

**Combined Margin**

Particulars	Specific emission (tCO <sub>2</sub> /GWh)
Operating Margin	834.92
Build Margin	407.22
<b>Combined Margin</b>	<b>621.07</b>

Power Plants	Type of FUEL	STATE	Generation in GWh	IPCC Emission factor tCO2/GWh	Emission Rate
			April'03 - Mar'04		
HAMPI	Hydro	AP	0.0	0.0	0.0
N' SAGAR RBC	Hydro	AP	0.0	0.0	0.0
N' SAGAR LBC	Hydro	AP	0.0	0.0	0.0
PENNA AHOBELAM	Hydro	AP	0.0	0.0	0.0
LVS POWER DG	Diesel	AP	0.0	661.0	0.0
MALANKARA	Hydro	KER	0.0	0.0	0.0
MALLARPUR	Hydro	KAR	0.0	0.0	0.0
HARANGI	Hydro	KAR	0.0	0.0	0.0
NARIMAN GT	Natural Gas	TN	0.0	418.0	0.0
PYKARA DAM	Hydro	TN	0.0	0.0	0.0
KARAIKAL	Natural Gas	TN	0.0	418.0	0.0
SATHNUR DAM	Hydro	TN	2.0	0.0	0.0
BHADRA	Hydro	KAR	11.0	0.0	0.0
PEPPARA	Hydro	KER	1.0	0.0	0.0
METTUR TUNNEL	Hydro	TN	70.0	0.0	0.0
SRISAILAM LB	Hydro	AP	328.0	0.0	0.0
METTUR DAM	Hydro	TN	15.0	0.0	0.0
SINGUR	Hydro	AP	6.0	0.0	0.0
SRISAILAM	Hydro	AP	309.0	0.0	0.0
NAGARJUNA SAGAR	Hydro	AP	369.0	0.0	0.0
LOWER BHAVANI	Hydro	TN	9.0	0.0	0.0
PARSEN'S VALLEY	Hydro	TN	18.0	0.0	0.0
NIZAM SAGAR	Hydro	AP	6.0	0.0	0.0
KUNDAH	Hydro	TN	429.0	0.0	0.0
LOWER METTUR	Hydro	TN	97.0	0.0	0.0
KUTTALAM GT	Natural Gas	TN	108.0	418.0	45144.0
VAIGAI	Hydro	TN	5.0	0.0	0.0
KUTHUNGAL	Hydro	KER	19.0	0.0	0.0
SERVALAR	Hydro	TN	19.0	0.0	0.0
KADAMPARI	Hydro	TN	408.0	0.0	0.0
SURULIYAR	Hydro	TN	41.0	0.0	0.0
MANI DPH	Hydro	KAR	11.0	0.0	0.0
JOG	Hydro	KAR	160.0	0.0	0.0
ENNORE	Coal	TN	1258.0	1085.0	1364930.0
KODAYAR	Hydro	TN	141.0	0.0	0.0
ALIYAR	Hydro	TN	86.0	0.0	0.0
TORANGALLU IMP	Coal	KAR	766.0	1085.0	831110.0
MOYAR	Hydro	TN	53.0	0.0	0.0
KADRA	Hydro	KAR	223.0	0.0	0.0

