Appendix 1

SAMPLE COLLECTED DATA FROM DISTRIBUTED GENERATION

	Microturbine	Fuel Cell	Solar Thermal	Photovoltaic	Wind Turbine
Manufacturer	Allied Signal	N/A	N/A	N/A	N/A
Model	Parallon 75	N/A	N/A	N/A	N/A
Fuel Type	gas, diesel, methanol, propane, naptha, JP-8	gas	solar, fossil fuel	solar	wind
Rating (kWe)	75	1550	15	N/A	525
Rated Min Load (%)	50	27.5	5	0	1
Efficiency (LHV) (%)	30	N/A	N/A	N/A	N/A
Useable Therms (kJ/kWh)	N/A	1688	7174	0	0
Exhaust Temp (C)	260	227	66	0	0
Cold Start-up Time (min)	2	1800	4	0	0.33
Equip. Cost ($/kW)	N/A	1358	3900	7500	1175
Install. Cost ($/kW)	N/A	268	N/A	N/A	118
Turnkey Costs ($/kW)	450	N/A	N/A	N/A	N/A
Fixed O&M ($/kWa)	N/A	70	N/A	N/A	37.1
Variable O&M ($/kWh)	0.01	0.003	0.0375	0.0025	0.012
Lifetime	40 000 h	32.5 a	N/A	N/A	22.5 a
Lead Time (months)	N/A	18	1	N/A	10
Range of Footprint (m^2/kW)	N/A	0.093-0.372	15-25	50	0.02-10.22
Range of Weight (kg/kW)	1089-1451	54-109	272	N/A	113
Noise Level (dB)	62.5 @10 m	N/A	N/A	0	45 @ 250 m
CO2 (g/kWh)	N/A	382	N/A	0	N/A
NOx (g/kWh)	25 ppm (<9 ppm with gas)	0.00091	9	0	N/A
SOx (g/kWh)	N/A	0.0014	N/A	0	N/A
UHC (g/kWh)	N/A	0	N/A	0	N/A
PM-10 (g/kWh)	N/A	0	N/A	0	N/A
Water Requirement (l/kWh)	0	0.24	0	0	N/A
Wastewater Production (l/kWh)	N/A	0.08	0	0	N/A
Hazardous Material	N/A	none	hydrogen	none	hydraulic fluid
Frequency (Hz)	50/60	N/A	N/A	N/A	N/A

RESTAURANT BASE CASE

Total Electricity Consumed (kWh/year)
1726515
Annual Average Demand (kW)
197
Min Load (kW)
110
Max. Load (kW)
328
Load factor
0.60
Energy from grid w DG (kWh/year)
49955
Energy self-generated w DG (kWh/year)
1676589
Energy sold to the grid (kWh/year)
29

Cost of bill without DG ($)
158036
Average price (c/kWh)
9.15
Costs with DG ($)
141090
Average price (c/kWh)
8.17
Cost of bill with DG ($)
11421
Average price of electricity from grid (c/kWh)
22.86
Net Costs of self-gen ($)
129669
Average net cost of self-gen (c/kWh)
7.73
Savings (% with respect to not installing DG)
10.72

Power installed Step 1

Units	Capacity	Total	LEC	Technology
1	50	50	7.34	FC Solid oxide SOFCo
1	50	50	7.34	FC Solid oxide SOFCo

Power installed Step 2

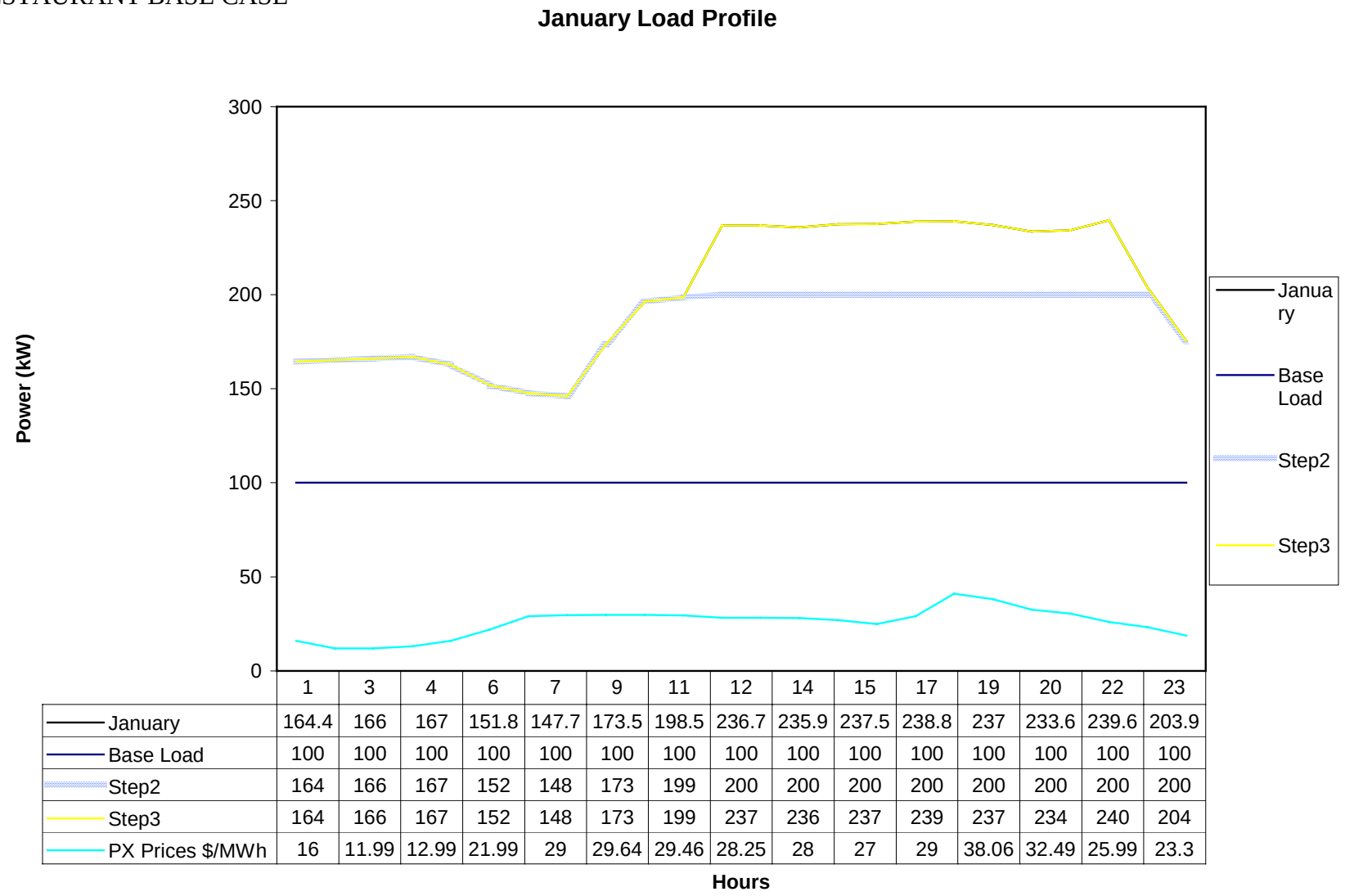
Units	Capacity	Total	LEC	Technology
1	100	100	7.78	FC Solid Oxide TMI

Power installed Step 3

Units	Capacity	Total	LEC	Technology
1	50	50	9.92	FC Solid oxide SOFCo

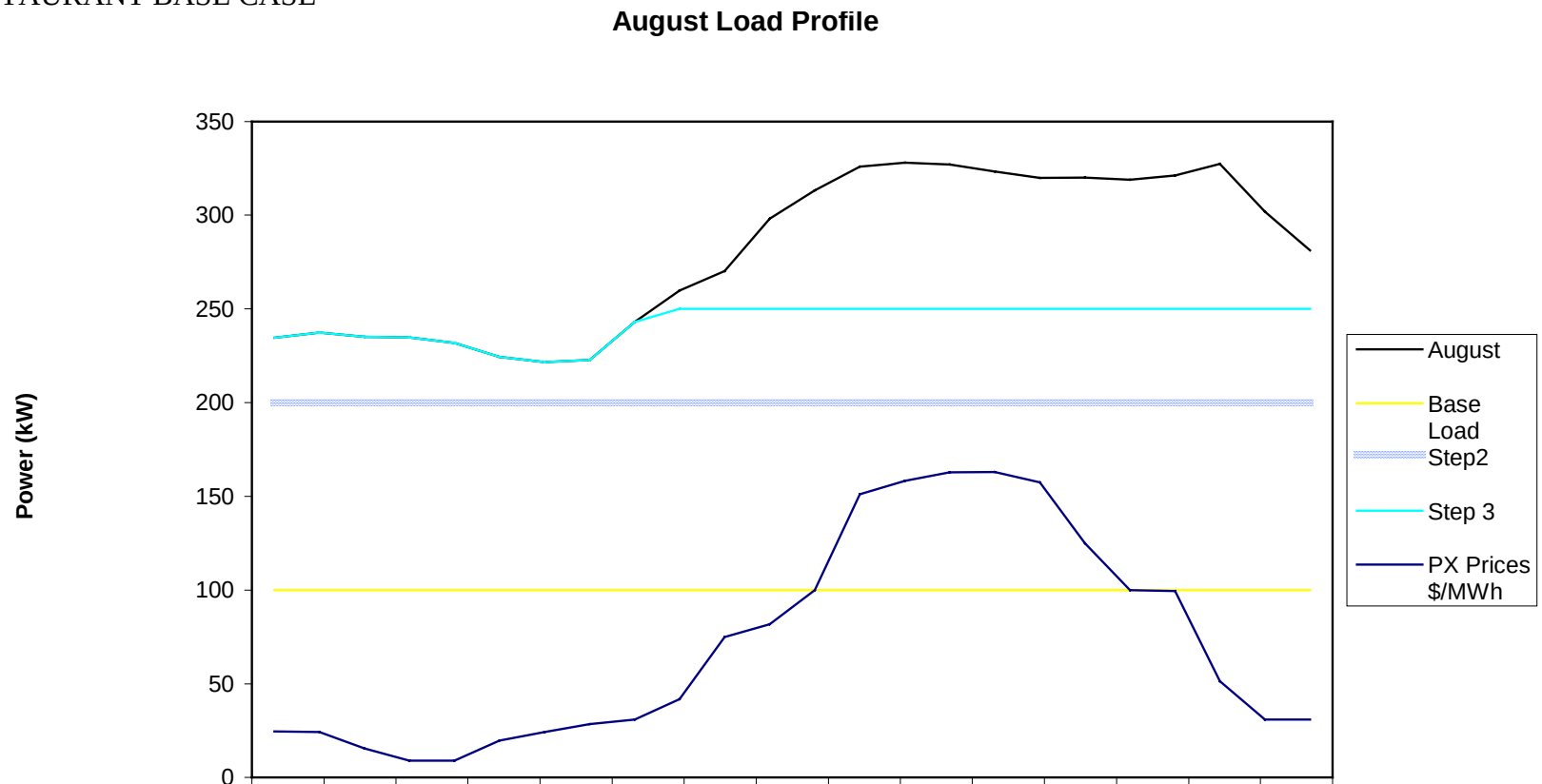
Total Power installed
250
Power installed/Max.Power
0.76

RESTAURANT BASE CASE



	1	3	4	6	7	9	11	12	14	15	17	19	20	22	23
January	164.4	166	167	151.8	147.7	173.5	198.5	236.7	235.9	237.5	238.8	237	233.6	239.6	203.9
Base Load	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Step2	164	166	167	152	148	173	199	200	200	200	200	200	200	200	200
Step3	164	166	167	152	148	173	199	237	236	237	239	237	234	240	204
PX Prices $/MWh	16	11.99	12.99	21.99	29	29.64	29.46	28.25	28	27	29	38.06	32.49	25.99	23.3

RESTAURANT BASE CASE



	1	3	4	6	7	9	11	12	14	15	17	19	20	22	23
August	234.7	235.1	234.9	224.4	221.7	243.1	270.2	298.2	325.8	328	323.4	320	318.9	327.4	301.9
Base Load	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Step2	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Step 3	235	235	235	224	222	243	250	250	250	250	250	250	250	250	250
PX Prices $/MWh	24.52	15.47	8.99	19.73	24.3	30.92	75	81.79	151.2	158.3	163	124.9	99.99	51.47	30.93

RESTAURANT FUEL 3

Total Electricity Consumed (kWh/year)
1726515
Annual Average Demand (kW)
197
Min Load (kW)
110
Max. Load (kW)
328
Load factor
0.60
Energy from grid w DG (kWh/year)
42
Energy self-generated w DG (kWh/year)
1727538
Energy sold to the grid (kWh/year)
1066

Cost of bill without DG ($)
158036
Costs with DG ($)
118183
Cost of bill with DG ($)
1029
Net Costs of self-gen ($)
117154
Savings (% with respect to not installing DG)
25.22

Average price (c/kWh)
9.15
Average price (c/kWh)
6.85
Average price of electricity from grid (c/kWh)
2423.90
Average net cost of self-gen (c/kWh)
6.78

