

TABLE I THERMAL UNIT DATA

Thermal Unit	Bus No	Unit Cost Coefficients			Pmax (MW)	Pmin (MW)	Initial State (h)	Min Dn(h)	Min Up(h)	Ramp (MW/h)	Start Up (MBtu)	Fuel Price (\$/MBtu)
		a(Mbtu/MWh ²)	b(MBtu/MWh)	c(MBtu)								
G-GOODADAP	210362	6.97E-02	26.24382	31.67	4.7	2	-1	1	1	15	40	1
G-GOODADAP	210361	6.97E-02	26.24382	31.67	5.2	2	-1	1	1	15	40	1
G-BERK_ENJ	211961	6.97E-02	26.24382	31.67	5.6	2	-1	1	1	15	40	1
G-BERK_ENJ	211962	0.010875	12.8875	6.78	5.6	2	-8	8	8	150	440	1
G-BERK_ENJ	211963	0.010875	12.8875	6.78	5.6	2	-8	8	8	150	110	1
G-ENTEK_ST1	212872	6.97E-02	26.24382	31.67	14.4	4	-1	1	1	15	40	1
G-NUHENERJI	212792	0.0128	17.82	10.15	20.9	5	-5	5	5	50	50	1
G-ENTEK_GT1	212871	6.97E-02	26.24382	31.67	21	5	-1	1	1	15	40	1
G-AKEN_YALOV11.000	214471	6.97E-02	26.24382	31.67	21.5	6	-1	1	1	15	40	1
G-ENJSA_KOSE11.000	212493	0.010875	12.8875	6.78	41	8	-8	8	8	175	100	1
G-ENJSA_KOSE11.000	212471	0.003	10.76	32.96	42.5	9	-1	1	1	15	100	1
G-ENJSA_KOSE11.000	212492	6.97E-02	26.24382	31.67	42.5	9	-1	1	1	15	40	1
G-NUHCIMENTO11.500	212671	6.97E-02	26.24382	31.67	49.1	12	-5	5	5	50	40	1
G-NUHENERJI	212791	0.0128	17.82	10.15	50.8	10	-1	1	1	15	50	1
G-ENTEK_GT3	212891	6.97E-02	26.24382	31.67	54	12	-5	5	5	50	40	1
G-OVA	211594	0.0128	17.82	10.15	133.5	40	-1	1	1	15	50	1
G-COLAKOGLU	211591	6.97E-02	26.24382	31.67	136	41	-1	1	1	15	40	1
G-OVA	211593	6.97E-02	26.24382	31.67	136	40	-5	5	5	50	40	1
G-COLAKOGLU	211592	0.0128	17.82	10.15	175.1	50	-8	8	8	125	59	1
G-4ADA_1_DG	210481	2.40E-03	12.3299	28	260.1	100	-8	8	8	125	100	1
G-4ADA_1_DG	210482	2.40E-03	12.3299	28	260.1	100	-5	5	5	50	100	1
G-4ADA_1_DG	210483	0.0128	17.82	10.15	260.1	100	-5	5	5	50	50	1
G-4ADA_1_DG	210484	0.0128	17.82	10.15	260.1	100	-8	8	8	100	50	1
G-4ADA_2_DG	210581	0.0044	13.29	39	260.1	100	-8	8	8	100	100	1
G-4ADA_2_DG	210582	0.0044	13.29	39	260.1	100	-5	5	5	50	100	1
G-4ADA_1_BT	210485	0.0128	17.82	10.15	281.4	110	-10	10	10	210	50	1
G-4ADA_1_BT	210486	1.06E-02	8.339148	64.16	281.4	110	-10	10	10	210	250	1
G-4ADA_2_BT	210583	1.06E-02	8.339148	64.16	281.4	110	-8	8	8	150	250	1