YELHANKA (DG)	Diesel	KAR	384.0	661.0	253824.0
GERUSUPPA	Hydro	KAR	358.0	0.0	0.0
MUNIRABAD	Hydro	KAR	41.0	0.0	0.0
PERIYAR	Hydro	TN	213.0	0.0	0.0
IDUKKI	Hydro	KER	1246.0	0.0	0.0
UPPER SILERU	Hydro	AP	401.0	0.0	0.0
PAPANASAM	Hydro	TN	47.0	0.0	0.0
SARKARPATHY	Hydro	TN	51.0	0.0	0.0
BELLARY DG	Diesel	KAR	42.0	661.0	27762.0
KODASALI	Hydro	KAR	214.0	0.0	0.0
SIVASAMUNDRUM	Hydro	KAR	79.0	0.0	0.0
BRAMHAPURAM DG	Diesel	KER	266.0	661.0	175826.0
GHAT PRABHA	Hydro	KAR	62.0	0.0	0.0
P. NALLUR CCGT	Natural Gas	TN	1314.0	418.0	549252.0
PYKARA DAM	Hydro	TN	141.0	0.0	0.0
LOWER PERIYAR	Hydro	KER	363.0	0.0	0.0
IDAMALAYAR	Hydro	KER	155.0	0.0	0.0
KUTTIADI	Hydro	KER	259.0	0.0	0.0
SHOLAYAR	Hydro	KER	199.0	0.0	0.0
MANIYAR	Hydro	KER	21.0	0.0	0.0
KALINADI	Hydro	KAR	1718.0	0.0	0.0
LOWER SILERU	Hydro	AP	977.0	0.0	0.0
LIGANAMAKKI	Hydro	KAR	120.0	0.0	0.0
KOJIKODE DG	Diesel	KER	313.0	661.0	206893.0
NEYVELI FST EXT	Lignite	TN	1993.0	1085.0	2162405.0
SABARIGIRI	Hydro	KER	698.0	0.0	0.0
POCHAMPAD	Hydro	AP	64.0	0.0	0.0
KALLADA	Hydro	KER	36.0	0.0	0.0
KALINADI SUPA	Hydro	KAR	241.0	0.0	0.0
BELGAUM DG	Diesel	KAR	235.0	661.0	155335.0
KAKKAD	Hydro	KER	126.0	0.0	0.0
PANNIAR	Hydro	KER	76.0	0.0	0.0
B. BRIDGE D. G	Diesel	TN	992.0	661.0	655712.0
PEDDAPURAM CCGT	Natural Gas	AP	1249.0	418.0	522082.0
SENGULAM	Hydro	KER	128.0	0.0	0.0
GODAVARI GT	Natural Gas	AP	1100.0	418.0	459800.0
T. B. DAM	Hydro	AP	102.0	0.0	0.0
COCHIN CCGT	Natural Gas	KER	991.0	418.0	414238.0
KAYAM KULAM GT	Natural Gas	KER	2118.0	418.0	885324.0
JEGURUPADU GT	Natural Gas	AP	1505.0	418.0	629090.0
SHIVPURA	Hydro	KAR	54.0	0.0	0.0
KONDAPALLI GT	Natural Gas	AP	2238.0	418.0	935484.0
VARAHI	Hydro	KAR	721.0	0.0	0.0
KAIGA	Nuclear	KAR	3123.0	0.0	0.0

SHIMSAPURA	Hydro	KAR	57.0	0.0	0.0
SAMAYANALLUR DG	Diesel	TN	457.0	661.0	302077.0
NEYVELI ST II	Lignite	TN	10003.0	1085.0	10853255.0
SHAHPUR	Hydro	KAR	22.0	0.0	0.0
NORTH CHENNAI	Coal	TN	4347.0	1085.0	4716495.0
K'GUEDEM	Coal	AP	8177.0	1085.0	8872045.0
TANIR BAVI	Coal	KAR	1631.0	1085.0	1769635.0
NEYVELI ST I	Lignite	TN	4400.0	1085.0	4774000.0
SHARAVATHY	Hydro	KAR	3316.0	0.0	0.0
SHOLAYAR	Hydro	TN	202.0	0.0	0.0
KASARGODE DG	Diesel	KER	78.0	661.0	51558.0
TUTICORIN	Coal	TN	8084.0	1085.0	8771140.0
SIMHADRI	Coal	AP	7722.0	1085.0	8378370.0
RAICHUR	Coal	KAR	11400.0	1085.0	12369000.0
R'GUNDEM STPS	Coal	AP	16332.0	1085.0	17720220.0
KOVILKALAPPAL	Natural Gas	TN	745.0	418.0	311410.0
RAYAL SEEMA	Coal	AP	3331.0	1085.0	3614135.0
VALUTHUR GT	Natural Gas	TN	671.0	418.0	280478.0
METTUR	Coal	TN	6735.0	1085.0	7307475.0
VIJAYWADA	Coal	AP	10104.0	1085.0	10962840.0
MADHUPATTY	Hydro	KER	8.0	0.0	0.0
VIJESWARAN GT	Natural Gas	AP	2147.0	418.0	897446.0
ANDHRA	Hydro	AP	69.0	0.0	0.0
MADHAVAMANTRI	Hydro	KAR	13.0	0.0	0.0
NARIMANGLAM	Hydro	KER	196.0	0.0	0.0
PORINGALKUTTU	Hydro	KER	142.0	0.0	0.0
MACHKUND	Hydro	AP	529.0	0.0	0.0
PALLIVASAL	Hydro	KER	193.0	0.0	0.0
M. A. P. P.	Nuclear	TN	1577.0	0.0	0.0
R'GUNDEM - B	Coal	AP	471.0	1085.0	511035.0
PORINGALKUTTU L	Hydro	KER	88.0	0.0	0.0
NARAYANPUR	Hydro	KAR	38.0	0.0	0.0
		<b><math>SUM\ GEN_{j,y} =</math></b>	<b><u>135027.0</u></b>	<b><math>SUM (GEN_{j,y} * EF_{IPCCi,j}) =</math></b>	<b><u>112736825.0</u></b>
				<b>Average Operation Margin =</b>	<b>834.921</b>