Power installed Step 1

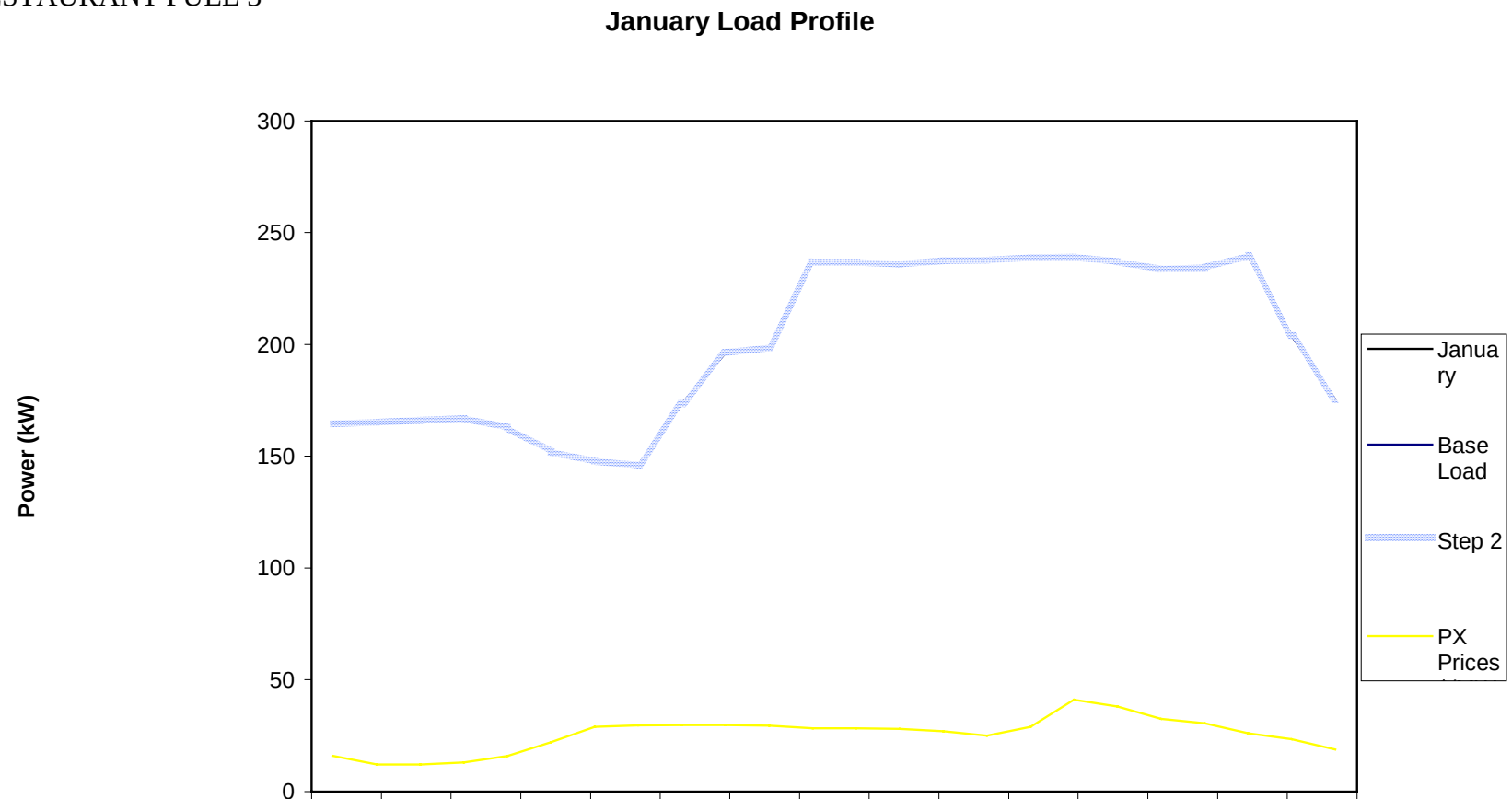
Units	Capacity	Total	LEC	Technology
1	250	250	5.64	FC PEM

Power installed Step 2

Units	Capacity	Total	LEC	Technology
1	75	75	18.20	Microturbine Parallon

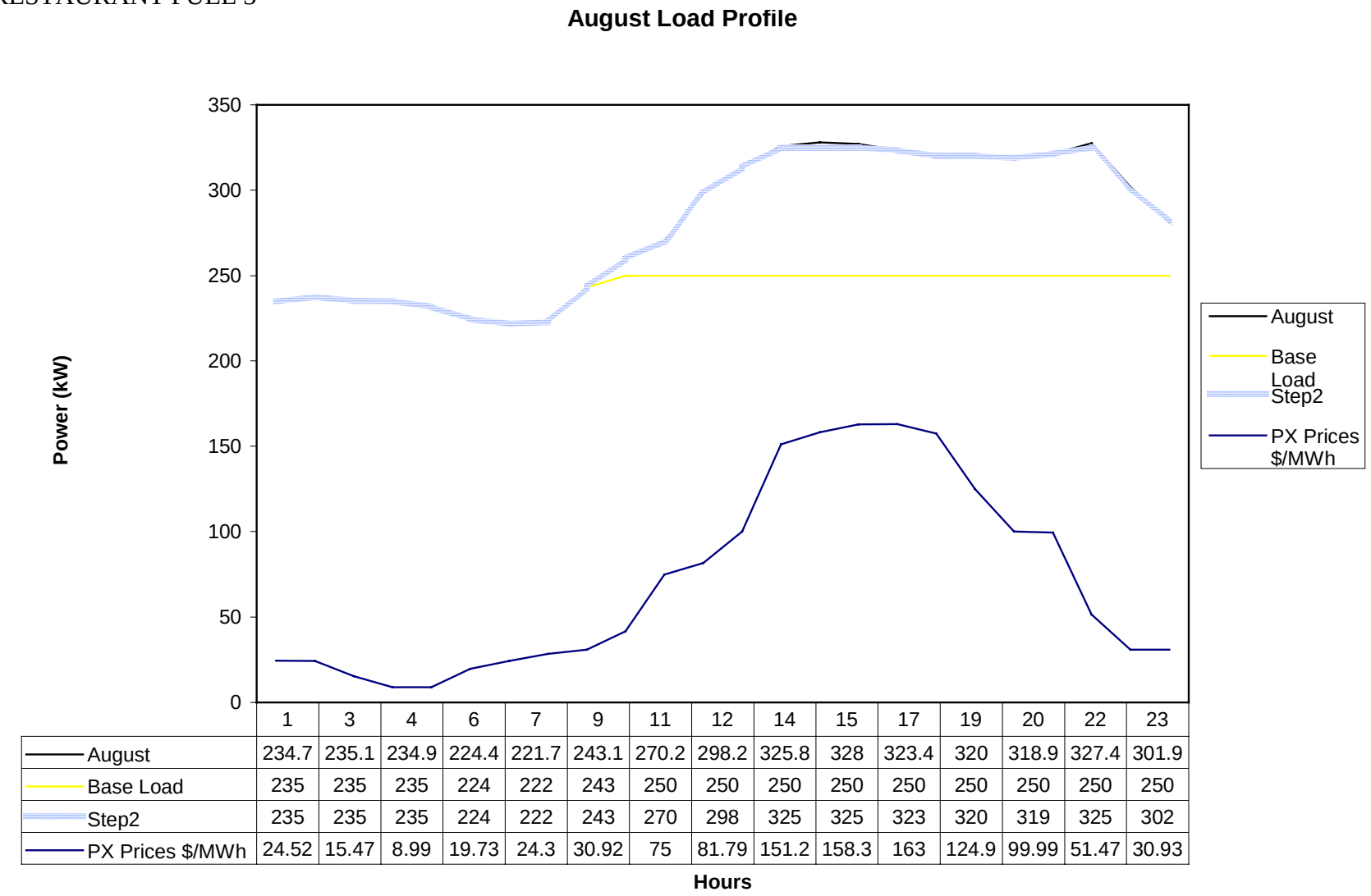
Total Power installed
325
Power installed/Max.Power
0.99

RESTAURANT FUEL 3



	1	3	4	6	7	9	11	12	14	15	17	19	20	22	23
January	164.4	166	167	151.8	147.7	173.5	198.5	236.7	235.9	237.5	238.8	237	233.6	239.6	203.9
Base Load	164	166	167	152	148	173	199	237	236	237	239	237	234	240	204
Step 2	164	166	167	152	148	173	199	237	236	237	239	237	234	240	204
PX Prices $/MWh	16	11.99	12.99	21.99	29	29.64	29.46	28.25	28	27	29	38.06	32.49	25.99	23.3

RESTAURANT FUEL 3



	1	3	4	6	7	9	11	12	14	15	17	19	20	22	23
August	234.7	235.1	234.9	224.4	221.7	243.1	270.2	298.2	325.8	328	323.4	320	318.9	327.4	301.9
Base Load	235	235	235	224	222	243	250	250	250	250	250	250	250	250	250
Step2	235	235	235	224	222	243	270	298	325	325	323	320	319	325	302
PX Prices $/MWh	24.52	15.47	8.99	19.73	24.3	30.92	75	81.79	151.2	158.3	163	124.9	99.99	51.47	30.93

Appendix 1

RESTAURANT FUEL 8

Total Electricity Consumed (kWh/year)
1726515
Annual Average Demand (kW)
197
Min Load (kW)
110
Max. Load (kW)
328
Load factor
0.60
Energy from grid w DG (kWh/year)
850515
Energy self-generated w DG (kWh/year)
876000
Energy sold to the grid (kWh/year)
0

Cost of bill without DG ($)
158036
Costs with DG ($)
165355
Cost of bill with DG ($)
87806
Net Costs of self-gen ($)
77549
Savings (% with respect to not installing DG)
-4.63
Therefore, no adoption of DG!

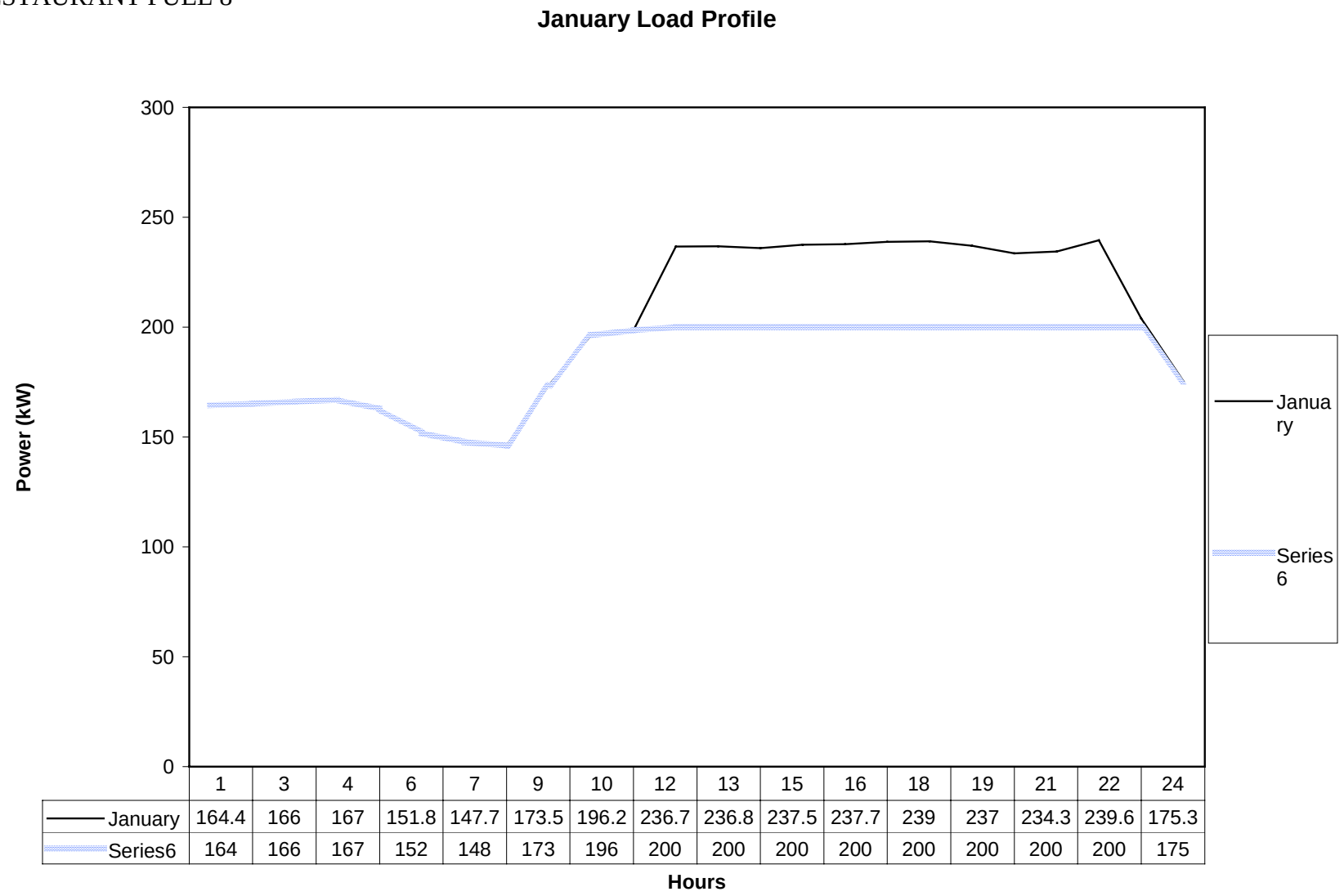
Average price (c/kWh)
9.15
Average price (c/kWh)
9.58
Average price of electricity from grid (c/kWh)
10.32
Average net cost of self-gen (c/kWh)
8.85

Power installed Step 1

Units	Capacity	Total	LEC	Technology
1	50	50	8.85	FC Solid oxide SOFCo
1	50	50	8.85	FC Solid oxide SOFCo

Total Power installed
100
Power installed/Max.Power
0.30

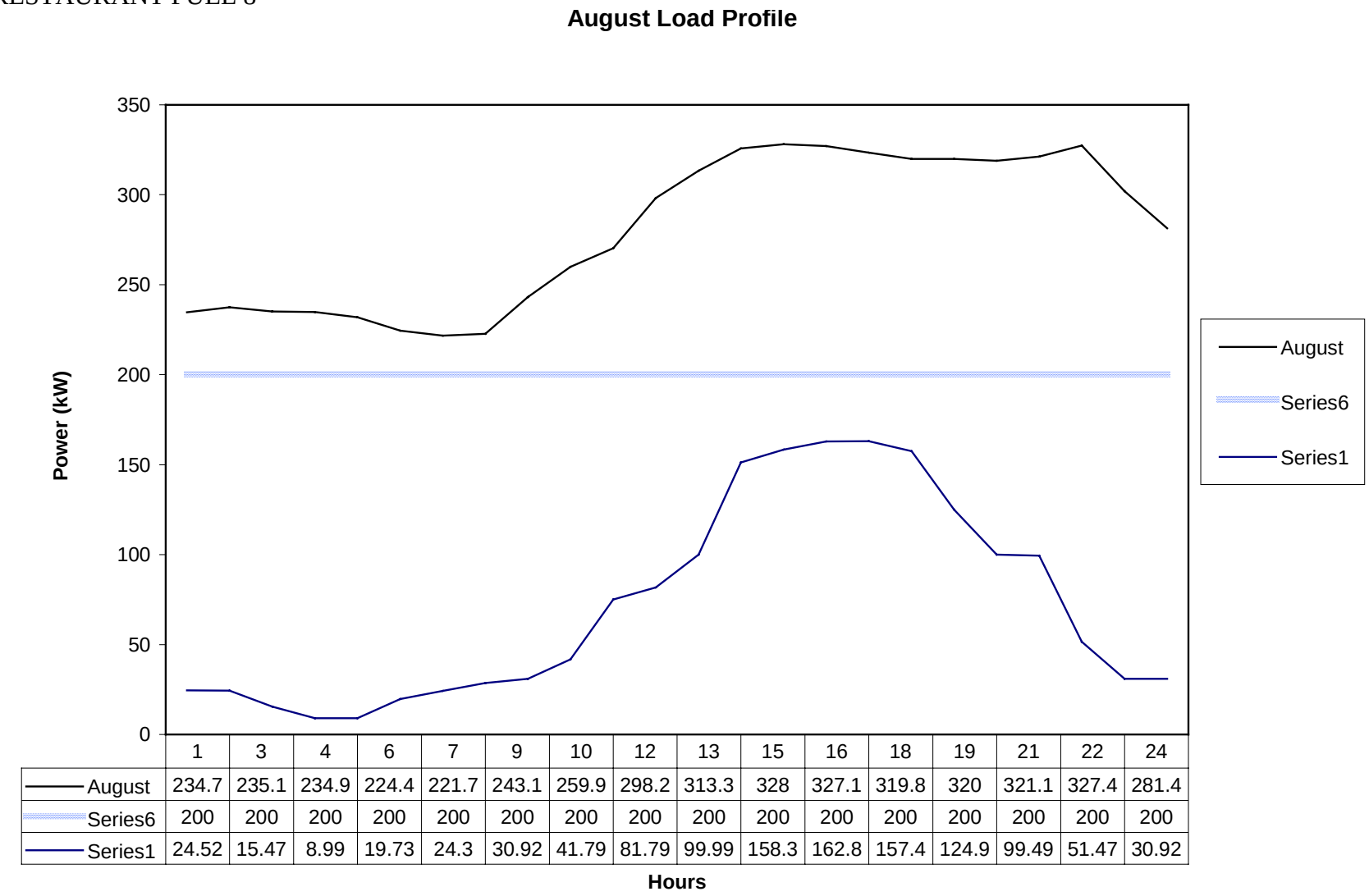
RESTAURANT FUEL 8



	1	3	4	6	7	9	10	12	13	15	16	18	19	21	22	24
January	164.4	166	167	151.8	147.7	173.5	196.2	236.7	236.8	237.5	237.7	239	237	234.3	239.6	175.3
Series6	164	166	167	152	148	173	196	200	200	200	200	200	200	200	200	175