TABLE II SYSTEM LOAD DATA

Hour	Total System Load (MW)												
	Base Case	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 10	Scenario 11	Scenario 12
1	1218.1248	1416.775	1396.126	1459.3759	1435.1476	1457.1735	1418.4861	1437.2123	1385.9334	1403.1135	1392.4735	1421.3478	1442.9216
2	1103.75424	1274.4568	1257.274	1285.0719	1293.5609	1260.964	1285.9742	1291.0699	1315.3322	1322.4606	1294.6383	1310.5804	1299.2675
3	875.01312	1038.2917	1078.6354	1024.1579	1050.6452	1075.0905	1036.1426	1038.9347	1065.7917	1035.761	1039.4211	1069.3209	1030.9142
4	360.3456	480.3311	472.9905	490.2226	488.455	467.5379	481.1687	479.7147	473.8883	477.257	479.212	477.9343	491.5283
5	646.272	797.8878	797.566	793.2323	786.061	794.4401	775.1801	833.66	792.6441	797.8753	792.3397	801.1018	819.3295
6	932.1984	1095.1415	1139.5778	1125.1586	1100.8046	1095.1153	1126.8532	1121.0529	1116.3871	1121.2355	1123.8069	1109.2068	1078.4471
7	1218.1248	1428.4949	1426.9682	1470.6402	1426.4281	1413.2238	1406.549	1423.3044	1448.2206	1372.3667	1443.9766	1425.8726	1428.0352
8	1446.86592	1681.4238	1673.5138	1652.375	1674.9869	1662.4223	1742.982	1663.6062	1629.1917	1692.4216	1640.6861	1671.4824	1646.7511
9	1561.23648	1737.4106	1821.4157	1819.6193	1788.0483	1801.335	1761.5376	1787.4209	1827.8743	1775.3112	1836.6861	1850.9714	1808.4198
10	1732.79232	2010.0326	2013.5672	2007.0846	1975.7116	1984.0594	1995.5014	1930.3009	1945.6478	1983.903	2009.7588	1944.4873	1974.754
11	1761.38496	2006.6758	2068.6315	2009.8748	1958.4888	2059.3247	1970.9759	2008.6647	2038.0253	2019.4052	2059.3996	2012.4256	2024.7225
12	1618.42176	1854.2955	1855.2492	1897.409	1850.4597	1875.184	1871.9301	1898.6085	1874.2518	1854.9225	1816.0569	1838.2494	1892.4184
13	1504.0512	1729.2698	1683.8995	1756.0656	1750.5491	1754.4357	1727.4082	1746.7177	1737.3209	1745.1638	1729.4711	1791.5732	1739.8619
14	1389.68064	1598.0567	1538.1093	1626.8439	1615.6901	1651.7929	1582.4464	1666.6066	1602.0212	1662.3233	1557.2991	1595.974	1559.6925
15	1732.79232	1977.9597	1993.1098	2034.7937	1990.5071	2045.6329	2022.4053	1937.2277	2000.2798	2000.4482	2005.9797	1961.6618	1963.3593
16	1789.9776	2060.8873	2061.958	2120.3565	2073.781	2074.5187	2009.5675	2051.0563	2046.7435	2097.1976	1996.6758	2069.2405	1993.6566
17	1647.0144	1833.838	1948.9557	1905.3105	1923.8599	1869.0303	1840.188	1944.6438	1932.4623	1976.8184	1826.3537	1922.7113	1881.6673
18	1761.38496	2050.1919	2020.2954	2012.5455	2029.3313	2027.0559	1974.995	2012.1154	2108.6872	2027.5834	2050.8407	2033.3983	2051.9745
19	1904.34816	2155.3425	2161.3693	2129.4005	2212.4509	2209.4329	2137.9049	2162.0905	2195.4317	2209.2002	2167.921	2182.9656	2172.6245
20	2018.71872	2319.5909	2224.6463	2292.595	2266.0695	2363.1126	2327.751	2334.0051	2331.3441	2306.8246	2317.9616	2231.9443	2295.8972
21	2075.904	2368.4505	2368.7557	2364.2596	2366.7089	2386.0386	2370.2198	2394.8059	2366.9855	2276.241	2410.8871	2352.9692	2341.0286
22	1789.9776	2111.3416	2068.8405	2071.4852	2013.1803	2012.2342	2041.105	2080.0321	2039.6767	2067.9492	2032.1378	2087.9125	2058.0078
23	1704.19968	2009.6006	1952.6526	1920.308	1912.5559	1923.5741	1977.7664	1951.7056	1929.7647	2006.3929	1992.8328	1942.4208	1905.2688
24	1561.23648	1758.4557	1790.5621	1794.8069	1800.165	1798.9635	1771.1695	1790.6732	1784.6406	1828.825	1813.2148	1808.4198	1811.2201

TABLE III WIND INJECTION

Hour	Wind Power (MW)											
	Base Case			Scenario 1			Scenario 2			Scenario 3		
	W1 (bus SILE)	W2 (bus KARAMURSEL)	W3 (bus YALOVA)	W1 (bus SILE)	W2 (bus KARAMURSEL)	W3 (bus YALOVA)	W1 (bus SILE)	W2 (bus KARAMURSEL)	W3 (bus YALOVA)	W1 (bus SILE)	W2 (bus KARAMURSEL)	W3 (bus YALOVA)
1	59.085	60.261	73.937	54.3443	57.7061	75.8561	49.8553	65.1436	78.5173	58.004	61.5966	75.7286
2	57.01	59.044	75.61	51.6767	57.2667	78.008	51.763	65.2438	77.2037	55.0612	58.1861	76.712
3	52.527	56.33	75.281	46.157	56.2012	76.5005	50.226	63.9886	75.7613	50.812	53.0389	74.6558
4	48.476	54.126	72.928	41.3386	54.8559	72.5649	44.6061	62.564	72.113	47.1735	50.6535	73.3684
5	47.465	50.121	71.429	38.5721	50.2172	72.0139	44.4435	57.1106	66.6729	45.4594	45.992	73.107
6	45.922	41.117	70.868	35.2143	40.5673	73.1297	43.2312	44.366	63.2456	44.0584	38.9329	70.9403
7	39.734	31.803	64.901	29.5585	31.059	67.8175	39.2449	32.9535	56.5024	37.491	32.7936	64.2782
8	36.483	23.081	52.828	31.6626	21.047	54.6905	39.641	25.9448	46.2958	32.9822	26.6045	54.2428
9	38.506	16.765	43.182	35.7938	12.6779	45.3326	37.5284	19.9565	38.8173	37.1076	20.1636	49.013
10	38.77	17.278	40.379	36.0354	14.5905	44.1444	35.8263	18.0934	31.2631	38.3819	17.9678	49.3752
11	38.93	23.474	41.147	36.3124	22.8785	41.7354	38.3053	22.7653	34.3837	37.3483	23.9501	49.2256
12	38.298	25.752	40.587	30.8893	25.8634	38.5168	38.5134	28.8254	42.604	38.2249	24.9723	46.6677
13	38.06	26.505	38.286	30.0871	26.7394	34.3486	38.4271	30.6692	40.465	41.3948	30.8325	39.1517
14	36.402	26.744	36.247	28.6456	27.5899	34.5304	39.7891	29.3627	33.7671	43.0513	31.5853	33.0651
15	35.607	23.917	36.163	28.1485	23.2225	36.535	39.8643	27.0345	33.3539	40.8464	26.5205	31.7094
16	37.159	24.456	38.095	27.3892	27.8542	42.1409	41.0015	28.8868	37.5997	42.4598	25.7813	29.1444
17	34.234	24.379	40.164	25.7503	27.7344	45.8702	42.6516	27.779	44.1721	38.4085	26.8616	32.9085
18	30.183	22.273	43.147	22.3044	27.9857	50.5236	41.2453	27.0945	44.2345	28.1957	26.7488	35.1459
19	33.182	21.967	43.884	25.8681	32.6405	55.5023	40.525	23.2187	41.0789	27.3962	28.0069	35.1472
20	40.094	26.249	46.538	35.9634	39.6799	60.5341	43.6192	22.2462	45.0346	36.4251	37.0582	39.0307
21	42.214	33.226	57.166	41.4569	46.4846	69.8707	42.4851	25.4029	57.9467	35.8538	46.4705	45.7858
22	45.568	35.237	64.706	50.4605	47.6737	75.9811	48.939	24.5065	64.6977	38.0134	47.3608	49.6444
23	53.383	33.243	69.294	65.0892	40.583	81.8891	61.7703	25.0964	68.6336	50.6882	46.5257	55.0597
24	58.409	29.32	72.226	69.024	38.9599	89.2876	68.3965	21.3954	73.1632	61.7857	44.4882	57.5953

