

Climate Change

Appendix A1.1

Baseline scenario general data:

A. Demand: sectors: Residential : 4157GWh, Industrial: 2920 GWh
 sub-sectors: Residential: urban: 90%, rural: 10%
 Industrial: None

B. Transformation:

1. Transmission and distribution losses: 15%
2. Dispatch rule: plants run on full capacity till 2005 and by merit order for a user defined load curve for 2005-2040
3. Electricity import: 1995: 291.8 GWh, 1996: 682.9 GWh, 1998: 1020 GWh, 2005: 2050 GWh.
4. Base year plant characteristics:

Plant	Capacity MW	Output GWh	Efficiency, %	Capacity factor
Fuel oil	705.5	3765	35	63.6
Diesel oil	78.4	418	28	63.6
Hydro	283	817	100	33.3
Combined Cycle	0	0	45	-

5. The hydro resources for 1995-2005 are taken as 475GWH
6. Fuel heat value: fuel oil: 1.1528×10^{-2} GWh/Ton , Diesel oil: 1.1806×10^{-2} GWh/Ton, Natural gas: 9.8472×10^{-6} GWh/m³
7. capital Cost: US\$1000000/MW for fuel oil type plant
 US\$ 635000/MW for natural gas type plants
 US\$300000/MW for diesel oil type plants
 US\$ 4500000/MW for solar plants
 US\$1500000/MW for wind plants

Annual fixed O&M costs: 20000\$/MW

Variable O&M costs: 8000\$/GWh

8. The emission factors of different fuels are calculated as:

Fuel Type	CO ₂ (g/Kwh)	CO (g/Kwh)	NO _x (g/Kwh)	SO _x (g/Kwh)
Natural Gas	187.36	0.11	0.66	0
Fuel oil	259.19	0.05	0.73	1.73
Diesel oil	272.38	0.05	0.48	0.41

Fuel Oil	2182	3452	5152	7423	10470	14690	21444
Hydro	120	120	120	120	120	120	120
Gas Comb. Cycle	830	830	830	830	830	830	830
Diesel Oil	242	242	242	242	242	92	92
Total	3368	4644	6344	8615	11662	15732	22486

8% Growth Capacity
(MW)

Fuel Type	2005	2010	2015	2020	2025	2030	2035
Fuel Oil	2484	4381	7159	11284	17290	26504	42548
Hydro	120	120	120	120	120	120	120
Gas Comb. Cycle	830	830	830	830	830	830	830
Diesel Oil	242	242	242	242	242	92	92
Total	3676	5574	8351	12487	18482	27546	43590

Appendix A1.3

Scenario	Type	Growth Interest (%)	Interest (%)	CO2 Emissions (Gg)	Cost (Million \$)
1	All solar	4	5	711498	2436
2	All solar	4	10	711498	1548
3	All solar	4	15	711498	1121
4	All solar	6	5	1150002	3882
5	All solar	6	10	1150002	2251
6	All solar	6	15	1150002	1513
7	All solar	8	5	1865044	6873
8	All solar	8	10	1865044	3672
9	All solar	8	15	1865044	2291
10	S.50%-W50%	4	5	719886	1710
11	S.50%-W50%	4	10	719886	1074
12	S.50%-W50%	4	15	719886	772
13	S.50%-W50%	6	5	1164186	2696
14	S.50%-W50%	6	10	1164186	1541
15	S.50%-W50%	6	15	1164186	1024
16	S.50%-W50%	8	5	1889560	4645
17	S.50%-W50%	8	10	1889560	2457
18	S.50%-W50%	8	15	1889560	1523
19	S.70%-W30%	4	5	716538	2003
20	S.70%-W30%	4	10	716538	1265
21	S.70%-W30%	4	15	716538	912
22	S.70%-W30%	6	5	1158498	3185
23	S.70%-W30%	6	10	1158498	1816
24	S.70%-W30%	6	15	1158498	1212
25	S.70%-W30%	8	5	1879732	5536
26	S.70%-W30%	8	10	1879732	2943
27	S.70%-W30%	8	15	1879732	1831
28	Natural Gas	4	5	624738	10320
29	Natural Gas	4	10	624738	4207
30	Natural Gas	4	15	624738	2058

31	Natural Gas	6	5	949878	20020
32	Natural Gas	6	10	949878	7955
33	Natural Gas	6	15	949878	3790
34	Natural Gas	8	5	1476280	34930
35	Natural Gas	8	10	1476280	13460
36	Natural Gas	8	15	1476280	6228