Appendix 1

RESTAURANT FUEL 8



	1	3	4	6	7	9	10	12	13	15	16	18	19	21	22	24
August	234.7	235.1	234.9	224.4	221.7	243.1	259.9	298.2	313.3	328	327.1	319.8	320	321.1	327.4	281.4
Series6	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Series1	24.52	15.47	8.99	19.73	24.3	30.92	41.79	81.79	99.99	158.3	162.8	157.4	124.9	99.49	51.47	30.92

RESTAURANT R = 6%

Total Electricity Consumed (kWh/year)
1726515
Annual Average Demand (kW)
197
Min Load (kW)
110
Max. Load (kW)
328
Load factor
0.60
Energy from grid w DG (kWh/year)
49955
Energy self-generated w DG (kWh/year)
1676589
Energy sold to the grid (kWh/year)
29

Cost of bill without DG ($)
158036
Costs with DG ($)
138927
Cost of bill with DG ($)
11421
Net Costs of self-gen ($)
127506

Average price (c/kWh)
9.15
Average price (c/kWh)
8.05
Average price of electricity from grid (c/kWh)
22.86
Average net cost of self-gen (c/kWh)
7.61
Savings (% with respect to not installing DG)
12.09

Power installed Step 1

Units	Capacity	Total	LEC	Technology
1	50	50	7.24	FC Solid oxide SOFCo
1	50	50	7.24	FC Solid oxide SOFCo

Power installed Step 2

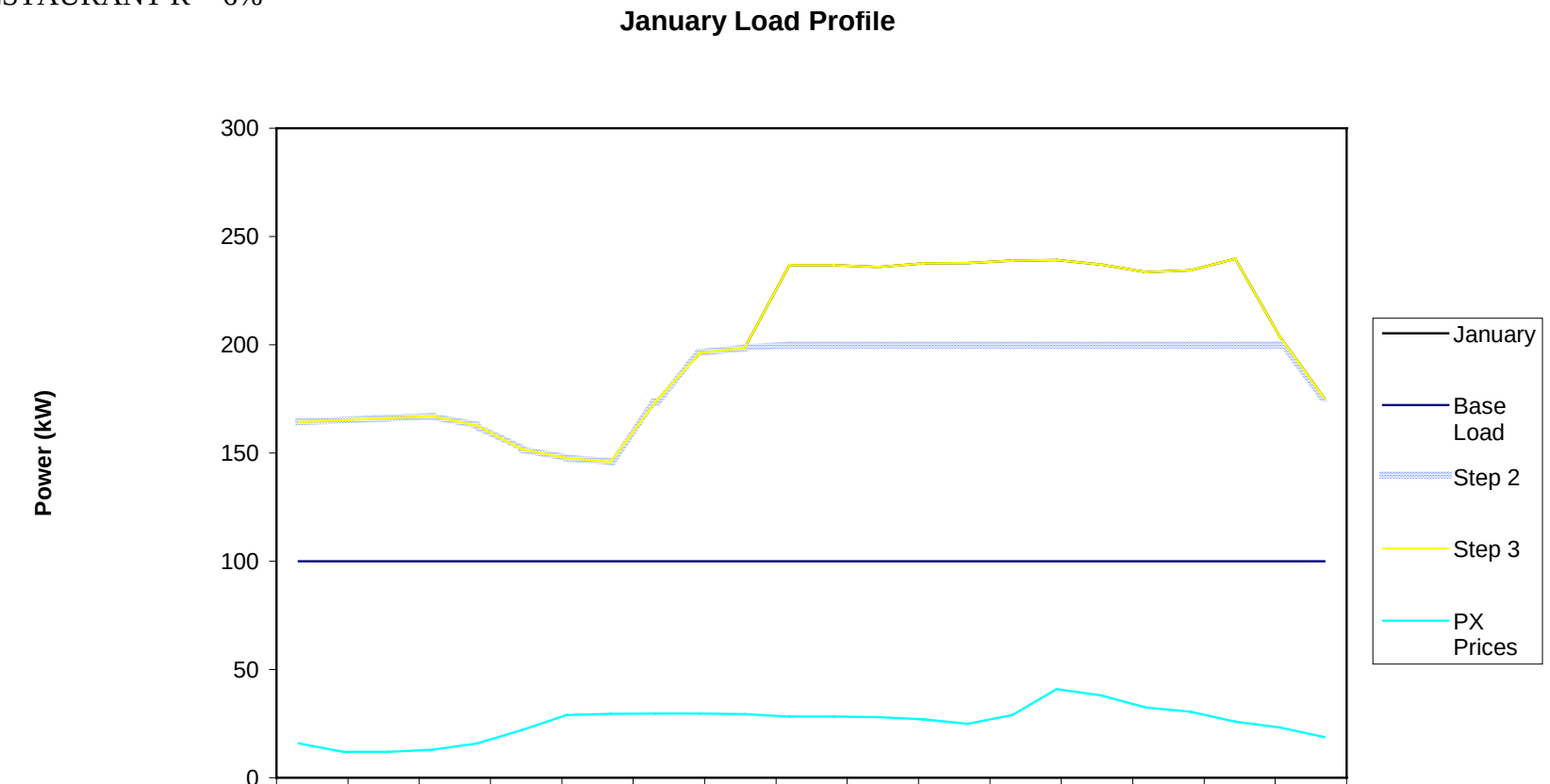
Units	Capacity	Total	LEC	Technology
1	100	100	7.64	FC Solid Oxide TMI

Power installed Step 3

Units	Capacity	Total	LEC	Technology
1	50	50	9.63	FC Solid oxide SOFCo

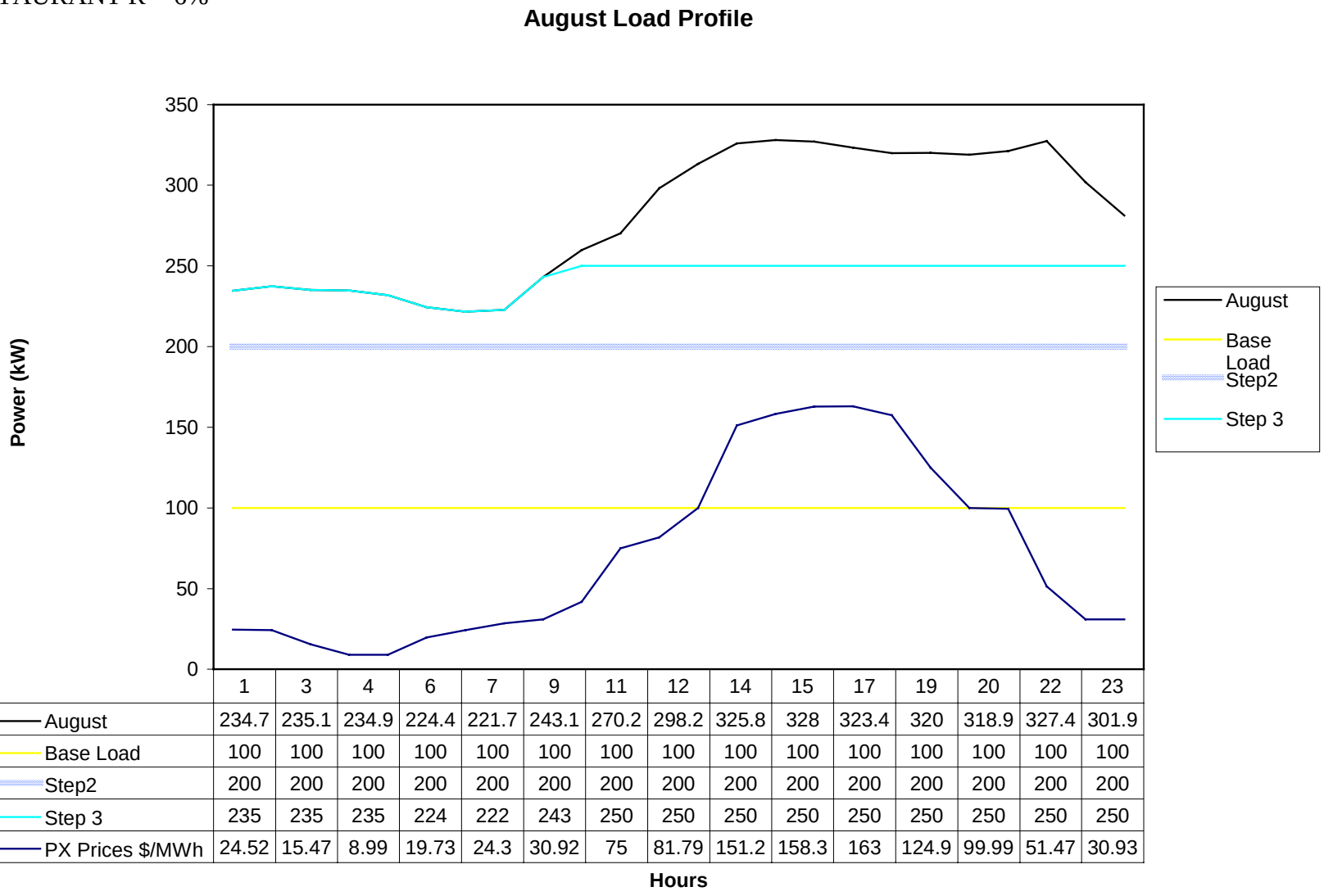
Total Power installed
250
Power installed/Max.Power
0.76

RESTAURANT R = 6%



	1	3	4	6	7	9	11	12	14	15	17	19	20	22	23
January	164.4	166	167	151.8	147.7	173.5	198.5	236.7	235.9	237.5	238.8	237	233.6	239.6	203.9
Base Load	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Step 2	164	166	167	152	148	173	199	200	200	200	200	200	200	200	200
Step 3	164	166	167	152	148	173	199	237	236	237	239	237	234	240	204
PX Prices $/MWh	16	11.99	12.99	21.99	29	29.64	29.46	28.25	28	27	29	38.06	32.49	25.99	23.3

RESTAURANT R = 6%



	1	3	4	6	7	9	11	12	14	15	17	19	20	22	23
August	234.7	235.1	234.9	224.4	221.7	243.1	270.2	298.2	325.8	328	323.4	320	318.9	327.4	301.9
Base Load	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Step2	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Step 3	235	235	235	224	222	243	250	250	250	250	250	250	250	250	250
PX Prices $/MWh	24.52	15.47	8.99	19.73	24.3	30.92	75	81.79	151.2	158.3	163	124.9	99.99	51.47	30.93

RESTAURANT R = 8%

Total Electricity Consumed (kWh/year)
1726515
Annual Average Demand (kW)
197
Min Load (kW)
110
Max. Load (kW)
328
Load factor
0.60
Energy from grid w DG (kWh/year)
49955
Energy self-generated w DG (kWh/year)
1676589
Energy sold to the grid (kWh/year)
29

Cost of bill without DG ($)
158036
Costs with DG ($)
143327
Cost of bill with DG ($)
11421
Net Costs of self-gen ($)
131906

Average price (c/kWh)
9.15
Average price (c/kWh)
8.30
Average price of electricity from grid (c/kWh)
22.86
Average net cost of self-gen (c/kWh)
7.87
Savings (% with respect to not installing DG)
9.31

Power installed Step 1

Units	Capacity	Total	LEC	Technology
1	50	50	7.44	FC Solid oxide SOFCo
1	50	50	7.44	FC Solid oxide SOFCo