Hour	Scenario 4			Scenario 5			Scenario 6			Scenario 7		
	W1 (bus SILE)	W2 (bus KARAMURSEL)	W3 (bus YALOVA)	W1 (bus SILE)	W2 (bus KARAMURSEL)	W3 (bus YALOVA)	W1 (bus SILE)	W2 (bus KARAMURSEL)	W3 (bus YALOVA)	W1 (bus SILE)	W2 (bus KARAMURSEL)	W3 (bus YALOVA)
1	62.5858	50.7845	74.419	56.0853	60.2226	78.9306	54.405	59.9286	71.4217	58.314	55.8256	72.5874
2	60.8608	51.503	78.6854	55.2211	59.8994	82.7838	52.788	56.9945	72.2748	54.9146	54.9914	72.0308
3	57.6369	49.5768	76.6998	56.1283	57.4832	85.484	51.0906	56.9821	71.8043	47.5987	53.9417	72.2769
4	51.8346	46.6418	69.8557	54.4373	56.1013	81.8956	49.1144	55.7845	72.3768	40.9834	53.6047	71.6167
5	51.8798	43.3078	68.7063	49.6075	51.3721	75.8545	48.1396	50.6432	70.1802	37.2557	50.4869	68.0865
6	52.9199	36.2556	67.9668	45.4903	37.2483	73.5369	44.8388	40.4145	67.9415	35.8035	38.6309	67.3497
7	44.1227	29.3503	63.606	38.0368	29.9444	68.4347	38.0648	30.2986	61.3564	31.1427	26.101	62.7735
8	41.1129	21.0644	60.0378	34.5831	23.5218	57.9763	36.7418	19.138	50.5262	29.6406	19.0707	49.978
9	46.0689	12.8641	48.5622	38.5008	20.5263	50.3669	40.1179	8.4657	44.8889	32.0534	9.8587	39.6436
10	42.8492	15.0422	38.7444	35.9516	20.5065	45.0955	43.4239	9.0175	43.3724	32.3406	4.8673	37.1859
11	39.1732	24.0512	34.7582	34.6967	27.6442	40.9744	47.0261	17.273	46.6156	34.9885	8.9253	39.5616
12	37.4705	25.4321	35.6693	30.3408	31.0327	37.215	48.2108	18.3517	47.3697	34.9128	13.9024	40.0976
13	40.4868	24.7263	34.3844	28.3597	26.3677	34.8867	53.5323	22.0399	46.1171	33.0957	15.9486	39.6732
14	37.1917	24.3046	29.8113	30.2034	28.1477	32.4855	52.7133	26.7716	47.3393	29.4405	13.6819	40.7245
15	36.7458	19.0974	24.507	29.9256	27.7219	26.9761	48.8924	24.7695	46.5473	29.2841	8.7403	41.9052
16	39.7365	15.0258	28.4865	30.3376	23.6943	25.9227	47.5149	25.9105	45.1395	36.2671	6.7414	43.2921
17	32.2442	13.4367	35.816	28.6345	16.7362	32.1669	43.4741	29.6005	41.8459	35.893	5.9677	42.255
18	22.6941	10.8369	45.5378	23.0407	13.7595	38.3687	36.8746	30.1891	43.1229	30.395	4.9014	46.3349
19	23.3685	5.6157	51.4641	22.8611	13.6862	36.1315	40.1593	28.6347	43.9078	30.2779	4.7714	44.2711
20	25.5987	8.4938	53.953	27.4561	17.1604	41.8741	50.8309	36.4859	48.4751	38.874	12.1612	43.3711
21	28.0427	18.7937	60.6551	36.5444	25.4581	57.0345	59.8559	47.1373	60.3495	38.8467	21.8599	54.5353
22	34.0318	28.4182	65.2486	41.3136	28.8927	62.1696	64.8278	43.8949	63.2179	41.3849	27.4461	62.7693
23	43.9434	31.5089	61.8204	44.8619	26.7221	66.311	66.9356	32.2763	64.6501	45.9136	28.5413	63.6505
24	53.9824	27.057	58.7336	47.5688	23.5685	70.5679	71.3078	23.33	71.2402	50.7357	24.3603	66.5637
Hour	Scenario 8			Scenario 9			Scenario 10			Scenario 11		
	W1 (bus SILE)	W2 (bus KARAMURSEL)	W3 (bus YALOVA)	W1 (bus SILE)	W2 (bus KARAMURSEL)	W3 (bus YALOVA)	W1 (bus SILE)	W2 (bus KARAMURSEL)	W3 (bus YALOVA)	W1 (bus SILE)	W2 (bus KARAMURSEL)	W3 (bus YALOVA)
1	65.0304	60.5111	79.2151	54.2039	66.698	75.0219	57.8259	64.3817	70.6752	60.4554	54.1207	73.035
2	60.4446	58.5105	82.2809	51.0534	65.3539	74.2686	58.0921	62.6641	74.3217	55.9603	52.0543	71.3708
3	51.9456	56.6173	83.5234	44.189	61.5987	73.6113	54.5478	58.0823	75.6928	48.8416	48.8754	69.4255

10	36.0329	12.8107	36.3321
11	34.835	24.7686	34.0119
12	33.3933	33.8484	34.5543
13	33.5635	38.4113	35.433
14	31.14	42.1499	35.4467
15	33.2169	40.4323	30.7858
16	37.5104	39.0813	31.9904
17	33.3416	33.4946	36.4892
18	31.1791	28.8143	41.1182
19	35.6763	29.8206	46.0194
20	44.5767	36.6235	51.6477
21	47.2831	45.3618	65.0455
22	51.1011	47.6324	71.1152
23	60.1562	44.9235	74.3893
24	62.5726	38.743	76.9082

