.77	12.68	12.6	12.55	12.53	12.55	12.62	12.86	13.09	13.28	13.41	13.48	13.37	13.37	13.35	13.36	13.39	13.35	13.29	13.28	13.27	13.16	12.96	12.62	
295	2001	13.23	13.1	13.05	13.01	12.99	13.01	13.05	13.26	13.51	13.72	13.82	13.85	13.77	13.78	13.75	13.79	13.78	13.76	13.68	13.67	13.68	13.56	13.39	13.06	
296	Levelized:	12.1	12.0	11.9	11.9	11.9	12.0	12.2	12.4	12.6	12.7	12.7	12.8	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.6	12.6	12.5	12.3	11.9	
297																										
298	Month:	September																								
299	Day:	Sunday																								
300	1997	16.08	15.75	15.38	15.25	15.16	15.37	16.33	16.94	17.22	17.33	17.41	17.47	17.44	17.38	17.41	17.38	17.35	17.29	17.29	17.31	17.24	16.97	16.63	15.41	
301	1998	15.36	15.11	14.88	14.69	14.63	14.81	15.06	15.56	15.86	16.07	16.19	16.22	16.14	16.15	16.14	16.17	16.16	16.16	16.23	16.27	16.27	16.01	15.69	14.29	
302	1999	14.19	13.91	13.67	13.6	13.51	13.68	13.93	14.39	14.73	14.9	15.05	15.08	15.02	15.02	14.96	15.06	15.08	15.05	15.12	15.11	14.92	14.54	13.38		
303	2000	13.05	12.9	12.78	12.71	12.65	12.74	12.81	13.16	13.49	13.72	13.77	13.83	13.79	13.81	13.77	13.79	13.83	13.83	13.83	13.93	13.88	13.67	13.33	12.57	
304	2001	15.03	14.71	14.52	14.38	14.36	14.52	14.74	15.2	15.48	15.73	15.82	15.86	15.75	15.77	15.79	15.73	15.78	15.82	15.78	15.91	15.86	15.67	15.36	14.43	
305	Levelized:	14.1	13.9	13.6	13.5	13.5	13.6	13.8	14.3	14.6	14.8	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	15.0	15.0	14.8	14.4	13.2
306																										
307	Month:	September																								
308	Day:	Weekday																								
309	1997	15.84	15.49	15.21	15.11	15.37	16.33	16.94	17.22	17.33	17.41	17.47	17.44	17.38	17.41	17.38	17.38	17.35	17.29	17.29	17.31	17.24	16.97	16.63	15.41	
310	1998	15.19	14.88	14.68	14.62	14.76	15.49	16.03	16.34	16.44	16.53	16.54	16.54	16.45	16.49	16.55	16.48	16.48	16.42	16.36	16.43	16.35	16.1	15.83	14.85	
311	1999	13.96	13.65	13.51	13.48	13.61	14.42	14.92	15.21	15.34	15.4	15.45	15.43	15.37	15.36	15.4	15.35	15.36	15.34	15.3	15.39	15.31	14.99	14.68	13.85	
312	2000	12.94	12.75	12.61	12.57	12.79	13.28	13.69	13.99	14.12	14.17	14.2	14.22	14.13	14.19	14.19	14.17	14.14	14.09	14.06	14.11	14.02	13.83	13.51	12.9	
313	2001	14																								

Table 9
Hours of the Week Designated as Higher (H) or Lower (L) in Cluster Analysis

	A	B	C	D	E	F	G
		<u>Sunday</u>		<u>Weekday</u>		<u>Saturday</u>	
	<u>Hour of Day</u>	<u>Marginal Cost</u>	<u>Designation</u>	<u>Marginal Cost</u>	<u>Designation</u>	<u>Marginal Cost</u>	<u>Designation</u>
		(m/kwh)		(m/kwh)		(m/kwh)	
1							
2							
3							
4							
5							
6	1	12.80	L	12.69	L	12.87	L
7	2	12.66	L	12.54	L	12.71	L
8	3	12.52	L	12.49	L	12.61	L
9	4	12.54	L	12.51	L	12.59	L
10	5	12.59	L	12.68	L	12.65	L
11	6	12.74	L	13.09	L	12.82	L
12	7	12.97	L	13.61	H	13.06	L
13	8	13.26	H	13.97	H	13.37	H
14	9	13.47	H	14.03	H	13.62	H
15	10	13.56	H	14.00	H	13.74	H
16	11	13.56	H	13.93	H	13.73	H
17	12	13.54	H	13.82	H	13.65	H
18	13	13.39	H	13.68	H	13.50	H
19	14	13.33	H	13.64	H	13.41	H
20	15	13.28	H	13.60	H	13.34	H
21	16	13.28	H	13.58	H	13.34	H
22	17	13.39	H	13.66	H	13.44	H
23	18	13.54	H	13.80	H	13.57	H
24	19	13.59	H	13.83	H	13.59	H
25	20	13.59	H	13.78	H	13.55	H
26	21	13.54	H	13.68	H	13.48	H
27	22	13.35	H	13.46	H	13.31	H
28	23	13.05	L	13.17	L	13.08	L
29	24	12.42	L	12.59	L	12.55	L