Power installed Step 2

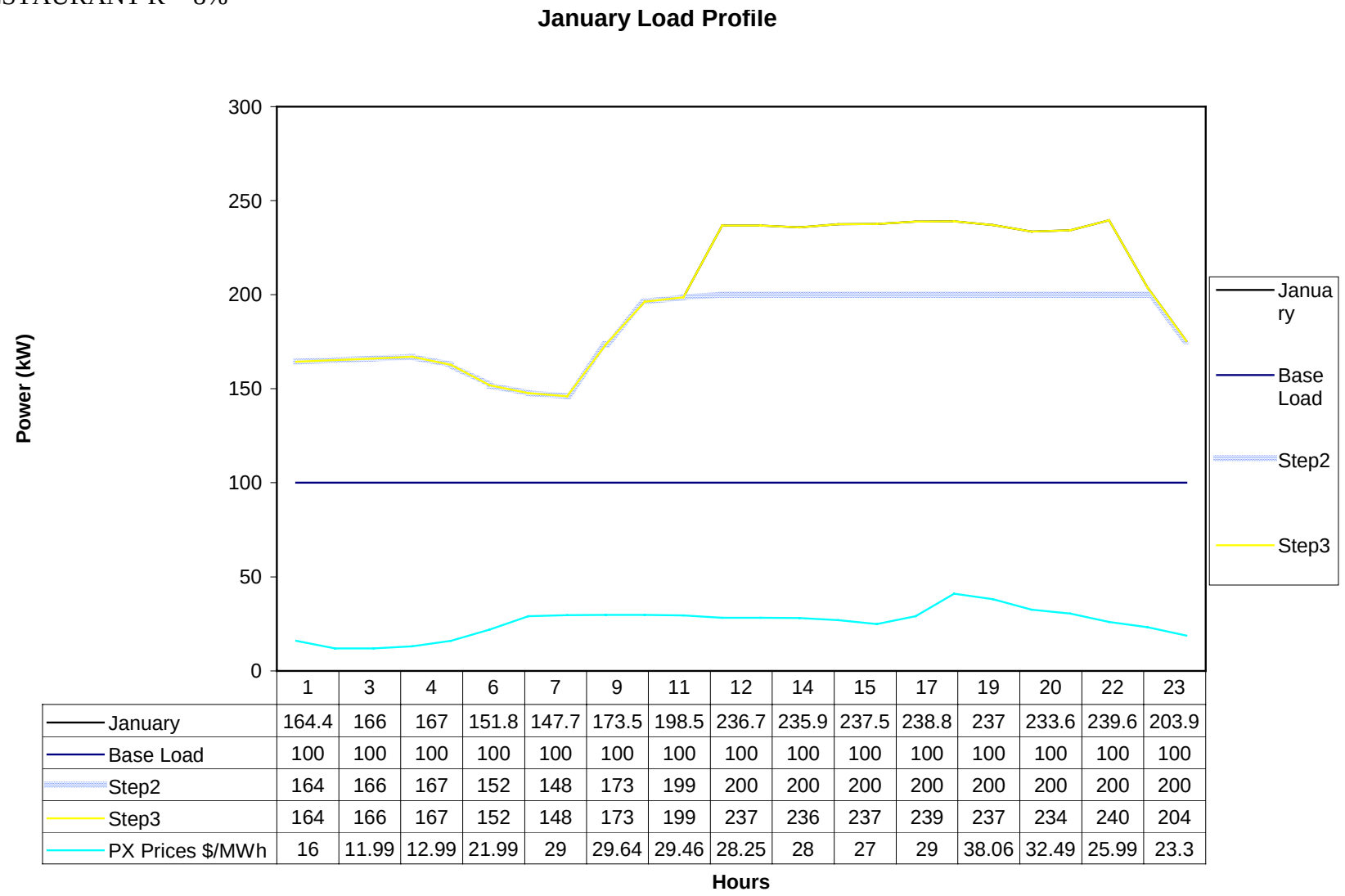
Units	Capacity	Total	LEC	Technology
1	100	100	7.91	FC Solid Oxide TMI

Power installed Step 3

Units	Capacity	Total	LEC	Technology
1	50	50	10.23	FC Solid oxide SOFCo

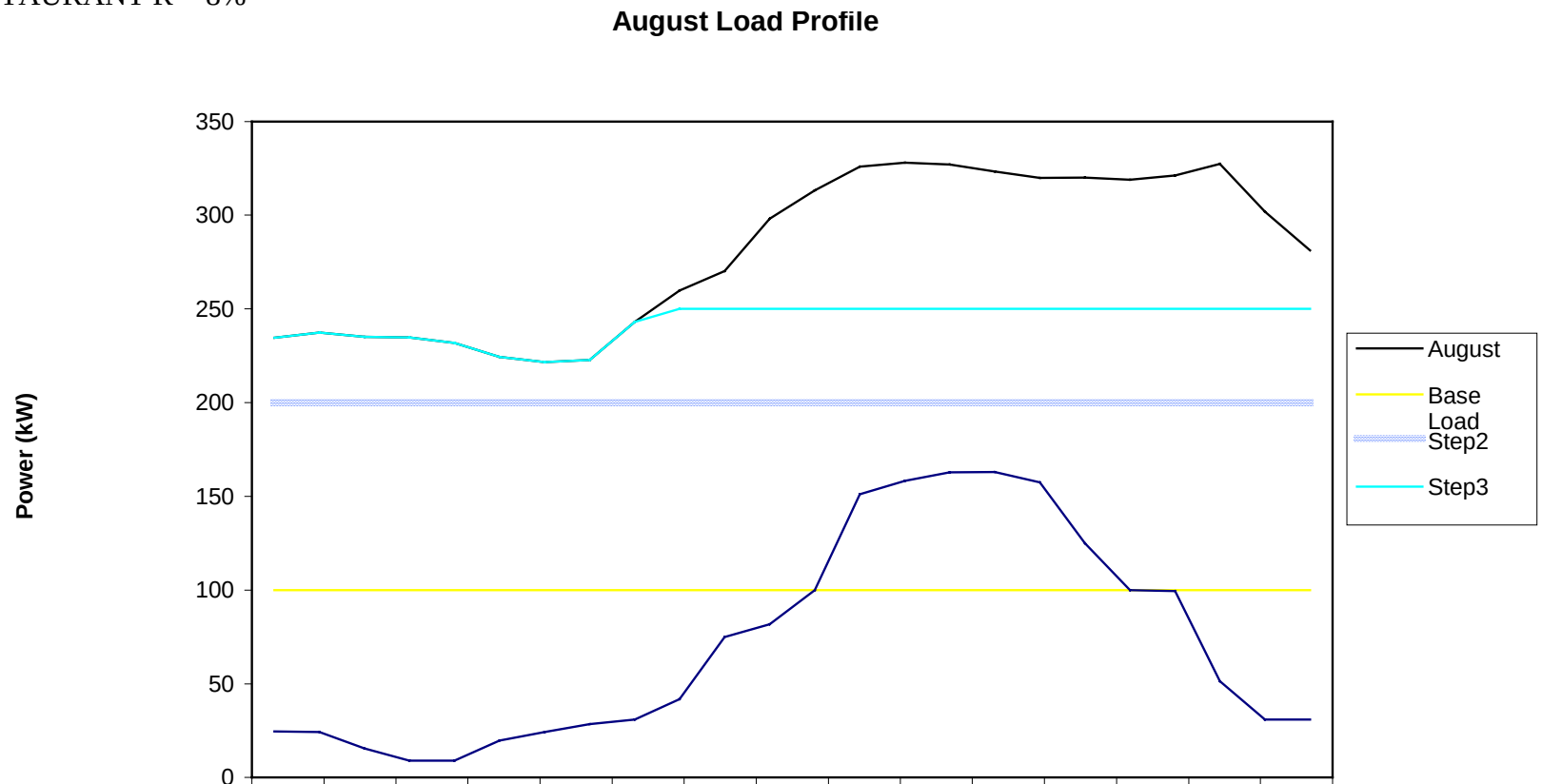
Total Power installed
250
Power installed/Max.Power
0.76

RESTAURANT R = 8%



	1	3	4	6	7	9	11	12	14	15	17	19	20	22	23
January	164.4	166	167	151.8	147.7	173.5	198.5	236.7	235.9	237.5	238.8	237	233.6	239.6	203.9
Base Load	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Step2	164	166	167	152	148	173	199	200	200	200	200	200	200	200	200
Step3	164	166	167	152	148	173	199	237	236	237	239	237	234	240	204
PX Prices $/MWh	16	11.99	12.99	21.99	29	29.64	29.46	28.25	28	27	29	38.06	32.49	25.99	23.3

RESTAURANT R = 8%



	1	3	4	6	7	9	11	12	14	15	17	19	20	22	23
August	234.7	235.1	234.9	224.4	221.7	243.1	270.2	298.2	325.8	328	323.4	320	318.9	327.4	301.9
Base Load	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Step2	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Step3	235	235	235	224	222	243	250	250	250	250	250	250	250	250	250
PX Prices $/MWh	24.52	15.47	8.99	19.73	24.3	30.92	75	81.79	151.2	158.3	163	124.9	99.99	51.47	30.93

Hours

OFFICE BASE CASE

Total Electricity Consumed (kWh/year)
2002813
Annual Average Demand (kW)
229
Min Load (kW)
111
Max. Load (kW)
545
Load factor
0.42
Energy from grid w DG (kWh/year)
4187
Energy self-generated w DG (kWh/year)
1998768
Energy sold to the grid (kWh/year)
142

Cost of bill without DG ($)
194215
Costs with DG ($)
178156
Cost of bill with DG ($)
8284
Net Costs of self-gen ($)
169872
Savings (% with respect to not installing DG)
8.27

Average price (c/kWh)
9.70
Average price (c/kWh)
8.90
Average price of electricity from grid (c/kWh)
197.87
Average net cost of self-gen (c/kWh)
8.50

Power installed Step 1

Units	Capacity	Total	LEC	Technology
1	50	50	7.34	FC Solid oxide SOFCo
1	50	50	7.34	FC Solid oxide SOFCo

Power installed Step 2

Units	Capacity	Total	LEC	Technology
1	100	100	7.63	FC Solid Oxide TMI

Power installed Step 3

Units	Capacity	Total	LEC	Technology
1	100	100	9.34	FC Solid Oxide TMI

Power installed Step 4

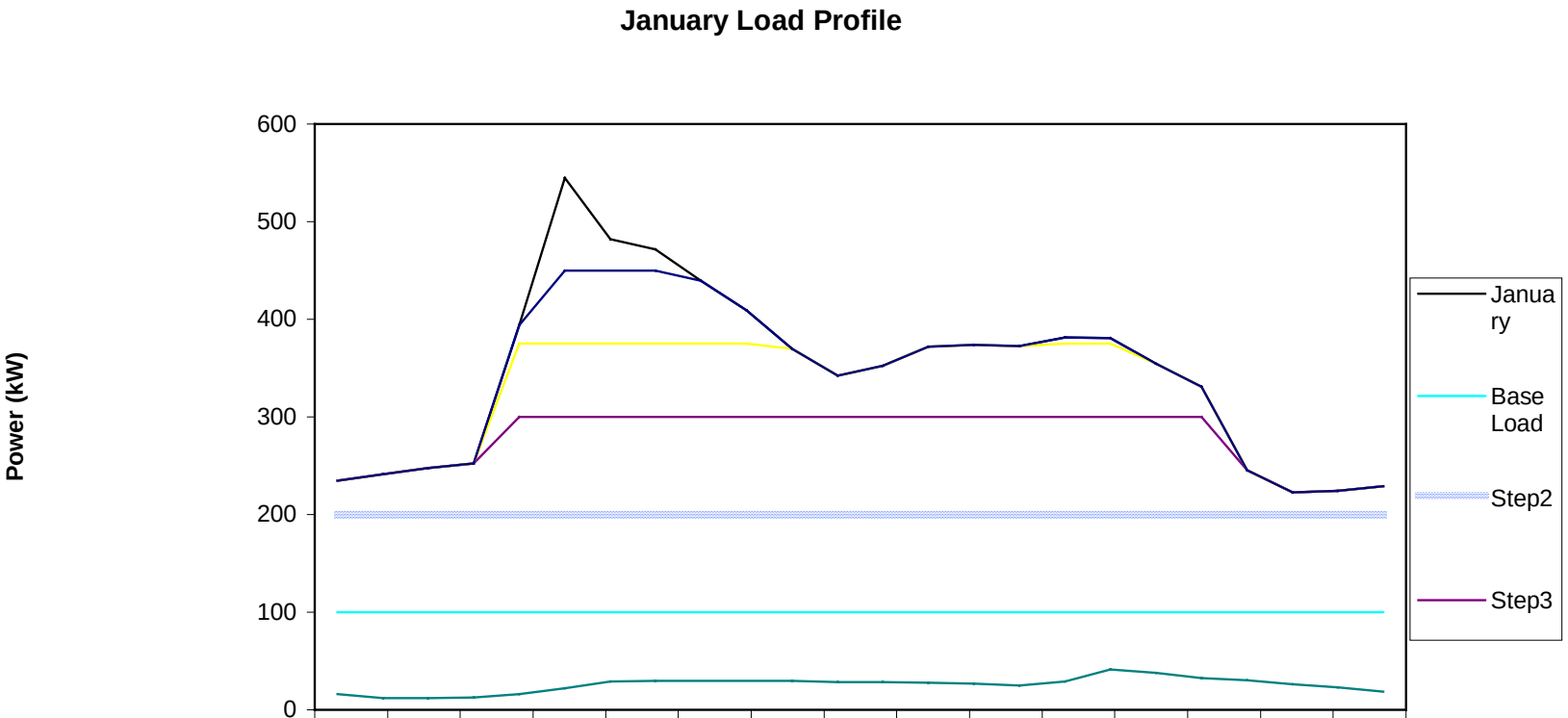
Units	Capacity	Total	LEC	Technology
1	75	75	22.44	Microturbine Parallon

Power installed Step 5

Units	Capacity	Total	LEC	Technology
1	75	75	49.06	Microturbine Parallon

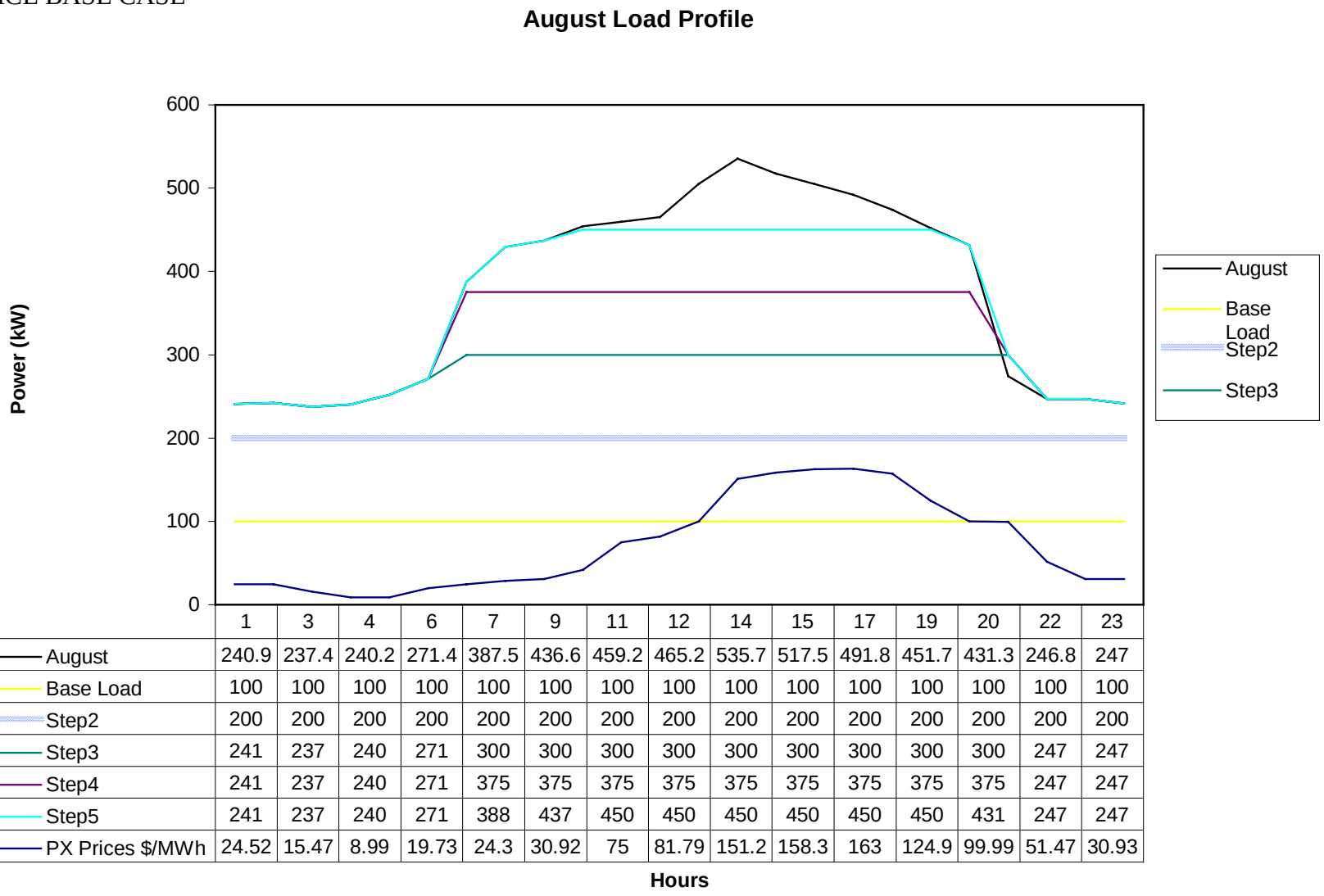
Total Power installed
450
Power installed/Max.Power
0.83