TABLE IV BRANCH DATA

Name	From Bus	To Bus	CID	Status	R (pu)	X(pu)	B(pu)	RATEA(MW)	RATEB(MW)	RATEC(MW)	GI(pu)	BI(pu)	GJ(pu)	BJ(pu)
br1	210010	210110	1	1	0.00079	0.007317	0.16179	1360	845	1005	0	0	0	0
br2	210010	210110	1	1	0.00079	0.007317	0.16179	1360	845	1005	0	0	0	0
br3	210021	210022	1	1	0	0.00001	0	250	153	182	0	0	0	0
br4	210021	212021	1	1	0.00453	0.02125	0.0091	250	153	182	0	0	0	0
br5	210022	210721	1	1	0.00046	0.00497	0.09049	250	250	250	0	0	0	0
br6	210022	210921	1	1	0.00219	0.01029	0.00441	250	153	182	0	0	0	0
br7	210022	210921	1	1	0.00219	0.01029	0.00441	250	153	182	0	0	0	0
br8	210022	214121	1	1	0.001939	0.009081	0.0039	250	153	182	0	0	0	0
br9	210110	210210	1	1	0.00033	0.003792	0.12457	2070	1268	1510	0	0	0	0
br10	210110	210310	1	1	0.002109	0.019526	0.43176	1360	845	1005	0	0	0	0
br11	210110	210310	1	1	0.001033	0.015438	0.53092	1360	845	1005	0	0	0	0
br12	210110	214210	1	1	0.001243	0.011482	0.25499	1360	845	1005	0	0	0	0
br13	210121	211721	1	1	0.005771	0.027083	0.0116	250	153	182	0	0	0	0
br14	210121	211821	1	1	0.002131	0.010002	0.00428	250	153	182	0	0	0	0
br15	210121	211921	1	1	0.00312	0.01466	0.00628	250	153	182	0	0	0	0
br16	210121	211921	1	1	0.00312	0.01466	0.00628	250	153	182	0	0	0	0
br17	210121	212021	1	1	0.00966	0.04534	0.01942	280	283	282	0	0	0	0
br18	210122	212221	1	1	0.01094	0.05423	0.02078	250	153	182	0	0	0	0
br19	210122	212321	1	1	0.016806	0.079598	0.03346	250	153	182	0	0	0	0
br20	210210	210410	1	1	0.001276	0.019078	0.65608	2480	1524	1825	0	0	0	0
br21	210210	214510	1	1	0.000289	0.003684	0.12503	2070	1268	1510	0	0	0	0
br22	210221	211021	1	1	0.00143	0.01025	0.0047	336	206	247	0	0	0	0
br23	210221	211021	1	1	0.00143	0.01025	0.0047	336	206	247	0	0	0	0
br24	210310	210410	1	1	0.00047	0.00433	0.09626	2480	1524	1825	0	0	0	0
br25	210310	214210	1	1	0.000784	0.007173	0.16242	1360	845	1005	0	0	0	0
br26	210321	210621	1	1	0.01109	0.05254	0.02208	250	153	182	0	0	0	0
br27	210321	212521	1	1	0.01196	0.05612	0.02404	250	153	182	0	0	0	0
br28	210321	212521	1	1	0.01196	0.05612	0.02404	250	153	182	0	0	0	0

br29	210321	212921	1	1	0.01471	0.0474	0.0161	180	110	132	0	0	0	0
br30	210321	213021	1	1	0.01776	0.08333	0.03569	250	153	182	0	0	0	0
br31	210321	213021	1	1	0.01776	0.08333	0.03569	250	153	182	0	0	0	0
br32	210321	213121	1	1	0.00788	0.02531	0.00872	180	110	132	0	0	0	0
br33	210321	213321	1	1	0.00814	0.03878	0.0167	250	153	182	0	0	0	0
br34	210321	213821	1	1	0.01034	0.048432	0.02083	250	153	182	0	0	0	0
br35	210321	214322	1	1	0.025712	0.126449	0.04853	250	153	182	0	0	0	0
br36	210410	210510	1	1	0.000008	0.000093	0.00306	2480	1524	1825	0	0	0	0
br37	210621	212121	1	1	0.00768	0.03597	0.01546	250	153	182	0	0	0	0
br38	210721	210821	1	1	0.00046	0.00497	0.09049	560	342	408	0	0	0	0
br39	210921	211022	1	1	0.00347	0.01627	0.00697	250	153	182	0	0	0	0
br40	210921	211022	1	1	0.00347	0.01627	0.00697	250	153	182	0	0	0	0
br41	211021	211121	1	1	0.00159	0.00748	0.0032	250	153	182	0	0	0	0
br42	211021	211221	1	1	0.0034	0.01594	0.00683	250	153	182	0	0	0	0
br43	211121	211221	1	1	0.0018	0.00893	0.00342	250	153	182	0	0	0	0
br44	211221	211321	1	1	0.00849	0.03985	0.01707	250	153	182	0	0	0	0
br45	211221	211621	1	1	0.00381	0.01786	0.00768	250	153	182	0	0	0	0
br46	211321	211421	1	1	0.00042	0.00195	0.00084	250	153	182	0	0	0	0
br47	211421	211521	1	1	0.00804	0.03774	0.01616	250	153	182	0	0	0	0
br48	211521	211525	1	1	0	0.00001	0	336	206	247	0	0	0	0
br49	211521	211526	1	1	0	0.00001	0	336	206	247	0	0	0	0
br50	211521	211721	1	1	0.00051	0.00364	0.00165	336	206	247	0	0	0	0
br51	211521	211821	1	1	0.0052	0.0244	0.01045	250	153	182	0	0	0	0
br52	211521	214321	1	1	0.0004	0.00319	0.0015	336	206	247	0	0	0	0
br53	211621	211721	1	1	0.00624	0.02922	0.01257	250	153	182	0	0	0	0
br54	211721	214321	1	1	0.0001	0.0015	0.0005	336	206	247	0	0	0	0
br55	212221	214021	1	1	0.004874	0.024158	0.00926	250	153	182	0	0	0	0
br56	212421	212521	1	1	0.00208	0.00976	0.00418	250	153	182	0	0	0	0
br57	212521	212621	1	1	0.01298	0.06079	0.02614	250	153	182	0	0	0	0
br58	212521	212821	1	1	0.00169	0.00808	0.00348	250	153	182	0	0	0	0
br59	212521	213521	1	1	0.0067	0.02149	0.00736	180	110	132	0	0	0	0
br60	212621	212721	1	1	0.00068	0.00323	0.00139	250	153	182	0	0	0	0

