



A.S. BAKSHI

Chairperson
Central Electricity Authority
& Ex-officio Secretary to
Government of India

FOREWORD

Reliable and quality Power is the most important infrastructure required to sustain the growth of the country. Government of India has taken a number of initiatives to increase power generation in the country. As a result of these initiatives, new capacity aggregating to 20501.7 MW was added during the financial year 2011-12. Generation from thermal power stations, which constitute nearly 66% of the total installed capacity and contribute nearly 81% of the total power generation in the country, continue to be dominant source of power generation.

This performance review of thermal power stations for the year 2011-12 is the 36th in the series being brought out by CEA in fulfillment of its obligations under Section 73 (i) and (j) of The Electricity Act, 2003. The review covers the performance of 454 thermal units from 126 Thermal Power Stations.

During the financial year 2011-12, the country witnessed good monsoon resulting into better generation from hydro power plants with a growth rate of almost 14% as compared to 2010-11. Generation from nuclear power plants also had an impressive growth rate of about 23% as compared to previous year. A few thermal power stations faced problem of fuel supply shortages or costly fuel. As such, the yearly growth rate in respect of thermal power generation in the country got restricted to 6.59%.

My thanks are due to all power utilities for furnishing the information, which enabled publication of this Review. I hope that this review would serve as a useful guide to power utilities and equipment manufacturers in identifying the factors affecting the performance of thermal power stations and spur efforts in achieving excellence in O&M strategies.

NEW DELHI
October, 2012

(A.S. BAKSHI)



KAUSHAL. K. AGRAWAL

Member (GO&D),
Central Electricity Authority
& Ex-Officio Addl. Secretary to
Government of India

PREAMBLE

Recognizing the crucial role of Thermal Power Stations to meet the power requirement in the country, Central Electricity Authority carries out studies to review the Performance of Thermal Power Stations in close coordination with power utilities so as to ensure their optimum utilization. The results of these studies are brought out in the form of a Report on "Performance Review of Thermal Power Stations".

The report on 'Review of Performance of Thermal Power Stations' for the year 2011-12 is the 36th in the series being brought out by CEA every year in fulfillment of its obligations under Section 73(i) and (j) of The Electricity Act, 2003. The review covers an exhaustive analysis of the performance of 454 thermal units (above 25 MW capacity) aggregating to 97768 MW for which operative data has been provided by the generating utilities in the State, Centre and Private Sectors. The factors covered in the review are actual generation with respect to the yearly generation, Plant Load Factor (PLF), Operating Availability, Planned Maintenance, Forced Outages and Partial Outages etc. This report also tries to encapsulate the efficiency of thermal stations in terms of auxiliary power consumption, specific fuel consumption and station heat rate.

During the year 2011-12, a few thermal power stations have reported increased generation loss on account of coal supply problem, transmission constraints, low schedules from the beneficiaries, receipt of poor quality/wet coal. In addition, some thermal generating units were kept under reserve shut down on account of environmental restrictions. As a result, the National average PLF of coal/lignite based thermal power stations reduced to 73.54% against 75.08% during 2010-11. Had there been no coal shortages, no generation loss due to poor quality coal, no grid constraints and the coal /lignite based plants would have received adequate schedules from their beneficiaries and were not required to be kept under reserve shut down, there would have been additional energy generation of about 50.8 BU from coal/lignite based power plants thereby achieving PLF of 79%.

Our thanks are due, to all the generating utilities for furnishing the data required by CEA for carrying out the performance review. Thanks are also due to Operation Monitoring Division, Thermal Renovation & Modernization Division, Conservation & Efficiency Division and Grid Management Division of CEA for making available necessary inputs on related aspects of thermal stations performance for preparation of this Review.

Studies for this publication have been carried out by Smt. Rishika Sharan, Director, Operation Performance Monitoring Division, under the overall supervision of Shri A.K.Singhal, Chief Engineer (OPM) and I would like to place on record my appreciation for the same.

Suggestions to improve the contents of the report are most welcome.

INDEX

SECTION	CONTENTS	PAGE
	Objective	II
	Overview	III
	Performance Indices (Historical Trend)	IV
	Highlights	V-VII
	Definition	VIII
	Abbreviation used in the Report	X
SECTION 1	Scope of the Review	1.1
SECTION 2	Generation Performance	2.1
SECTION 3	Planned Maintenance	3.1
SECTION 4	Forced Outages	4.1
SECTION 5	Operating Availability	5.1
SECTION 6	Capacity group wise performance	6.1
SECTION 7	Partial unavailability and non-utilization of energy due to system load variation.	7.1
SECTION 8	Effect of outages on generation reliability	8.1
SECTION 9	Fuel supply to various power stations	9.1
SECTION 10	Gas Turbine Plants	10.1
SECTION 11	Auxiliary Power consumption in Thermal Power Stations.	11.1
SECTION 12	Station operation under disturbed grid/frequency conditions	12.1
SECTION 13	Station heat rate of coal/lignite based Thermal Power Stations	13.1
SECTION 14	Environmental aspects in Power Sector	14.1
SECTION 15	Energy Conservation and Audit	15.1
SECTION 16	Renovation and Modernization of Thermal Power Plants	16.1