OFFICE BASE CASE



	1	3	4	6	7	9	11	12	14	15	17	19	20	22	23
January	235.1	247.5	252.5	545	482.2	439.6	369.9	342.6	371.8	374.1	381.6	354.9	331.1	222.6	224.2
Base Load	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Step2	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Step3	235	248	253	300	300	300	300	300	300	300	300	300	300	223	224
Step4	235	248	253	375	375	375	370	343	372	374	375	355	331	223	224
Step5	235	248	253	450	450	440	370	343	372	374	382	355	331	223	224
PX Prices $/MWh	16	11.99	12.99	21.99	29	29.64	29.46	28.25	28	27	29	38.06	32.49	25.99	23.3

OFFICE BASE CASE



	1	3	4	6	7	9	11	12	14	15	17	19	20	22	23
August	240.9	237.4	240.2	271.4	387.5	436.6	459.2	465.2	535.7	517.5	491.8	451.7	431.3	246.8	247
Base Load	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Step2	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Step3	241	237	240	271	300	300	300	300	300	300	300	300	300	247	247
Step4	241	237	240	271	375	375	375	375	375	375	375	375	375	247	247
Step5	241	237	240	271	388	437	450	450	450	450	450	450	431	247	247
PX Prices $/MWh	24.52	15.47	8.99	19.73	24.3	30.92	75	81.79	151.2	158.3	163	124.9	99.99	51.47	30.93

OFFICE FUEL 3

Total Electricity Consumed (kWh/year)
2002813
Annual Average Demand (kW)
229
Min Load (kW)
111
Max. Load (kW)
545
Load factor
0.42
Energy from grid w DG (kWh/year)
614
Energy self-generated w DG (kWh/year)
2002889
Energy sold to the grid (kWh/year)
690

Cost of bill without DG ($)
194215
Average price (c/kWh)
9.70
Costs with DG ($)
155647
Average price (c/kWh)
7.77
Cost of bill with DG ($)
2957
Average price of electricity from grid (c/kWh)
481.88
Net Costs of self-gen ($)
152690
Average net cost of self-gen (c/kWh)
7.62
Savings (% with respect to not installing DG)
19.86

Power installed Step 1

Units	Capacity	Total	LEC	Technology
1	250	250	5.43	FC PEM

Power installed Step 2

Units	Capacity	Total	LEC	Technology
1	100	100	10.91	FC Solid Oxide TMI

Power installed Step 3

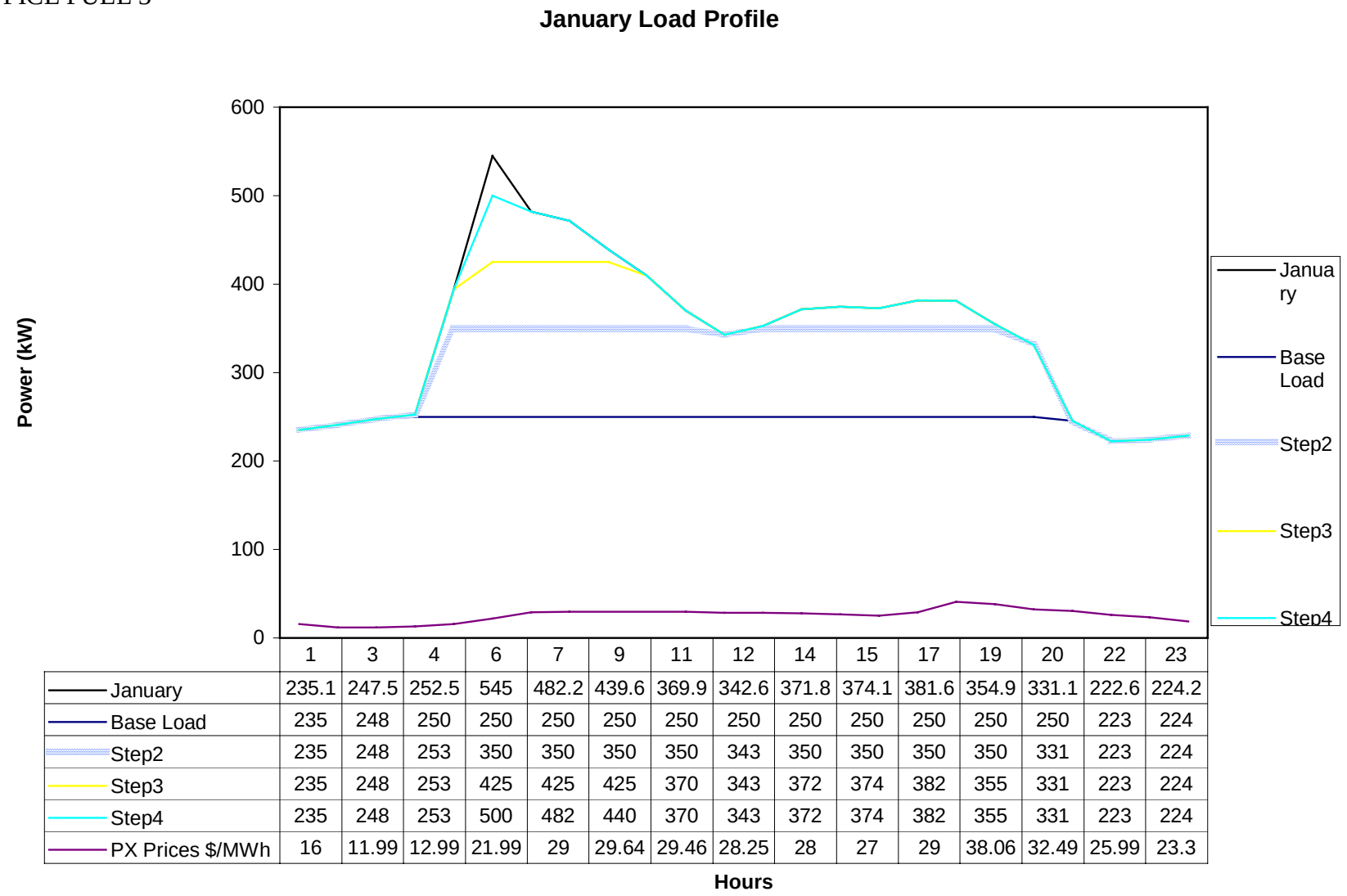
Units	Capacity	Total	LEC	Technology
1	75	75	35.25	Microturbine Parallon

Power installed Step 4

Units	Capacity	Total	LEC	Technology
1	75	75	96.73	Microturbine Parallon

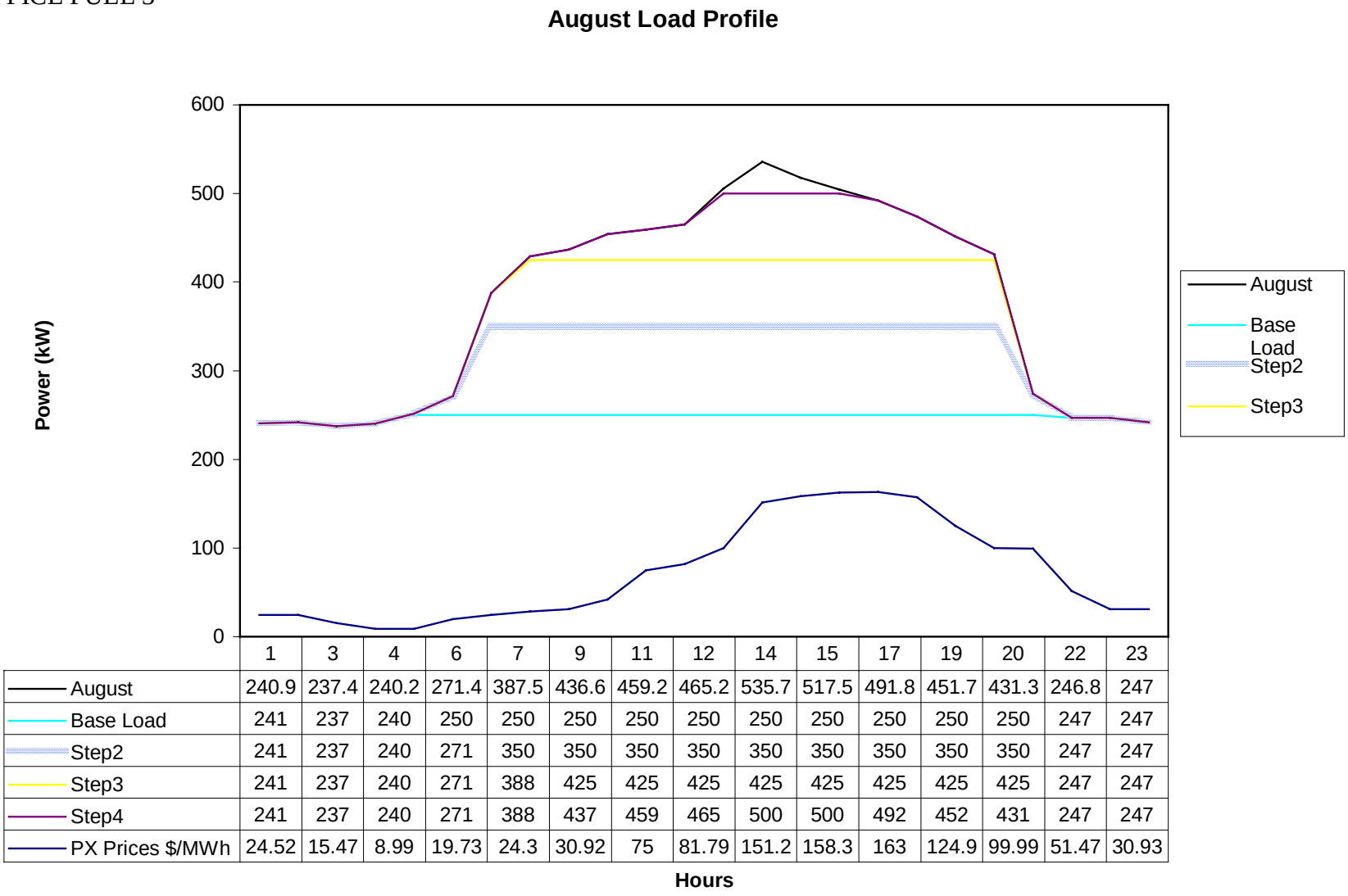
Total Power installed
500
Power installed/Max.Power
0.92

OFFICE FUEL 3



	1	3	4	6	7	9	11	12	14	15	17	19	20	22	23
January	235.1	247.5	252.5	545	482.2	439.6	369.9	342.6	371.8	374.1	381.6	354.9	331.1	222.6	224.2
Base Load	235	248	250	250	250	250	250	250	250	250	250	250	250	223	224
Step2	235	248	253	350	350	350	350	343	350	350	350	350	331	223	224
Step3	235	248	253	425	425	425	370	343	372	374	382	355	331	223	224
Step4	235	248	253	500	482	440	370	343	372	374	382	355	331	223	224
PX Prices $/MWh	16	11.99	12.99	21.99	29	29.64	29.46	28.25	28	27	29	38.06	32.49	25.99	23.3

OFFICE FUEL 3



	1	3	4	6	7	9	11	12	14	15	17	19	20	22	23
August	240.9	237.4	240.2	271.4	387.5	436.6	459.2	465.2	535.7	517.5	491.8	451.7	431.3	246.8	247
Base Load	241	237	240	250	250	250	250	250	250	250	250	250	250	247	247
Step2	241	237	240	271	350	350	350	350	350	350	350	350	350	247	247
Step3	241	237	240	271	388	425	425	425	425	425	425	425	425	247	247
Step4	241	237	240	271	388	437	459	465	500	500	492	452	431	247	247
PX Prices $/MWh	24.52	15.47	8.99	19.73	24.3	30.92	75	81.79	151.2	158.3	163	124.9	99.99	51.47	30.93

OFFICE FUEL 8

Total Electricity Consumed (kWh/year)
2002813
Annual Average Demand (kW)
229
Min Load (kW)
111
Max. Load (kW)
545
Load factor
0.42
Energy from grid w DG (kWh/year)
1126813
Energy self-generated w DG (kWh/year)
876000
Energy sold to the grid (kWh/year)
0

Cost of bill without DG ($)
194215
Costs with DG ($)
202552
Cost of bill with DG ($)
125003
Net Costs of self-gen ($)
77549
Savings (% with respect to not installing DG)
-4.29
Therefore, no adoption of DG!