br61	213121	213221	1	1	0.01182	0.03797	0.01308	180	110	132	0	0	0	0
br62	213321	213421	1	1	0.01831	0.08726	0.03758	250	153	182	0	0	0	0
br63	213521	213621	1	1	0.01558	0.04999	0.01713	180	110	132	0	0	0	0
br64	213621	213721	1	1	0.02722	0.08487	0.03085	180	110	132	0	0	0	0
br65	213721	214421	1	1	0.001933	0.015243	0.00727	336	206	247	0	0	0	0
br66	214321	214322	1	1	0.000034	0.000162	0.00007	250	153	182	0	0	0	0
br_tr1	210010	210022	1	1	0.0034	0.12	0	250	250	250	0	0	0	0
br_tr2	210010	210043	1	1	0.0063	0.15	0	125	125	125	0	0	0	0
br_tr3	210010	210044	1	1	0.0063	0.15	0	125	125	125	0	0	0	0
br_tr4	210021	210041	1	1	0.0147	0.1181	0	100	100	100	0	0	0	0
br_tr5	210022	210042	1	1	0.0147	0.125	0	100	100	100	0	0	0	0
br_tr6	210110	210121	1	1	0.0034	0.1184	0	250	250	250	0	0	0	0
br_tr7	210110	210121	1	1	0.0034	0.1207	0	250	250	250	0	0	0	0
br_tr8	210110	210122	1	1	0.0034	0.1184	0	250	250	250	0	0	0	0
br_tr9	210110	210122	1	1	0.0034	0.1195	0	250	250	250	0	0	0	0
br_tr10	210121	210141	1	1	0.0147	0.118	0	100	100	100	0	0	0	0
br_tr11	210121	210142	1	1	0.0147	0.1211	0	100	100	100	0	0	0	0
br_tr12	210122	210143	1	1	0.0147	0.117	0	100	100	100	0	0	0	0
br_tr13	210122	210144	1	1	0.0147	0.117	0	100	100	100	0	0	0	0
br_tr14	210210	210221	1	1	0.0034	0.12	0	250	250	250	0	0	0	0
br_tr15	210210	210221	1	1	0.0034	0.12	0	250	250	250	0	0	0	0
br_tr16	210221	210241	1	1	0.0147	0.12	0	100	100	100	0	0	0	0
br_tr17	210221	210242	1	1	0.0147	0.121	0	100	100	100	0	0	0	0
br_tr18	210310	210321	1	1	0.0063	0.12662	0	150	150	150	0	0	0	0
br_tr19	210310	210321	1	1	0.0063	0.109	0	150	150	150	0	0	0	0
br_tr20	210310	210321	1	1	0.0034	0.1181	0	250	250	250	0	0	0	0
br_tr21	210321	210341	1	1	0.0147	0.1271	0	100	100	100	0	0	0	0
br_tr22	210321	210342	1	1	0.0147	0.124	0	100	100	100	0	0	0	0
br_tr23	210341	210361	1	1	0	0.0789	0	6.3	6.3	6.3	0	0	0	0
br_tr24	210341	210362	1	1	0	0.0735	0	6.5	6.5	6.5	0	0	0	0
br_tr25	210410	210481	1	1	0	0.13	0	295	295	295	0	0	0	0
br_tr26	210410	210482	1	1	0	0.13	0	295	295	295	0	0	0	0

br_tr27	210410	210483	1	1	0	0.13	0	295	295	295	0	0	0	0
br_tr28	210410	210484	1	1	0	0.13	0	295	295	295	0	0	0	0
br_tr29	210410	210485	1	1	0	0.13	0	335	335	335	0	0	0	0
br_tr30	210410	210486	1	1	0	0.13	0	335	335	335	0	0	0	0
br_tr31	210510	210581	1	1	0	0.13	0	295	295	295	0	0	0	0
br_tr32	210510	210582	1	1	0	0.13	0	295	295	295	0	0	0	0
br_tr33	210510	210583	1	1	0	0.13	0	315	315	315	0	0	0	0
br_tr34	210621	210651	1	1	0.0898	0.1975	0	25	25	25	0	0	0	0
br_tr35	210621	210651	1	1	0.0898	0.1975	0	25	25	25	0	0	0	0
br_tr36	210721	210741	1	1	0.0147	0.1289	0	100	100	100	0	0	0	0
br_tr37	210721	210751	1	1	0.0303	0.1634	0	50	50	50	0	0	0	0
br_tr38	210721	210752	1	1	0.0303	0.1634	0	50	50	50	0	0	0	0
br_tr39	210821	210841	1	1	0.0147	0.1225	0	100	100	100	0	0	0	0
br_tr40	210821	210851	1	1	0.0303	0.1639	0	62.5	62.5	62.5	0	0	0	0
br_tr41	210821	210852	1	1	0.0303	0.1639	0	62.5	62.5	62.5	0	0	0	0
br_tr42	210921	210941	1	1	0.0147	0.12	0	100	100	100	0	0	0	0
br_tr43	210921	210942	1	1	0.0147	0.119	0	100	100	100	0	0	0	0
br_tr44	210921	210943	1	1	0.0147	0.1179	0	100	100	100	0	0	0	0
br_tr45	211022	211041	1	1	0.0303	0.12	0	62.5	62.5	62.5	0	0	0	0
br_tr46	211121	211141	1	1	0.0147	0.1212	0	100	100	100	0	0	0	0
br_tr47	211121	211142	1	1	0.0147	0.117	0	100	100	100	0	0	0	0
br_tr48	211121	211151	1	1	0.0898	0.155	0	25	25	25	0	0	0	0
br_tr49	211221	211241	1	1	0.0147	0.126	0	100	100	100	0	0	0	0
br_tr50	211221	211242	1	1	0.0147	0.1264	0	100	100	100	0	0	0	0
br_tr51	211321	211341	1	1	0.0303	0.1188	0	50	50	50	0	0	0	0
br_tr52	211321	211342	1	1	0.0303	0.1177	0	50	50	50	0	0	0	0
br_tr53	211321	211342	1	1	0.0303	0.117	0	50	50	50	0	0	0	0
br_tr54	211421	211441	1	1	0.01	0.1174	0	125	125	125	0	0	0	0
br_tr55	211421	211442	1	1	0.0303	0.1426	0	75	75	75	0	0	0	0
br_tr56	211521	211541	1	1	0.0147	0.1174	0	120	120	120	0	0	0	0
br_tr57	211521	211543	1	1	0.0147	0.113	0	125	125	125	0	0	0	0
br_tr58	211521	211591	1	1	0	0.123	0	200	200	200	0	0	0	0