Table 8
Cluster Analysis
Annual Load-Weighted Average Marginal Costs of Energy

	A	B	C	D	E	F	G	H	I
	<u>Day-Type</u>	<u>Hour</u>	<u>Monday</u> (m/kwh)	<u>Tuesday</u> (m/kwh)	<u>Wednesday</u> (m/kwh)	<u>Thursday</u> (m/kwh)	<u>Friday</u> (m/kwh)	<u>Pseudo-F</u>	<u>Max Psd-F</u>
1	Weekday	9	14.03	14.03	14.03	14.03	14.03		
2	Weekday	10	14.00	14.00	14.00	14.00	14.00	10.073	
3	Weekday	8	13.97	13.97	13.97	13.97	13.97	20.911	
4	Weekday	11	13.93	13.93	13.93	13.93	13.93	32.884	
5	Weekday	19	13.83	13.83	13.83	13.83	13.83	45.728	
6	Weekday	12	13.82	13.82	13.82	13.82	13.82	56.084	
7	Weekday	18	13.80	13.80	13.80	13.80	13.80	68.513	
8	Weekday	20	13.78	13.78	13.78	13.78	13.78	82.513	
9	Saturday	10	13.74					98.186	
10	Saturday	11	13.73					101.121	
11	Weekday	21	13.68	13.68	13.68	13.68	13.68	104.062	
12	Weekday	13	13.68	13.68	13.68	13.68	13.68	116.753	
13	Weekday	17	13.66	13.66	13.66	13.66	13.66	132.344	
14	Saturday	12	13.65					150.801	
15	Weekday	14	13.64	13.64	13.64	13.64	13.64	154.798	
16	Saturday	9	13.62					176.964	
17	Weekday	7	13.61	13.61	13.61	13.61	13.61	181.634	
18	Weekday	15	13.60	13.60	13.60	13.60	13.60	207.322	
19	Sunday	20	13.59					239.831	
20	Saturday	19	13.59					247.121	
21	Sunday	19	13.59					254.871	
22	Weekday	16	13.58	13.58	13.58	13.58	13.58	263.094	
23	Saturday	18	13.57					312.948	
24	Sunday	11	13.56					324.379	
25	Sunday	10	13.56					336.650	
26	Saturday	20	13.55					349.835	
27	Sunday	21	13.54					363.562	
28	Sunday	18	13.54					377.417	
29	Sunday	12	13.54					392.470	
30	Saturday	13	13.50					408.835	
31	Saturday	21	13.48					423.064	
32	Sunday	9	13.47					437.553	
33	Weekday	22	13.46	13.46	13.46	13.46	13.46	451.836	
34	Saturday	17	13.44					540.555	
35	Saturday	14	13.41					561.293	
36	Sunday	13	13.39					579.921	
37	Sunday	17	13.39					598.687	
38	Saturday	8	13.37					618.297	
39	Sunday	22	13.35					637.365	
40	Saturday	15	13.34					654.442	
41	Saturday	16	13.34					672.269	
42	Sunday	14	13.33					691.154	
43	Saturday	22	13.31					711.606	
44	Sunday	16	13.28					730.494	
45	Sunday	15	13.28					744.226	
46	Sunday	8	13.26					759.714	
47	Weekday	23	13.17	13.17	13.17	13.17	13.17	772.534	772.534
48	Weekday	6	13.09	13.09	13.09	13.09	13.09	748.172	