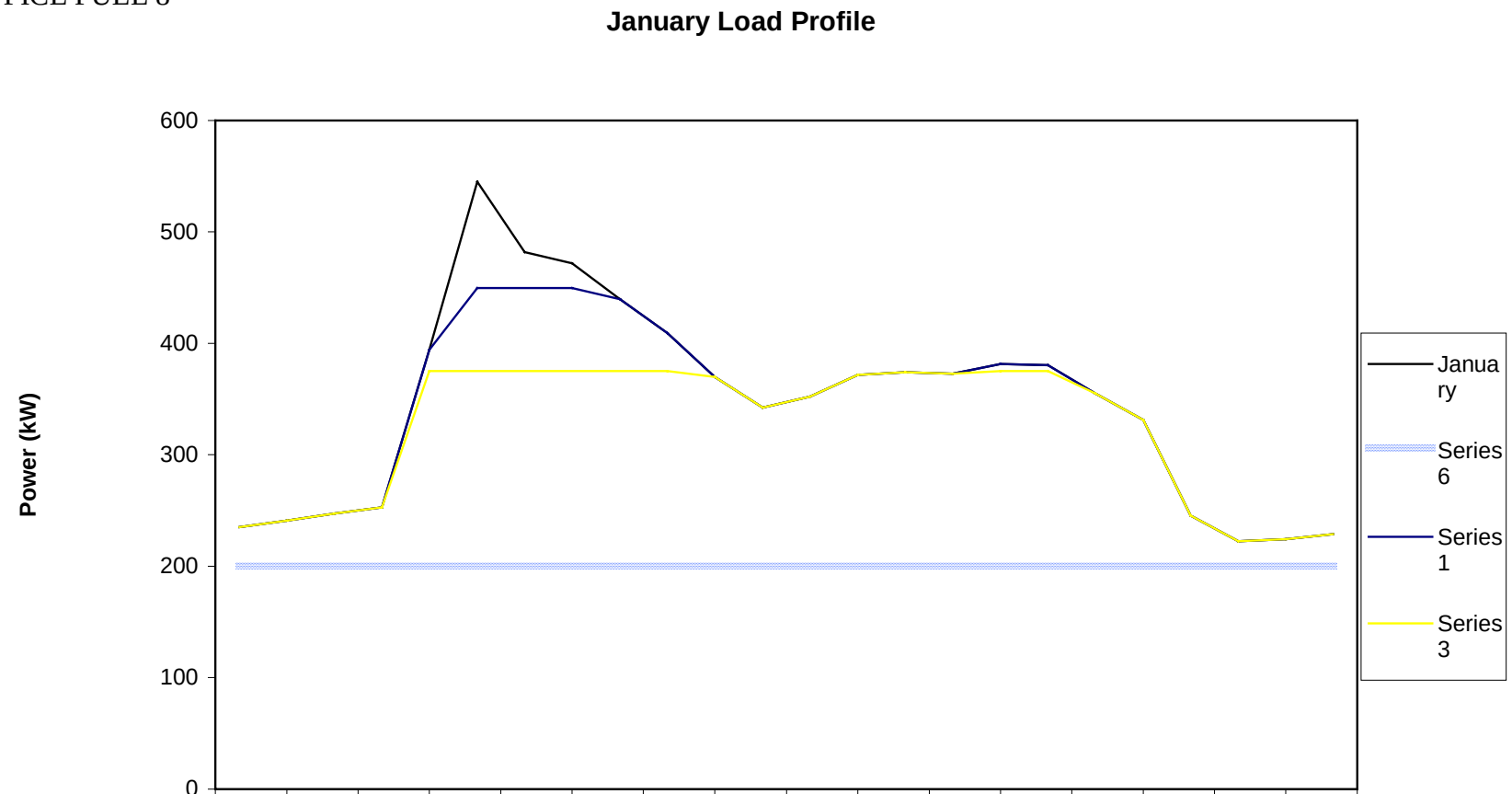
Average price (c/kWh)
9.70
Average price (c/kWh)
10.11
Average price of electricity from grid (c/kWh)
11.09
Average net cost of self-gen (c/kWh)
8.85

Power installed Step 1

Units	Capacity	Total	LEC	Technology
1	50	50	8.85	FC Solid oxide SOFCo
1	50	50	8.85	FC Solid oxide SOFCo

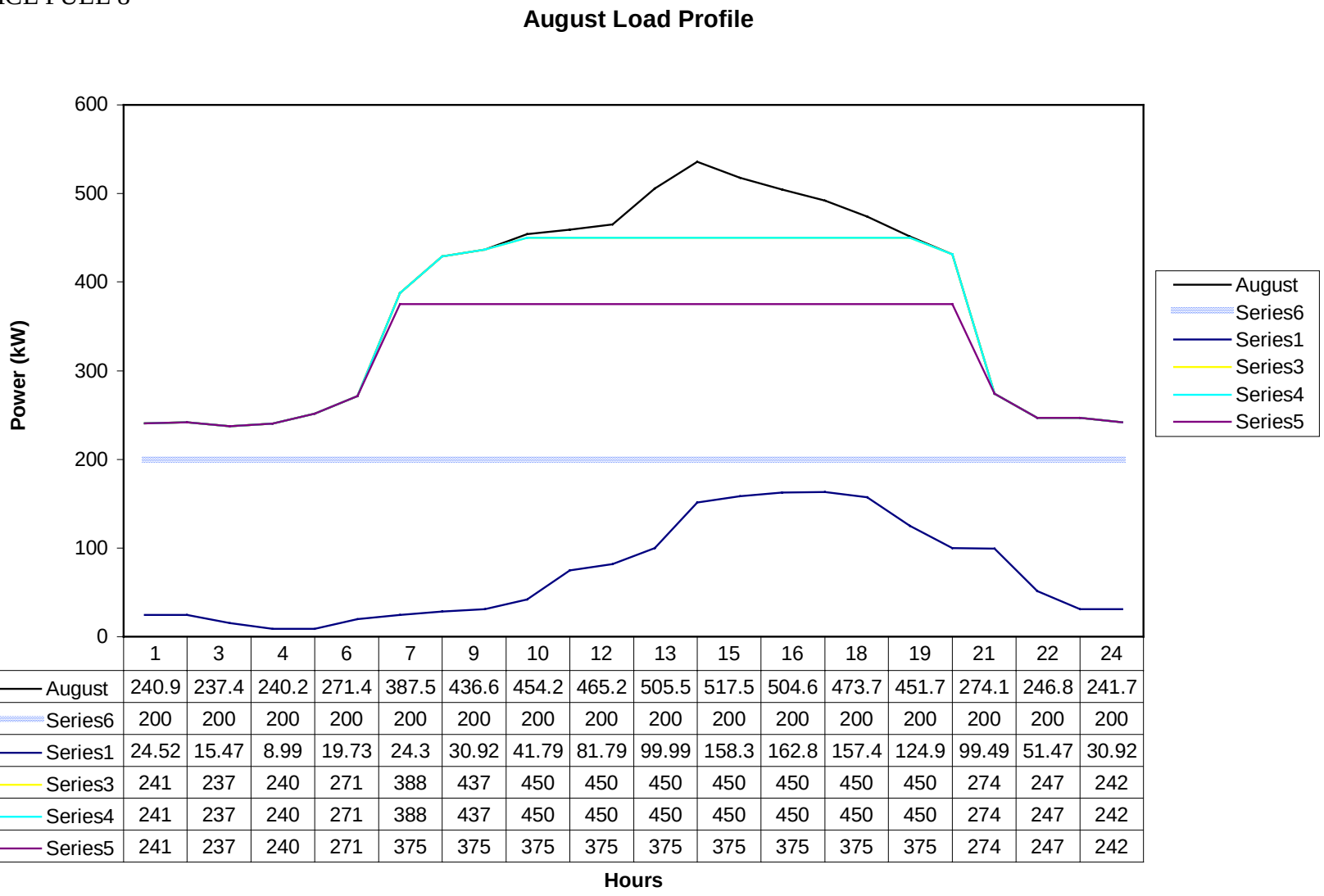
Total Power installed
100
Power installed/Max.Power
0.18

OFFICE FUEL 8



	1	3	4	6	7	9	10	12	13	15	16	18	19	21	22	24
January	235.1	247.5	252.5	545	482.2	439.6	409.4	342.6	352.3	374.1	372.8	380.6	354.9	245.2	222.6	228.9
Series6	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Series1	235	248	253	450	450	440	409	343	352	374	373	381	355	245	223	229
Series3	235	248	253	375	375	375	375	343	352	374	373	375	355	245	223	229

OFFICE FUEL 8



	1	3	4	6	7	9	10	12	13	15	16	18	19	21	22	24
August	240.9	237.4	240.2	271.4	387.5	436.6	454.2	465.2	505.5	517.5	504.6	473.7	451.7	274.1	246.8	241.7
Series6	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Series1	24.52	15.47	8.99	19.73	24.3	30.92	41.79	81.79	99.99	158.3	162.8	157.4	124.9	99.49	51.47	30.92
Series3	241	237	240	271	388	437	450	450	450	450	450	450	450	274	247	242
Series4	241	237	240	271	388	437	450	450	450	450	450	450	450	274	247	242
Series5	241	237	240	271	375	375	375	375	375	375	375	375	375	274	247	242

Appendix 1

OFFICE R = 6%

Total Electricity Consumed (kWh/year)
2002813
Annual Average Demand (kW)
229
Min Load (kW)
111
Max. Load (kW)
545
Load factor
0.42
Energy from grid w DG (kWh/year)
116.427
Energy self-generated w DG (kWh/year)
2002838
Energy sold to the grid (kWh/year)
142

Cost of bill without DG ($)
194215
Costs with DG ($)
174885
Cost of bill with DG ($)
1299
Net Costs of self-gen ($)
173586
Savings (% with respect to not installing DG)
9.95

Average price (c/kWh)
9.70
Average price (c/kWh)
8.73
Average price of electricity from grid (c/kWh)
1115.42
Average net cost of self-gen (c/kWh)
8.67

Power installed Step 1

Units	Capacity	Total	LEC	Technology
1	50	50	7.24	FC Solid oxide SOFCo
1	50	50	7.24	FC Solid oxide SOFCo

Power installed Step 2

Units	Capacity	Total	LEC	Technology
1	100	100	7.51	FC Solid Oxide TMI

Power installed Step 3

Units	Capacity	Total	LEC	Technology
1	100	100	9.09	FC Solid Oxide TMI

Power installed Step 4

Units	Capacity	Total	LEC	Technology
1	75	75	21.78	Microturbine Parallon

Power installed Step 5

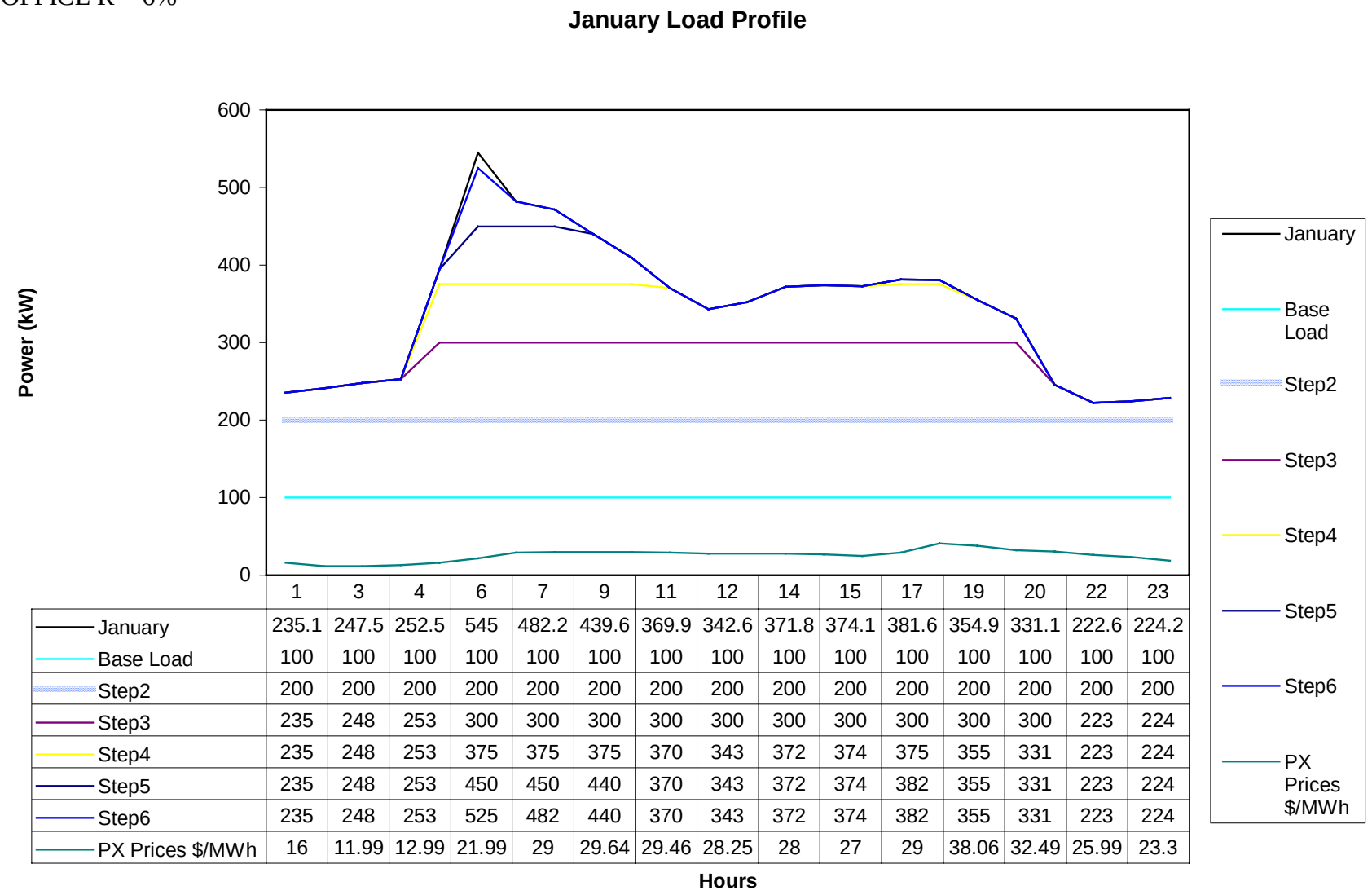
Units	Capacity	Total	LEC	Technology
1	75	75	47.18	Microturbine Parallon