br_tr59	211521	211592	1	1	0	0.147	0	230	230	230	0	0	0	0
br_tr60	211521	211593	1	1	0	0.1259	0	160	160	160	0	0	0	0
br_tr61	211521	211594	1	1	0	0.1218	0	160	160	160	0	0	0	0
br_tr62	211525	211542	1	1	0.0147	0.113	0	125	125	125	0	0	0	0
br_tr63	211525	211544	1	1	0.0147	0.113	0	125	125	125	0	0	0	0
br_tr64	211526	211545	1	1	0.01	0.1276	0	156	156	156	0	0	0	0
br_tr65	211526	211546	1	1	0.01	0.1276	0	156	156	156	0	0	0	0
br_tr66	211621	211641	1	1	0.0147	0.1221	0	100	100	100	0	0	0	0
br_tr67	211621	211642	1	1	0.0147	0.1219	0	100	100	100	0	0	0	0
br_tr68	211721	211741	1	1	0.0147	0.122	0	100	100	100	0	0	0	0
br_tr69	211721	211742	1	1	0.0147	0.117	0	100	100	100	0	0	0	0
br_tr70	211821	211841	1	1	0.0147	0.1221	0	100	100	100	0	0	0	0
br_tr71	211821	211842	1	1	0.0147	0.1223	0	100	100	100	0	0	0	0
br_tr72	211921	211941	1	1	0.0147	0.1208	0	100	100	100	0	0	0	0
br_tr73	211921	211942	1	1	0.0147	0.1223	0	100	100	100	0	0	0	0
br_tr74	211921	211943	1	1	0.0147	0.116	0	100	100	100	0	0	0	0
br_tr75	211941	211961	1	1	0	0.0783	0	6.3	6.3	6.3	0	0	0	0
br_tr76	211941	211962	1	1	0	0.0781	0	6.3	6.3	6.3	0	0	0	0
br_tr77	211941	211963	1	1	0	0.0736	0	6.3	6.3	6.3	0	0	0	0
br_tr78	212021	212041	1	1	0.0147	0.117	0	100	100	100	0	0	0	0
br_tr79	212021	212042	1	1	0.0147	0.117	0	100	100	100	0	0	0	0
br_tr80	212021	212043	1	1	0.0147	0.115	0	100	100	100	0	0	0	0
br_tr81	212021	212044	1	1	0.0147	0.115	0	100	100	100	0	0	0	0
br_tr82	212121	212141	1	1	0.0303	0.114	0	50	50	50	0	0	0	0
br_tr83	212121	212142	1	1	0.0303	0.1084	0	50	50	50	0	0	0	0
br_tr84	212121	212143	1	1	0.0147	0.1203	0	100	100	100	0	0	0	0
br_tr85	212221	212241	1	1	0.0898	0.119	0	25	25	25	0	0	0	0
br_tr86	212221	212241	1	1	0.0898	0.119	0	25	25	25	0	0	0	0
br_tr87	212321	212341	1	1	0.0303	0.119	0	62.5	62.5	62.5	0	0	0	0
br_tr88	212321	212342	1	1	0.0147	0.116	0	100	100	100	0	0	0	0
br_tr89	212421	212441	1	1	0.0303	0.1	0	62.5	62.5	62.5	0	0	0	0
br_tr90	212421	212492	1	1	0	0.1	0	54	54	54	0	0	0	0

br_tr91	212421	212493	1	1	0	0.1	0	54	54	54	0	0	0	0
br_tr92	212441	212471	1	1	0	0.12	0	54	54	54	0	0	0	0
br_tr93	212521	212541	1	1	0.0147	0.1189	0	100	100	100	0	0	0	0
br_tr94	212521	212542	1	1	0.0147	0.12	0	100	100	100	0	0	0	0
br_tr95	212621	212641	1	1	0.0303	0.1169	0	62.5	62.5	62.5	0	0	0	0
br_tr96	212621	212642	1	1	0.0303	0.1173	0	62.5	62.5	62.5	0	0	0	0
br_tr97	212641	212671	1	1	0	0.12	0	60	60	60	0	0	0	0
br_tr98	212721	212741	1	1	0.0147	0.12	0	100	100	100	0	0	0	0
br_tr99	212721	212742	1	1	0.0147	0.12	0	100	100	100	0	0	0	0
br_tr100	212721	212791	1	1	0	0.12	0	65	65	65	0	0	0	0
br_tr101	212721	212792	1	1	0	0.12	0	35	35	35	0	0	0	0
br_tr102	212821	212891	1	1	0	0.12	0	62.5	62.5	62.5	0	0	0	0
br_tr103	212841	212871	1	1	0	0.0981	0	25	25	25	0	0	0	0
br_tr104	212841	212872	1	1	0	0.0981	0	25	25	25	0	0	0	0
br_tr105	212921	212941	1	1	0.0898	0.118	0	50	50	50	0	0	0	0
br_tr106	212921	212941	1	1	0.0898	0.10045	0	31	31	31	0	0	0	0
br_tr107	213021	213041	1	1	0.0147	0.1184	0	100	100	100	0	0	0	0
br_tr108	213121	213141	1	1	0.0303	0.1103	0	62.5	62.5	62.5	0	0	0	0
br_tr109	213121	213142	1	1	0.0303	0.1103	0	62.5	62.5	62.5	0	0	0	0
br_tr110	213221	213241	1	1	0.0898	0.1073	0	31	31	31	0	0	0	0
br_tr111	213221	213241	1	1	0.0898	0.1085	0	31	31	31	0	0	0	0
br_tr112	213321	213341	1	1	0.0898	0.118	0	62.5	62.5	62.5	0	0	0	0
br_tr113	213421	213441	1	1	0.0898	0.11	0	25	25	25	0	0	0	0
br_tr114	213521	213551	1	1	0.0898	0.115	0	43	43	43	0	0	0	0
br_tr115	213521	213552	1	1	0.0898	0.115	0	43	43	43	0	0	0	0
br_tr116	213621	213641	1	1	0.0898	0.118	0	50	50	50	0	0	0	0
br_tr117	213621	213642	1	1	0.0898	0.117	0	50	50	50	0	0	0	0
br_tr118	213721	213741	1	1	0.0303	0.12	0	62.5	62.5	62.5	0	0	0	0
br_tr119	213721	213741	1	1	0.0303	0.12	0	62.5	62.5	62.5	0	0	0	0
br_tr120	213821	213841	1	1	0.0303	0.123	0	50	50	50	0	0	0	0
br_tr121	214021	214051	1	1	0.0898	0.154	0	25	25	25	0	0	0	0
br_tr122	214021	214052	1	1	0.0898	0.154	0	25	25	25	0	0	0	0