Table 8
Cluster Analysis
Annual Load-Weighted Average Marginal Costs of Energy

	A	B	C	D	E	F	G	H	I
	<u>Day-Type</u>	<u>Hour</u>	<u>Monday</u> (m/kwh)	<u>Tuesday</u> (m/kwh)	<u>Wednesday</u> (m/kwh)	<u>Thursday</u> (m/kwh)	<u>Friday</u> (m/kwh)	<u>Pseudo-F</u>	<u>Max Psd-F</u>
49	Saturday	23	13.08					682.486	
50	Saturday	7	13.06					671.030	
51	Sunday	23	13.05					657.967	
52	Sunday	7	12.97					645.306	
53	Saturday	1	12.87					619.463	
54	Saturday	6	12.82					579.712	
55	Sunday	1	12.80					537.404	
56	Sunday	6	12.74					498.005	
57	Saturday	2	12.71					456.512	
58	Weekday	1	12.69	12.69	12.69	12.69	12.69	417.428	
59	Weekday	5	12.68	12.68	12.68	12.68	12.68	276.757	
60	Sunday	2	12.66					194.686	
61	Saturday	5	12.65					181.784	
62	Saturday	3	12.61					169.714	
63	Saturday	4	12.59					157.534	
64	Weekday	24	12.59	12.59	12.59	12.59	12.59	145.794	
65	Sunday	5	12.59					99.446	
66	Saturday	24	12.55					92.018	
67	Weekday	2	12.54	12.54	12.54	12.54	12.54	84.420	
68	Sunday	4	12.54					53.173	
69	Sunday	3	12.52					48.034	
70	Weekday	4	12.51	12.51	12.51	12.51	12.51	42.880	
71	Weekday	3	12.49	12.49	12.49	12.49	12.49	20.931	
72	Sunday	24	12.42					3.491	

Column A: Day-type = "Sunday," "Weekday," or "Saturday"

Column B: The hour of the day

Columns C-(Levelized marginal costs of energy; Rows 13, 28, and 43 of Table 5

If "Day-Type" = "Weekday" for the given row, then five identical weekdays of data appear.

Column H: The Pseudo F-Statistic when 2 clusters are separated at the given row

Column I: The maximum Pseudo F-Statistic appears where clusters are divided "optimally."

Table 13
Comparison of Proposed Seasons to Seasons Which Minimize
Differences Between Seasonal and Monthly Marginal Costs of Firm Energy

	A	B	C	D	E	F	G	H
51								
52		Seasonal Marginal Costs						
53								
54			<u>HLH</u>				<u>LLH</u>	
55								
56	Oct-Dec, Feb-Mar	18.87					17.838773	
57	Jan, Sep	18.6240168					17.0488523	
58	Apr	16.8355322					16.0799159	
59	May-Jun	9.16596368					7.97986244	
60	Jul	11.2677379					9.81927038	
61	Aug	16.0596369					13.9467578	
62								
63								
64		Ratio (Proposed/Difference-Minimizing):						1.14

Column B: Heavy load hour marginal costs of firm energy; seasonal averages calculated using loads in Table 9 as weights for marginal costs from Table 8:
HLH averages =
 $(\text{Table 8, Column G} * \text{Table 9, Column B}) / \text{Sum}(\text{Table 9, Column B})$,
for the appropriate months.

Column C: Monthly MC minus seasonal average MC from Column B

Column D: The absolute value of Column C

Column E: Light load hour marginal costs of firm energy; seasonal averages calculated using loads in Table 9 as weights for marginal costs from Table 8:
LLH averages =
 $(\text{Table 8, Column H} * \text{Table 9, Column C}) / \text{Sum}(\text{Table 9, Column C})$,
for the appropriate months.

Column F: Monthly MC minus seasonal average MC from Column E

Column G: the absolute value of Column F

Column H: Weighted average of totals of absolute values of deviations of monthly from seasonal values: $(\text{Sum of Column D} * 4 + \text{Sum of Column G} * 3) / 7$
Row 64 = Row 13/Row 49

Appendix A

BPA Firm Energy Loads and Hydro Inflows Used to Shape Marginal Cost of Firmness of Energy by Month