Power installed Step 6

Units	Capacity	Total	LEC	Technology
1	75	75	170.62	Microturbine Parallon

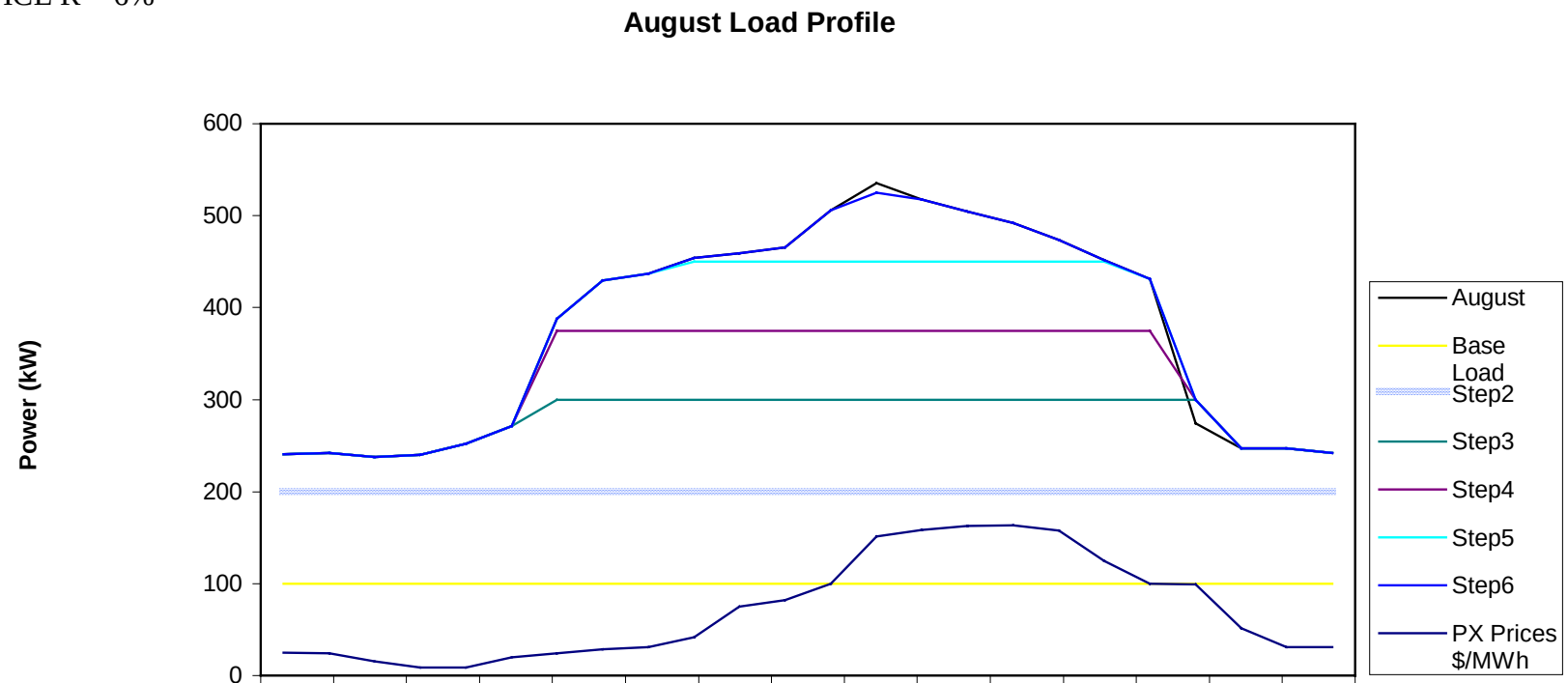
Total Power installed
525
Power installed/Max.Power
0.96

OFFICE R = 6%



	1	3	4	6	7	9	11	12	14	15	17	19	20	22	23
January	235.1	247.5	252.5	545	482.2	439.6	369.9	342.6	371.8	374.1	381.6	354.9	331.1	222.6	224.2
Base Load	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Step2	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Step3	235	248	253	300	300	300	300	300	300	300	300	300	300	223	224
Step4	235	248	253	375	375	375	370	343	372	374	375	355	331	223	224
Step5	235	248	253	450	450	440	370	343	372	374	382	355	331	223	224
Step6	235	248	253	525	482	440	370	343	372	374	382	355	331	223	224
PX Prices $/MWh	16	11.99	12.99	21.99	29	29.64	29.46	28.25	28	27	29	38.06	32.49	25.99	23.3

OFFICE R = 6%



	1	3	4	6	7	9	11	12	14	15	17	19	20	22	23
August	240.9	237.4	240.2	271.4	387.5	436.6	459.2	465.2	535.7	517.5	491.8	451.7	431.3	246.8	247
Base Load	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Step2	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Step3	241	237	240	271	300	300	300	300	300	300	300	300	300	247	247
Step4	241	237	240	271	375	375	375	375	375	375	375	375	375	247	247
Step5	241	237	240	271	388	437	450	450	450	450	450	450	431	247	247
Step6	241	237	240	271	388	437	459	465	525	517	492	452	431	247	247
PX Prices $/MWh	24.52	15.47	8.99	19.73	24.3	30.92	75	81.79	151.2	158.3	163	124.9	99.99	51.47	30.93

Hours

OFFICE R = 8%

Total Electricity Consumed (kWh/year)
2002813
Annual Average Demand (kW)
229
Min Load (kW)
111
Max. Load (kW)
545
Load factor
0.42
Energy from grid w DG (kWh/year)
1126813
Energy self-generated w DG (kWh/year)
876000
Energy sold to the grid (kWh/year)
0

Cost of bill without DG ($)
194215
Costs with DG ($)
190176
Cost of bill with DG ($)
125003
Net Costs of self-gen ($)
65173
Savings (% with respect to not installing DG)
2.08

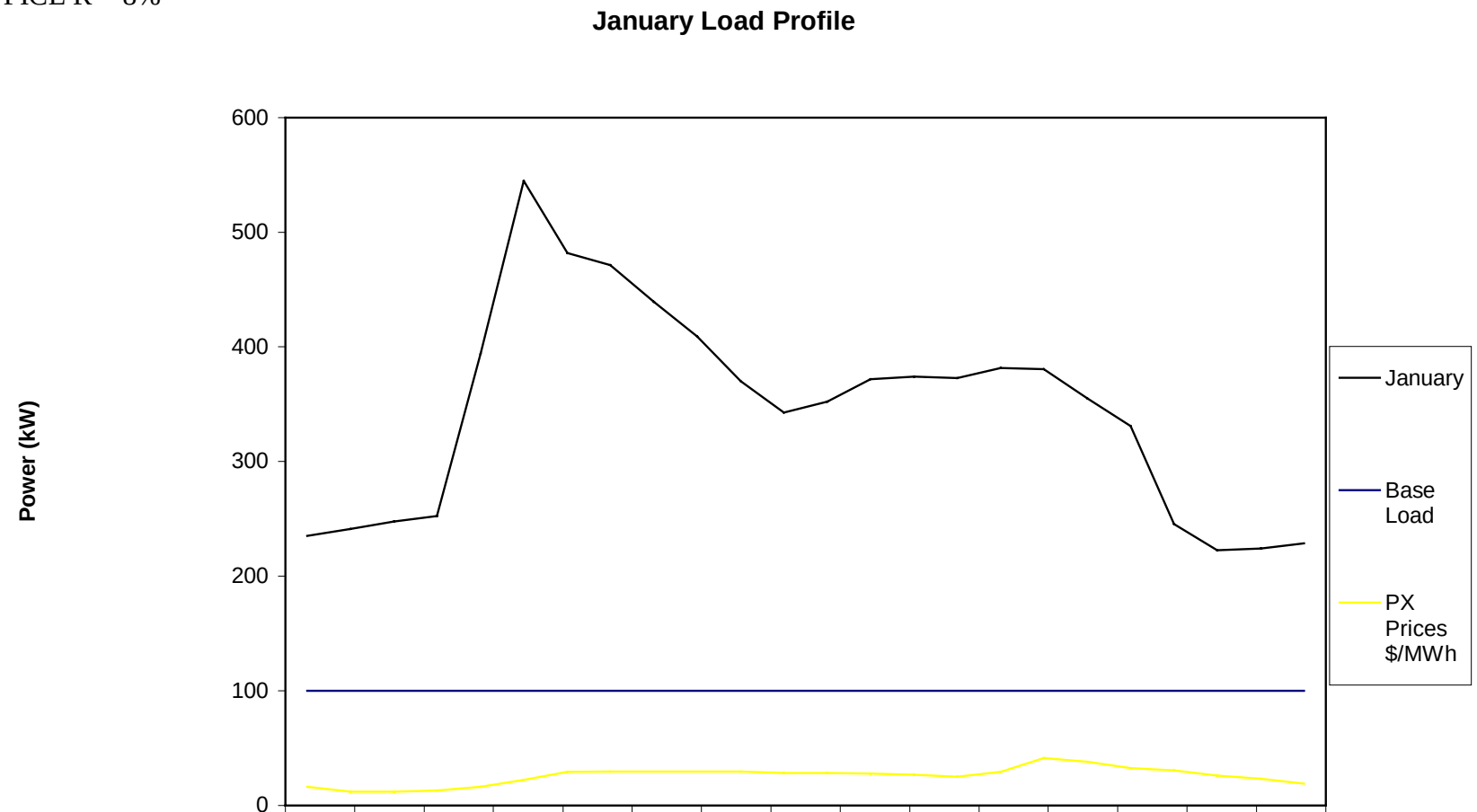
Average price (c/kWh)
9.70
Average price (c/kWh)
9.50
Average price of electricity from grid (c/kWh)
11.09
Average net cost of self-gen (c/kWh)
7.44

Power installed Step 1

Units	Capacity	Total	LEC	Technology
1	50	50	7.44	FC Solid oxide SOFCo
1	50	50	7.44	FC Solid oxide SOFCo

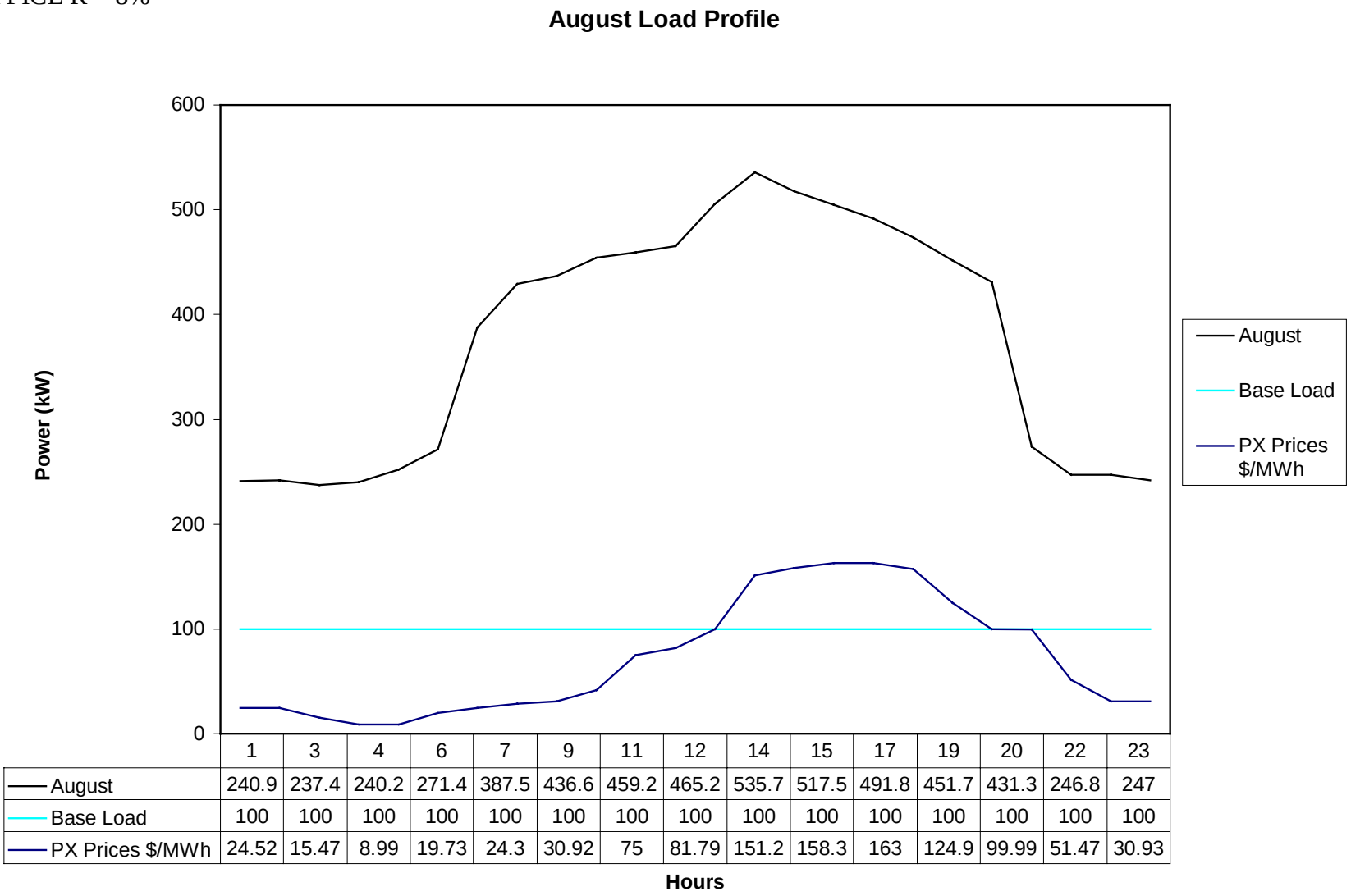
Total Power installed
100
Power installed/Max.Power
0.18

OFFICE R = 8%



	1	3	4	6	7	9	11	12	14	15	17	19	20	22	23
January	235.1	247.5	252.5	545	482.2	439.6	369.9	342.6	371.8	374.1	381.6	354.9	331.1	222.6	224.2
Base Load	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
PX Prices $/MWh	16	11.99	12.99	21.99	29	29.64	29.46	28.25	28	27	29	38.06	32.49	25.99	23.3

OFFICE R = 8%



	1	3	4	6	7	9	11	12	14	15	17	19	20	22	23
August	240.9	237.4	240.2	271.4	387.5	436.6	459.2	465.2	535.7	517.5	491.8	451.7	431.3	246.8	247
Base Load	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
PX Prices $/MWh	24.52	15.47	8.99	19.73	24.3	30.92	75	81.79	151.2	158.3	163	124.9	99.99	51.47	30.93

Appendix 1

Integrated assessment of DER deployment

Appendix 2

AGREEMENT FOR INTERCONNECTION AND PARALLEL OPERATION OF DISTRIBUTED GENERATION

This Interconnection Agreement ("Agreement") is made and entered into this _____ day of _____, 19__, by _____, ("Company"), and _____ ("Customer"), a _____ [specify whether corporation, and if so name state, municipal corporation, cooperative corporation, or other], each hereinafter sometimes referred to individually as "Party" or both referred to collectively as the "Parties". In consideration of the mutual covenants set forth herein, the Parties agree as follows:

1. **Scope of Agreement** -- This Agreement is applicable to conditions under which the Company and the Customer agree that one or more generating facility or facilities of ten MW or less to be interconnected at 60 kV or less ("Facility or Facilities") may be interconnected to the Company's utility system, as described in Exhibit A.