OVERVIEW

PARTICULARS	2008-09	2009-10	2010-11	2011-12
ALL INDIA GENERATION (BU)	723.79	768.43	811.14	876.89
THERMAL GENERATION (BU)	590.10	640.54	665.01	708.81
NUCLEAR GENERATION (BU)	14.71	18.64	26.27	32.29
HYDRO GENERATION* (BU)	113.08	109.26	119.87	136.12
THERMAL PLANT LOAD FACTOR (%)**	77.22	77.53	75.08	73.32
NUCLEAR PLANT LOAD FACTOR (%)	40.77	51.08	65.40	76.90

* Hydro generation includes import from Bhutan

** Coal & lignite based stations

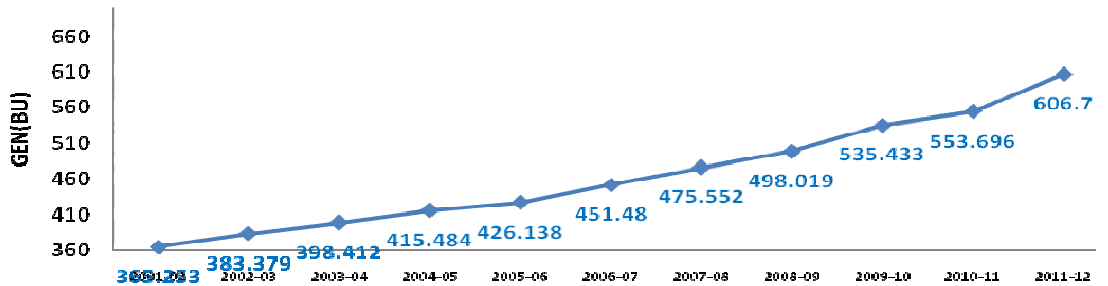
PERFORMANCE OF THERMAL STATIONS CONSIDERED IN THE REVIEW

PARTICULARS	08-09	09-10	10-11	11-12
1. COAL & LIGNITE BASED UNITS REVIEWED				
(a) NUMBER OF UNITS	390	413	428	454
(b) CAPACITY (MW)	74914.5	80439.5	86137	97768
(c) GROSS GENERATION (MU)	498019	535433	553696	606684
2. FORCED OUTAGE (%)	9.29	8.85	10.32	11.46
3. PLANNED MAINTENANCE (%)	5.66	6.05	5.83	5.93
4. OPERATING AVAILABILITY FACTOR (%)	85.05	85.10	83.85	82.61
5. PARTIAL UNAVAILABILITY DUE TO INTERNAL AS WELL AS EXTERNAL PROBLEMS (%)	8.48	8.03	9.33	9.43
6. LOW SYSTEM DEMAND & RESERVE SHUTDOWN(%)	0.50	0.88	1.88	1.9
7. PLANT LOAD FACTOR (%)	77.22	77.53	75.08	73.32
8. SPECIFIC SECONDARY FUEL OIL CONSUMPTION (ml/kWh)	1.93	1.51	1.85	1.83
9. AUX. POWER CONSUMPTION (%)	8.33	8.34	8.49	8.44
10. (a) AVERAGE TIME TAKEN IN DAYS FOR BOILER OVERHAUL	24	28	27	30
10. (b) AVERAGE TIME TAKEN IN DAYS FOR CAPITAL MAINTENANCE	53	62	64	58

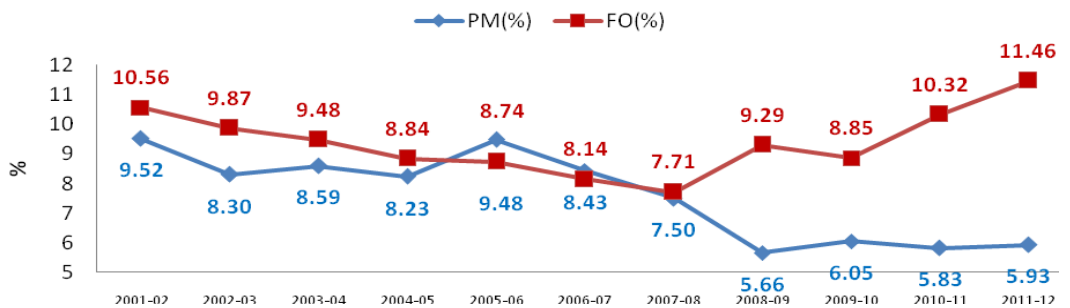
Performance Review of Thermal Power Stations 2011-12
PERFORMANCE OF COAL/ LIGNITE BASED THERMAL POWER STATIONS
DURING 2001-02 TO 2011-12