br_tr123	214021	214053	1	1	0.0898	0.154	0	25	25	25	0	0	0	0
br_tr124	214121	214151	1	1	0.0303	0.1656	0	50	50	50	0	0	0	0
br_tr125	214121	214152	1	1	0.0303	0.1658	0	50	50	50	0	0	0	0
br_tr126	214421	214441	1	1	0.0303	0.1205	0	62.5	62.5	62.5	0	0	0	0
br_tr127	214441	214471	1	1	0	0.0955	0	31	31	31	0	0	0	0
br_tr128	214510	214541	1	1	0.0063	0.1445	0	125	125	125	0	0	0	0
br_tr129	214510	214542	1	1	0.0063	0.1445	0	125	125	125	0	0	0	0
br_tr130	212841	212821	1	1	0	0.0981	0	25	25	25	0	0	0	0
br_tr131	212842	212821	1	1	0	0.0981	0	25	25	25	0	0	0	0

TABLE V TRANSFORMER DATA

Name	From Bus	To Bus	Circuit	Tap	Angle(degree)	TapMin	TapMax	AngleMin (degree)	AngleMax (degree)
TF1	210010	210022	1	0.935	3.57	0	0	-15	15
TF2	210010	210043	1	0.935	0	0	0	0	0
TF3	210010	210044	1	0.935	0	0	0	0	0
TF4	210021	210041	1	0.935	0	0	0	0	0
TF5	210022	210042	1	0.935	0	0	0	0	0
TF6	210110	210121	1	1.026	0	0	0	0	0
TF7	210110	210121	1	1.026	0	0	0	0	0
TF8	210110	210122	1	0.935	0	0	0	0	0
TF9	210110	210122	1	0.935	0	0	0	0	0
TF10	210121	210141	1	0.935	0	0	0	0	0
TF11	210121	210142	1	0.935	0	0	0	0	0
TF12	210122	210143	1	0.935	0	0	0	0	0
TF13	210122	210144	1	0.935	0	0	0	0	0
TF14	210210	210221	1	1.026	0	0	0	0	0
TF15	210210	210221	1	0.935	0	0	0	0	0
TF16	210221	210241	1	0.935	0	0	0	0	0
TF17	210221	210242	1	0.935	0	0	0	0	0
TF18	210310	210321	1	0.935	3.57	0	0	-30	30

TF19	210310	210321	1	1.026	0	0	0	0	0
TF20	210310	210321	1	1.026	0	0	0	0	0
TF21	210321	210341	1	0.935	0	0	0	0	0
TF22	210321	210342	1	0.935	0	0	0	0	0
TF23	210341	210361	1	0.935	0	0	0	0	0
TF24	210341	210362	1	0.935	0	0	0	0	0
TF25	210410	210481	1	0.935	0	0	0	0	0
TF26	210410	210482	1	0.935	0	0	0	0	0
TF27	210410	210483	1	0.935	0	0	0	0	0
TF28	210410	210484	1	0.935	0	0	0	0	0
TF29	210410	210485	1	0.935	0	0	0	0	0
TF30	210410	210486	1	0.935	0	0	0	0	0
TF31	210510	210581	1	0.935	0	0	0	0	0
TF32	210510	210582	1	0.935	0	0	0	0	0
TF33	210510	210583	1	0.935	0	0	0	0	0
TF34	210621	210651	1	1.026	0	0	0	0	0
TF35	210621	210651	1	0.935	0	0	0	0	0
TF36	210721	210741	1	0.935	0	0	0	0	0
TF37	210721	210751	1	0.935	0	0	0	0	0
TF38	210721	210752	1	0.935	0	0	0	0	0
TF39	210821	210841	1	0.935	0	0	0	0	0
TF40	210821	210851	1	0.935	0	0	0	0	0
TF41	210821	210852	1	0.935	0	0	0	0	0
TF42	210921	210941	1	0.935	0	0	0	0	0
TF43	210921	210942	1	0.935	0	0	0	0	0
TF44	210921	210943	1	0.935	0	0	0	0	0
TF45	211022	211041	1	0.935	0	0	0	0	0
TF46	211121	211141	1	0.935	0	0	0	0	0
TF47	211121	211142	1	0.935	0	0	0	0	0
TF48	211121	211151	1	0.935	0	0	0	0	0
TF49	211221	211241	1	0.935	0	0	0	0	0
TF50	211221	211242	1	0.935	0	0	0	0	0