A	B	C	D	E	F	G
<u>Year</u>	<u>Month</u>	<u>Native Load aMw</u>	<u>Total Mkt Load aMw</u>	<u>Total Load aMw</u>	<u>Inflows Mwh</u>	<u>Ratio</u>
1996	96JAN	6840	3034	9874	3731430	1.968738
1996	96FEB	6788	4588	11376	3905703	1.974862
1996	96MAR	6527	4534	11061	4983073	1.651513
1996	96APR	6464	4086	10550	8715875	0.871502
1996	96MAY	6368	3735	10103	17124565	0.438949
1996	96JUN	6359	3516	9875	18847584	0.377238
1996	96JUL	6267	3277	9544	10619339	0.668662
1996	96AUG	6299	3709	10008	5653157	1.317158
1996	96SEP	6156	4051	10207	3786943	1.94058
1996	96OCT	6086	3325	9411	3546641	1.97418
1996	96NOV	6355	2921	9276	3518250	1.898367
1996	96DEC	6792	2881	9673	3864160	1.86244
1997	97JAN	7210	2441	9651	3731430	1.924236
1997	97FEB	7158	2651	9809	3905703	1.702821
1997	97MAR	6902	2860	9762	4983073	1.457581
1997	97APR	6841	2391	9232	8715875	0.762624
1997	97MAY	6748	2214	8962	17124565	0.389353
1997	97JUN	6736	2148	8884	18847584	0.339374
1997	97JUL	6637	2792	9429	10619339	0.660572
1997	97AUG	6668	3116	9784	5653157	1.287592
1997	97SEP	6526	2786	9312	3786943	1.770459
1997	97OCT	6461	2456	8917	3546641	1.870633
1997	97NOV	6724	2592	9316	3518250	1.906426
1997	97DEC	7158	2593	9751	3864160	1.877492
1998	98JAN	7340	3982	11322	3731430	2.257552
1998	98FEB	7288	6449	13737	3905703	2.384683
1998	98MAR	7029	6224	13253	4983073	1.978739
1998	98APR	6967	6492	13459	8715875	1.111789
1998	98MAY	6872	6872	13744	17124565	0.597139
1998	98JUN	6860	6862	13722	18847584	0.5242
1998	98JUL	6759	3673	10432	10619339	0.730863
1998	98AUG	6790	5095	11885	5653157	1.564186
1998	98SEP	6647	5085	11732	3786943	2.230509
1998	98OCT	6581	5290	11871	3546641	2.490332
1998	98NOV	6847	5460	12307	3518250	2.518623
1998	98DEC	7288	5534	12822	3864160	2.46872
1999	99JAN	7294	2831	10125	3731430	2.018812
1999	99FEB	7242	4074	11316	3905703	1.964405
1999	99MAR	6984	3902	10886	4983073	1.625394
1999	99APR	6922	4082	11004	8715875	0.90905
1999	99MAY	6829	4163	10992	17124565	0.477543
1999	99JUN	6816	4530	11346	18847584	0.433449
1999	99JUL	6716	3146	9862	10619339	0.690933
1999	99AUG	6747	3856	10603	5653157	1.395452
1999	99SEP	6604	3366	9970	3786943	1.895642
1999	99OCT	6539	3472	10011	3546641	2.100159
1999	99NOV	6804	3480	10284	3518250	2.104534
1999	99DEC	7242	3746	10988	3864160	2.115608
2000	00JAN	7260	2354	9614	3731430	1.916965
2000	00FEB	7209	2991	10200	3905703	1.770556
2000	00MAR	6951	2560	9511	4983073	1.420046
2000	00APR	6889	2633	9522	8715875	0.7866

Appendix A

BPA Firm Energy Loads and Hydro Inflows Used to Shape Marginal Cost of Firmness of Energy by Month

A	B	C	D	E	F	G
<u>Year</u>	<u>Month</u>	<u>Native Load aMw</u>	<u>Total Mkt Load aMw</u>	<u>Total Load aMw</u>	<u>Inflows Mwh</u>	<u>Ratio</u>
2000	00MAY	6795	2787	9582	17124565	0.416319
2000	00JUN	6783	2876	9659	18847584	0.369002
2000	00JUL	6683	2054	8737	10619339	0.612151
2000	00AUG	6715	3012	9727	5653157	1.280097
2000	00SEP	6572	2614	9186	3786943	1.746531
2000	00OCT	6507	2867	9374	3546641	1.966456
2000	00NOV	6771	3152	9923	3518250	2.030732
2000	00DEC	7208	3150	10358	3864160	1.994402
2001	01JAN	7268	2906	10174	3731430	2.028576
2001	01FEB	7216	3781	10997	3905703	1.908986
2001	01MAR	6956	3417	10373	4983073	1.548788
2001	01APR	6894	3671	10565	8715875	0.872734
2001	01MAY	6799	4059	10858	17124565	0.471749
2001	01JUN	6787	3788	10575	18847584	0.403995
2001	01JUL	6688	3960	10648	10619339	0.745976
2001	01AUG	6719	4918	11637	5653157	1.531528
2001	01SEP	6575	4514	11089	3786943	2.108412
2001	01OCT	6509	4575	11084	3546641	2.325261
2001	01NOV	6776	4965	11741	3518250	2.402741
2001	01DEC	7216	4637	11853	3864160	2.282208

Column A: Calendar year.

Column C: Includes Non-generating preference customers and DSI quartiles 1-3.

Column D: Includes generating preference customers, regional IOU's, and all extraregional customers.

Column E: C + D

Column F: Inflows to BPA hydro-system; see Documentation, WP-96-E-BPA-04A, Section VII

Column G: (Column E * 24 * number of days in month)/Column F