2. **Establishment of Point(s) of Interconnection** -- Company and Customer agree to interconnect their Facility or Facilities at the locations specified in this Agreement, in accordance with Public Utility Commission of Texas Substantive Rules § 25.211 relating to Interconnection of Distributed Generation and § 25.212 relating to Technical requirements for Interconnection and Parallel Operation of On-Site Distributed Generation, (16 Texas Administrative Code §25.211 and §25.212) (the "Rules") or any successor rule addressing distributed generation and as described in the attached Exhibit A (the "Point(s) of Interconnection").

3. **Responsibilities of Company and Customer** -- Each Party will, at its own cost and expense, operate, maintain, repair, and inspect, and shall be fully responsible for, Facility or Facilities which it now or hereafter may own unless otherwise specified on Exhibit A. Customer shall conduct operations of its facility(s) in compliance with all aspects of the Rules, and Company shall conduct operations on its utility system in compliance with all aspects of the Rules, or as further described and mutually agreed to in the applicable Facility Schedule. Maintenance of Facilities or interconnection facilities shall be performed in accordance with the applicable manufacturer's recommended maintenance schedule. The Parties agree to cause their Facilities or systems to be constructed in accordance with specifications equal to or greater than those provided by the National Electrical Safety Code, approved by the American National Standards Institute, in effect at the time of construction.

Each Party covenants and agrees to design, install, maintain, and operate, or cause the design, installation, maintenance, and operation of, its distribution system and related Facilities and Units so as to reasonably minimize the likelihood of a disturbance, originating in the system of one Party, affecting or impairing the system of the other Party, or other systems with which a Party is interconnected.

Company will notify Customer if there is evidence that the Facility operation causes disruption or deterioration of service to other customers served from the same grid or if the Facility operation causes damage to Company's system.

Customer will notify Company of any emergency or hazardous condition or occurrence with the Customer's Unit(s) which could affect safe operation of the system.

4. ***Limitation of Liability and Indemnification***

a. Notwithstanding any other provision in this Agreement, with respect to Company's provision of electric service to Customer, Company's liability to Customer shall be limited as set forth in _____ of Company's PUC-approved tariffs and terms and conditions for electric service, which is incorporated herein by reference.

b. Neither Company nor Customer shall be liable to the other for damages for any act that is beyond such party's control, including any event that is a result of an act of God, labor disturbance, act of the public enemy, war, insurrection, riot, fire, storm or flood, explosion,

breakage or accident to machinery or equipment, a curtailment, order, or regulation or restriction imposed by governmental, military, or lawfully established civilian authorities, or by the making of necessary repairs upon the property or equipment of either party.

c. Notwithstanding Paragraph 4.b of this Agreement, Company shall assume all liability for and shall indemnify Customer for any claims, losses, costs, and expenses of any kind or character to the extent that they result from Company's negligence in connection with the design, construction, or operation of its facilities as described on Exhibit A; provided, however, that Company shall have no obligation to indemnify Customer for claims brought by claimants who cannot recover directly from Company. Such indemnity shall include, but is not limited to, financial responsibility for: (a) Customer's monetary losses; (b) reasonable costs and expenses of defending an action or claim made by a third person; (c) damages related to the death or injury of a third person; (d) damages to the property of Customer; (e) damages to the property of a third person; (f) damages for the disruption of the business of a third person. In no event shall Company be liable for consequential, special, incidental or punitive damages, including, without limitation, loss of profits, loss of revenue, or loss of production. The Company does not assume liability for any costs for damages arising from the disruption of the business of the Customer or for the Customer's costs and expenses of prosecuting or defending an action or claim against the Company. This paragraph does not create a liability on the part of the Company to the Customer or a third person, but requires indemnification where such liability exists. The limitations of liability provided in this paragraph do not apply in cases of gross negligence or intentional wrongdoing.

d. Notwithstanding Paragraph 4.b of this Agreement, Customer shall assume all liability for and shall indemnify Company for any claims, losses, costs, and expenses of any kind or character to the extent that they result from Customer's negligence in connection with the design, construction or operation of its facilities as described on Exhibit A; provided, however, that Customer shall have no obligation to indemnify Company for claims brought by claimants who cannot recover directly from Customer. Such indemnity shall include, but is not limited to, financial responsibility for: (a) Company's monetary losses; (b) reasonable costs and expenses of defending an action or claim made by a third person; (c) damages related to the death or injury of a third person; (d) damages to the property of Company; (e) damages to the property of a third person; (f) damages for the disruption of the business of a third person. In no event shall Customer be liable for consequential, special, incidental or punitive damages, including, without limitation, loss of profits, loss of revenue, or loss of production. The Customer does not assume liability for any costs for damages arising from the disruption of the business of the Company or for the Company's costs and expenses of prosecuting or defending an action or claim against the Customer. This paragraph does not create a liability on the part of the Customer to the Company or a third person, but requires indemnification where such liability exists. The limitations of liability provided in this paragraph do not apply in cases of gross negligence or intentional wrongdoing.

e. Company and Customer shall each be responsible for the safe installation, maintenance, repair and condition of their respective lines and appurtenances on their respective sides of the point of delivery. The Company does not assume any duty of inspecting the Customer's lines, wires, switches, or other equipment and will not be responsible therefor. Customer assumes all responsibility for the electric service supplied hereunder and the facilities used in connection therewith at or beyond the point of delivery, the point of delivery being the point where the electric energy first leaves the wire or facilities provided and owned by Company and enters the wire or facilities provided by Customer.

f. For the mutual protection of the Customer and the Company, only with Company prior authorization are the connections between the Company's service wires and the Customer's service entrance conductors to be energized.

5. **Right of Access, Equipment Installation, Removal & Inspection**– Upon reasonable notice, the Company may send a qualified person to the premises of the Customer at or immediately before the time the Facility first produces energy to inspect the interconnection, and observe the Facility's commissioning

(including any testing), startup, and operation for a period of up to no more than three days after initial startup of the unit.

Following the initial inspection process described above, at reasonable hours, and upon reasonable notice, or at any time without notice in the event of an emergency or hazardous condition, Company shall have access to Customer's premises for any reasonable purpose in connection with the performance of the obligations imposed on it by this Agreement or if necessary to meet its legal obligation to provide service to its customers.

6. **Disconnection of Unit –** Customer retains the option to disconnect from Company's utility system. Customer will notify the Company of its intent to disconnect by giving the Company at least thirty days' prior written notice. Such disconnection shall not be a termination of the agreement unless Customer exercises rights under Section 7.

Customer shall disconnect Facility from Company's system upon the effective date of any termination under Section 7.

Subject to Commission Rule, for routine maintenance and repairs on Company's utility system, Company shall provide Customer with seven business days' notice of service interruption.

Company shall have the right to suspend service in cases where continuance of service to Customer will endanger persons or property. During the forced outage of the Company's utility system serving customer, Company shall have the right to suspend service to effect immediate repairs on Company's utility system, but the Company shall use its best efforts to provide the Customer with reasonable prior notice.

7. **Effective Term and Termination Rights**-- This Agreement becomes effective when executed by both parties and shall continue in effect until terminated. The agreement may be terminated for the following reasons: (a) Customer may terminate this Agreement at any time, by giving the Company sixty days' written notice; (b) Company may terminate upon failure by the Customer to generate energy from the Facility in parallel with the Company's system within twelve months after completion of the interconnection; (c) either party may terminate by giving the other party at least sixty days prior written notice that the other Party is in default of any of the material terms and conditions of the Agreement, so long as the notice specifies the basis for termination and there is reasonable opportunity to cure the default; or (d) Company may terminate by giving Customer at least sixty days notice in the event that there is a material change in an applicable rule or statute.

8. **Governing Law and Regulatory Authority** -- This Agreement was executed in the State of Texas and must in all respects be governed by, interpreted, construed, and enforced in accordance with the laws thereof. This Agreement is subject to, and the parties' obligations hereunder include, operating in full compliance with all valid, applicable federal, state, and local laws or ordinances, and all applicable rules, regulations, orders of, and tariffs approved by, duly constituted regulatory authorities having jurisdiction.

9. **Amendment** --This Agreement may be amended only upon mutual agreement of the Parties, which amendment will not be effective until reduced to writing and executed by the Parties.

10. **Entirety of Agreement and Prior Agreements Superseded** -- This Agreement, including all attached Exhibits and Facility Schedules, which are expressly made a part hereof for all purposes, constitutes the entire agreement and understanding between the Parties with regard to the interconnection of the facilities of the Parties at the Points of Interconnection expressly provided for in this Agreement. The Parties are not bound by or liable for any statement, representation, promise, inducement, understanding, or undertaking of any kind or nature (whether written or oral) with regard to the subject matter hereof not set forth or provided for herein. This Agreement replaces all prior agreements and undertakings, oral or written, between the Parties with regard to the subject matter hereof, including without limitation _____ [specify any prior agreements being superseded], and all such agreements and undertakings are agreed by the Parties to no longer be of any force or effect. It is expressly acknowledged that the Parties may have

other agreements covering other services not expressly provided for herein, which agreements are unaffected by this Agreement.

11. **Notices** -- Notices given under this Agreement are deemed to have been duly delivered if hand delivered or sent by United States certified mail, return receipt requested, postage prepaid, to:

(a) If to Company:

_____
_____
_____
_____

(b) If to Customer:

_____
_____
_____
_____

The above-listed names, titles, and addresses of either Party may be changed by written notification to the other, notwithstanding Section 10.

12. **Invoicing and Payment** -- Invoicing and payment terms for services associated with this agreement shall be consistent with applicable Substantive Rules of the PUCT.

13. **No Third-Party Beneficiaries** -- This Agreement is not intended to and does not create rights, remedies, or benefits of any character whatsoever in favor of any persons, corporations, associations, or entities other than the Parties, and the obligations herein assumed are solely for the use and benefit of the Parties, their successors in interest and, where permitted, their assigns.

14. **No Waiver** -- The failure of a Party to this Agreement to insist, on any occasion, upon strict performance of any provision of this Agreement will not be considered to waive the obligations, rights, or duties imposed upon the Parties.

15. **Headings** -- The descriptive headings of the various articles and sections of this Agreement have been inserted for convenience of reference only and are to be afforded no significance in the interpretation or construction of this Agreement.

16. **Multiple Counterparts** -- This Agreement may be executed in two or more counterparts, each of which is deemed an original but all constitute one and the same instrument.

IN WITNESS WHEREOF, the Parties have caused this Agreement to be signed by their respective duly authorized representatives.

[COMPANY NAME]	[CUSTOMER NAME]
BY:_____	BY:_____
TITLE:_____	TITLE:_____
DATE:_____	DATE:_____

EXHIBIT A

LIST OF FACILITY SCHEDULES AND POINTS OF INTERCONNECTION

Facility Schedule No.	Name of Point of Interconnection

[Insert Facility Schedule number and name for each Point of Interconnection]

FACILITY SCHEDULE NO.

[The following information is to be specified for each Point of Interconnection, if applicable.]

1. Name:
2. Facility location:
3. Delivery voltage:
4. Metering (voltage, location, losses adjustment due to metering location, and other):
5. Normal Operation of Interconnection:
6. One line diagram attached (check one): _____ Yes /_____ No
7. Facilities to be furnished by Company:
8. Facilities to be furnished by Customer:
9. Cost Responsibility:
10. Control area interchange point (check one): _____ Yes /_____ No
11. Supplemental terms and conditions attached (check one): _____ Yes / _____ No

[COMPANY NAME]	[CUSTOMER NAME]
BY:_____	BY:_____
TITLE:_____	TITLE:_____
DATE:_____	DATE:_____

Distributed Generation Interconnection

Availability

Company shall interconnect distributed generation as described in PUC Substantive Rules §25.211 and §25.212 pursuant to the terms of the Agreement for Interconnection and Parallel Operation of Distributed Generation which is incorporated herein.

Application

A person seeking interconnection and parallel operation of distributed generation with Company must complete and submit the Application for Interconnection and Parallel Operation of Distributed Generation with the Utility System, which is incorporated herein.

Definitions

1) Non-Peak Hours - _____.

2) Peak Hours - _____.

Pricing

Standby

Maintenance

Supplemental

Terms and Conditions of Service

The terms and conditions under which interconnection of distributed generation is to be provided are contained in Commission Substantive Rules §25.211 and §25.212, which are incorporated herein by reference, and in the Agreement for Interconnection and Parallel Operation of Distributed Generation, which is incorporated herein. The rules are subject to change from time to time as determined by the Commission, and such changes shall be automatically applicable hereto based upon the effective date of any Commission order or rule amendment.

Studies and Services

Pre-interconnection studies may be required and conducted by Company. Other services may be provided as requested by the customer and provided pursuant to negotiations and agreement by the customer and Company and may be subject to approval by the Commission.

Pre-Interconnection Study Fee Schedule

Prescribed Form Application for Interconnection and Parallel Operation of Distributed Generation with the Utility System

Customers seeking to interconnect distributed generation with the utility system will complete and file with the company the following Application for Parallel Operation:

APPLICATION FOR INTERCONNECTION AND PARALLEL OPERATION OF DISTRIBUTED GENERATION WITH THE UTILITY SYSTEM

Return Completed Application to: [Company name]
[Attention: Manager, Distribution Planning
[Company address]
[Company address]

Customer's Name: _____

Address:_____

Contact Person: _____

Telephone Number: _____

Service Point Address: _____

Information Prepared and Submitted By: _____
(Name and Address)
_____

Signature _____

The following information shall be supplied by the Customer or Customer's designated representative. All applicable items must be accurately completed in order that the Customer's generating facilities may be effectively evaluated by the (Company) _____for interconnection with the utility system.

GENERATOR

Number of Units: _____

Manufacturer: _____

Type (Synchronous, Induction, or Inverter): _____

Fuel Source Type (Solar, Natural Gas, Wind, etc.): _____

Kilowatt Rating (95 F at location) _____

Kilovolt-Ampere Rating (95 F at location): _____

Power Factor: _____

Voltage Rating: _____

Ampere Rating: _____

Number of Phases: _____

Frequency: _____

Do you plan to export power: _____Yes / _____No

If Yes, maximum amount expected: _____

Pre-Certification Label or Type Number: _____

Expected Energizing and Start-up Date: _____

Normal Operation of Interconnection: (examples: provide power to meet base load, demand management, standby, back-up, other (please describe)_____

One-line diagram attached: _____Yes

Has the generator Manufacturer supplied its dynamic modeling values to the Host Utility? _____Yes
[Note: Requires a Yes for complete application. For Pre-Certified Equipment answer is Yes.]

Layout sketch showing lockable, "visible" disconnect device: _____Yes

[COMPANY NAME]	[CUSTOMER NAME]
BY: _____	BY: _____
TITLE: _____	TITLE: _____
DATE: _____	DATE: _____