Note:

All Data on Generation were taken from CEA website - <http://cea.nic.in/>

PLF considered is based on Capacity Group as given under published document by CEA - Performance Review of Thermal Power Station 03 - 04 Section 2

Only Thermal Power Plants PLF is given under the published document

Hydro Power Plants PLF has been - considered as 40% based on various sites on Renewable Resources - [http://www.auswea.com.au/about/wind\\_stops.htm](http://www.auswea.com.au/about/wind_stops.htm)

Capacity Group (MW) Commissioned up to 31-	P.L.F. % 01 - '02
500 and above	80.8
250 -500	83.89
200 - 250	75.51
140 - 200	46.73
120	39.19
110	49
100	56.33
70 - 85	42.7
62.5-67.5	59.1
60	46.58
50-57.5	37.12
20-40	37.12

Survey also dose not cover plants below 20MW, there PLF has been considered equivalent to 20 MW power plants

OM calculation has failed to cover many Renewable Energy Sources contributing to the local grids

For Nuclear Power Plants PLF for individual power plants are gven under CEA General Review 02 03 - Same has been applied

For All India Case - 20% will apply

System Generation (GWh) = 135027 20% of System Generation = 27005.4

Data of 75 plants commissioned in last 5 years in India

1999 - 2004

Power Plant	State	Installed Capacity MW	Fuel	Status (Commissioned/ Under construction)	Dates	PLF	Generation (GWh)	IPCC Emission Factor tCO <sub>2</sub> /GWh	Net Emission
Priyadarshini Jurala Hydro Electric Project	AP	234	Hydro	Underconstruction	03/10/07	0.60	1179.36	0.00	0.00
Bhoopalapally Thermal Power Station	AP	500	Coal	Underconstruction	03/10/07	0.82	3444.00	1085.00	3736740.00
Kaiga Unit 3	Karnataka	220	Atomic	Underconstruction	03/01/07	0.80	1478.40	0.00	0.00
Kaiga Unit 4	Karnataka	220	Atomic	Underconstruction	03/01/07	0.80	1478.40	0.00	0.00
Kudankulam Unit 1	TN	1000	Atomic	Underconstruction	03/01/07	0.80	6720.00	0.00	0.00
Rayala seema Thermal Power Project Stage - II	AP	420	Coal	Underconstruction	01/01/07	0.82	2892.96	1085.00	3138861.60
Vijayawada Thermal Power Station stage - IV	AP	660	Coal	Underconstruction	01/01/07	0.82	4546.08	1085.00	4932496.80
TAPS 4	Tamil Nadu	540	Atomic	Underconstruction	01/01/07	0.80	3628.80	0.00	0.00
TAPS 3	Tamil Nadu	540	Atomic	Underconstruction	04/01/06	0.80	3628.80	0.00	0.00
						SUM (GEN <sub>m,y</sub> ) =	28996.80	SUM (GEN <sub>m,y</sub> * EF_IPCC <sub>m</sub> ) =	11808098.40
								BM =	407.22
Ramagundam Unit VII	AP	500	Coal	Underconstruction	08/10/05	0.82	3444.00	1085.00	3736740.00
Reliance Energy Ltd.'s	Karnataka	1.80	Wind	Commissioned	07/01/03	0.35	5.29		0.00
Raichur Thermal Unit 7	Karnataka	210.00	Coal	Commissioned	12/10/02	0.78	1375.92	1085.00	1492873.20
Kappatguda East	Karnataka	2.47	Wind	Commissioned	07/31/02	0.35	7.25	0.00	0.00
Jamkhandi Sugars	Karnataka	6.50	Bagasse	Commissioned	03/31/02	0.80	43.68	0.00	0.00