TF51	211321	211341	1	1.026	0	0	0	0	0
TF52	211321	211342	1	0.935	0	0	0	0	0
TF53	211321	211342	1	0.935	0	0	0	0	0
TF54	211421	211441	1	0.935	0	0	0	0	0
TF55	211421	211442	1	0.935	0	0	0	0	0
TF56	211521	211541	1	0.935	0	0	0	0	0
TF57	211521	211543	1	0.935	0	0	0	0	0
TF58	211521	211591	1	0.935	0	0	0	0	0
TF59	211521	211592	1	0.935	0	0	0	0	0
TF60	211521	211593	1	0.935	0	0	0	0	0
TF61	211521	211594	1	0.935	0	0	0	0	0
TF62	211525	211542	1	0.935	0	0	0	0	0
TF63	211525	211544	1	0.935	0	0	0	0	0
TF64	211526	211545	1	0.935	0	0	0	0	0
TF65	211526	211546	1	0.935	0	0	0	0	0
TF66	211621	211641	1	0.935	0	0	0	0	0
TF67	211621	211642	1	0.935	0	0	0	0	0
TF68	211721	211741	1	0.935	0	0	0	0	0
TF69	211721	211742	1	0.935	0	0	0	0	0
TF70	211821	211841	1	0.935	0	0	0	0	0
TF71	211821	211842	1	0.935	0	0	0	0	0
TF72	211921	211941	1	0.935	0	0	0	0	0
TF73	211921	211942	1	0.935	0	0	0	0	0
TF74	211921	211943	1	0.935	0	0	0	0	0
TF75	211941	211961	1	0.935	0	0	0	0	0
TF76	211941	211962	1	0.935	0	0	0	0	0
TF77	211941	211963	1	0.935	0	0	0	0	0
TF78	212021	212041	1	0.935	0	0	0	0	0
TF79	212021	212042	1	0.935	0	0	0	0	0
TF80	212021	212043	1	0.935	0	0	0	0	0
TF81	212021	212044	1	0.935	0	0	0	0	0
TF82	212121	212141	1	0.935	0	0	0	0	0

TF83	212121	212142	1	0.935	0	0	0	0	0
TF84	212121	212143	1	0.935	0	0	0	0	0
TF85	212221	212241	1	1.026	0	0	0	0	0
TF86	212221	212241	1	0.935	0	0	0	0	0
TF87	212321	212341	1	0.935	0	0	0	0	0
TF88	212321	212342	1	0.935	0	0	0	0	0
TF89	212421	212441	1	0.935	0	0	0	0	0
TF90	212421	212492	1	0.935	0	0	0	0	0
TF91	212421	212493	1	0.935	0	0	0	0	0
TF92	212441	212471	1	0.935	0	0	0	0	0
TF93	212521	212541	1	0.935	0	0	0	0	0
TF94	212521	212542	1	0.935	0	0	0	0	0
TF95	212621	212641	1	0.935	0	0	0	0	0
TF96	212621	212642	1	0.935	0	0	0	0	0
TF97	212641	212671	1	0.935	0	0	0	0	0
TF98	212721	212741	1	0.935	0	0	0	0	0
TF99	212721	212742	1	0.935	0	0	0	0	0
TF100	212721	212791	1	0.935	0	0	0	0	0
TF101	212721	212792	1	0.935	0	0	0	0	0
TF102	212821	212891	1	0.935	0	0	0	0	0
TF103	212841	212871	1	0.935	0	0	0	0	0
TF104	212841	212872	1	0.935	0	0	0	0	0
TF105	212921	212941	1	1.026	0	0	0	0	0
TF106	212921	212941	1	0.935	0	0	0	0	0
TF107	213021	213041	1	0.935	0	0	0	0	0
TF108	213121	213141	1	0.935	0	0	0	0	0
TF109	213121	213142	1	0.935	0	0	0	0	0
TF110	213221	213241	1	0.935	0	0	0	0	0
TF111	213221	213241	1	0.935	0	0	0	0	0
TF112	213321	213341	1	0.935	0	0	0	0	0
TF113	213421	213441	1	0.935	0	0	0	0	0
TF114	213521	213551	1	0.935	0	0	0	0	0

TF115	213521	213552	1	0.935	0	0	0	0	0
TF116	213621	213641	1	0.935	0	0	0	0	0
TF117	213621	213642	1	0.935	0	0	0	0	0
TF118	213721	213741	1	1.026	0	0	0	0	0
TF119	213721	213741	1	0.935	0	0	0	0	0
TF120	213821	213841	1	0.935	0	0	0	0	0
TF121	214021	214051	1	0.935	0	0	0	0	0
TF122	214021	214052	1	0.935	0	0	0	0	0
TF123	214021	214053	1	0.935	0	0	0	0	0
TF124	214121	214151	1	0.935	0	0	0	0	0
TF125	214121	214152	1	0.935	0	0	0	0	0
TF126	214421	214441	1	0.935	0	0	0	0	0
TF127	214441	214471	1	0.935	0	0	0	0	0
TF128	212841	212821	1	0.935	0	0	0	0	0
TF129	212842	212821	1	0.935	0	0	0	0	0

TABLE VI DRP BIDS DATA

EC = Energy Cost for DRR point
CC = Capacity Cost for DRR point

DRP No	Bus	DRR 1 (MW)	CC 1 (\$/MW)	EC 1 (\$/MWh)	DRR 2 (MW)	CC 2 (\$/MW)	EC 2 (\$/MWh)	DRR 3 (MW)	CC 3 (\$/MW)	EC 3 (\$/MWh)
1	211742	7	7	17.5	14	9	22.5	21	11	27.5
2	211543	7	7	17.5	14	9	22.5	21	11	27.5
3	212041	7	7	17.5	14	9	22.5	21	11	27.5
4	212043	7	7	17.5	14	9	22.5	21	11	27.5
5	212541	7	7	17.5	14	9	22.5	21	11	27.5
6	210942	7	7	17.5	14	9	22.5	21	11	27.5
7	211842	7	7	17.5	14	9	22.5	21	11	27.5

BASE MVA = 100 MVA