Bhoruka Power Plants	Karnataka	3.50	Hydro	Commissioned	03/31/02	0.40	11.76	0.00	0.00
Deedee Enterprises	Karnataka	0.60	Hydro	Commissioned	03/31/02	0.40	2.02	0.00	0.00
Sharavathi Tail Race	Karnataka	60.00	Hydro	Commissioned	03/30/02	0.40	201.60	0.00	0.00
Raitha Sahakari Sugars	Karnataka	3.00	Bagasse	Commissioned	12/31/01	0.70	17.64	0.00	0.00
Topaz	Karnataka	0.60	Wind	Commissioned	12/31/01	0.35	1.76	0.00	0.00
Kaiga Unit 1	Karnataka	220	Atomic	Commissioned	11/16/00	0.86	1589.28	0.00	0.00
Kaiga Unit 2	Karnataka	220	Atomic	Commissioned	03/16/00	0.86	1589.28	0.00	0.00
Reliance Energy Ltd.'s	Karnataka	8.37	Wind	Commissioned	09/01/99	0.35	24.61		0.00

\* Ministry of Power Report 02 - 03

PLF considered is based on Capacity Group as given under published document by CEA - Performance Review of Thermal Power Station 03 - 04 Section 2

PLF of Wind, Hydro, Renewable taken from - <http://www.auswea.com.au/> Australian

Plants under Capacity Addition Scheme by CEA and other agencies, only those plants which are under construction has been considered, that is mainly under Xth Plan

Date selected for underconstruction plant are the tentative date of Synchronization of those plants with the electricity grid.

Particular	Algorithm	Value	Unit
Actual quantity of waste gases supplied to a power generator	W	NA	SCM
Annual quantity of waste gases generated in the steel manufacturing industry	X	NA	SCM
Annual quantity of waste gases flared in the steel manufacturing industry sector	Y	NA	SCM
Amount of waste gases used for meeting the internal requirements of all waste gas generators (in similar steel manufacturing sector) in the region or country	Z	NA	SCM
Annual quantity of gas available after meeting internal requirements	$GA = X - Z$	NA	SCM
Minimum quantity of waste gas available for supply to power generator	$MIN\_WGA = \text{Minimum}[GA, Y, W]$	NA	SCM
Correction Factor	$CF = MIN\_WGA / W$	1.0	--

Particulars	Value	Unit
GCV of LD gas	2000.00	Kcals/Nm3
GCV of LD Gas in Tjoules	0.00001	Tjoules/NM3
Annual LD gas generation expected	80.00	NM3/tcs
Annual expected crude steel production	1.60	Million Tonnes
Total Annual LD gas generation	128000000.00	NM3
Total heat content of LD Gas generated	256000000000.00	Kcals
Heat rate	2570.00	Kcals/KWh
Total power generated from LD Gas per annum	99.61	GWh
Auxiliary consumption @2%	1.99	GWh
Net LD gas based power exported by power plant per annum	97.62	GWh



		Years =>									
Particulars	Units	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Project Emission	tCO2/GWh	0	0	0	0	0	0	0	0	0	0
Baseline Emission	tCO2/GWh	621	621	621	621	621	621	621	621	621	621
Projected Generation	GWh	49	98	98	98	98	98	98	98	98	98
Annual Emission Reduction	tCO2	30,314	60,628	60,628	60,628	60,628	60,628	60,628	60,628	60,628	60,628
Total Emission Reduction	tCO2	575,967									