Year	Capacity (MW)	Generation (MU)	PLF (%)	PM (%)	FO (%)	Op.Av. (%)	Aux. Cons (%)	Sp. Coal cons. (kg/kWh)	Sp. Sec. Fuel oil cons. (ml/kWh)	Partial Loss (%) due to	
										Equip ment etc.	LSD/ RSD (%)
01-02	59902	365253	69.97	9.52	10.56	79.91	8.72	0.70	2.70	9.99	1.53
02-03	61152	383379	72.34	8.30	9.87	81.83	9.55	0.71	0.68	9.55	1.57
03-04	62727	398412	72.96	8.59	9.48	81.93	9.91	0.70	2.30	9.09	1.98
04-05	64646	415484	74.82	8.23	8.84	82.93	8.57	0.71	1.37	8.35	0.92
05-06	66449	426138	73.71	9.48	8.74	81.78	8.44	0.70	1.77	7.08	2.10
06-07	67596.5	451480	77.03	8.43	8.14	83.72	8.29	0.72	1.89	6.15	1.02
07-08	70569.5	475552	78.75	7.50	7.71	84.76	8.17	0.73	1.40	6.30	0.52
08-09	74914.5	498019	77.22	5.66	9.29	85.05	8.33	0.74	1.93	8.21	0.27
09-10	80439.5	535433	77.53	6.05	8.85	85.10	8.34	0.72	1.51	7.57	0.46
10-11	86137	553696	75.08	5.83	10.32	83.85	8.49	0.72	1.85	9.88	1.43
11-12	97768	606684	73.32	5.93	11.46	82.61	8.44	0.72	1.83	8.34	1.09

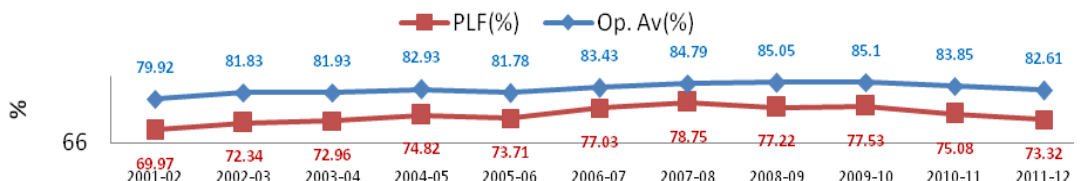
Year wise Thermal Generation in BU



Year wise Planned Maintenance & Forced Outages



Year wise PLF and Operating Availability



HIGHLIGHTS

- The review covers the performance analysis of 454 coal / lignite based thermal units above 25 MW capacity of 126 thermal power stations aggregating 97768 MW.
- During the financial year 2011-12 ,the highest ever capacity addition of 20501 MW (Thermal, Nuclear and Hydro) was achieved, out of which 18404 MW of capacity was of Coal/Lignite based plants.
- During the financial year 2011-12 , nine nos. of supercritical units were synchronized to the grid. The performance analysis of following Supercritical units (which were reckoned for PLF calculations during the year) was included in the Present Publication.

Sl. No	Name of Station	Unit No	Organisation	Capacity
1	MUNDRA TPS	5	APL	660
2	MUNDRA TPS	6	APL	660
3	MUNDRA TPS	7	APL	660
4	SIPAT STPS	1	NTPC Ltd.	660

- In order to include the performance analysis of above units, a new capacity group the capacity group 660-800 MW (Supercritical units) has been added in the review.
- All India electricity generation in the country during 2011-12 has been 876.89 BU representing a growth rate of 8.11% as compared to the generation of 811.14 BU during 2010-11.
- Thermal Generation stood at 708.81 BU representing a share of more than 80 % of total electricity generation in the country.
- Coal/ Lignite based plants continued to have major contribution towards electricity generation with a major share of 86.4% of the total thermal generation in the
- During 2011-12, the total thermal generation achieved a growth rate of 6.59%. Coal based generation recorded a remarkable growth rate of 9.24 %.
- The thermal generation in the country during 2011-12 was 99.52% of its target fixed for the year.
- Operating Availability of 82.61% was achieved during 2011-12 as against 83.85% achieved during 2010-11.
- 7 thermal generating units had achieved plant operating availability more than 99% during 2011-12. 32 Thermal stations achieved the Operating Availability more than 90% during 2011-12.
- Plant load factor (PLF) of thermal power stations at the national level, during 2011-12, reduced to 73.32% from 75.08% achieved during previous year. The Lower PLF was due to increased generation loss due to coal supply problem and transmission constraints and Reserve Shut down/Low system demand.

- Plant load factor (PLF) of Central Sector units was highest at 82.12%. However the PLF of IPP was reduced from 80.97% during 2010-11 to 67.27% during 2011-12.
- Plant load factor (PLF) of BHEL/BHEL make units (283 units aggregating to 65838 MW) registered the highest PLF of 77.00% among units of different makes. However, the PLF % of China / China make units reduced from 72.33% during 2010-11 to 62.48% during 2011-12 due to increased forced outages of China/China make units at Mundra TPS(U #5, 6 of capacity 660 MW each), Jallipa Kupurdi TPS (U#1,2 of 135 MW each), Yamuna Nagar TPS (U#2 of 300 MW).
- Dahanu Thermal Power Station (2X250 MW) of M/s Reliance Infrastructure Ltd. in Maharashtra achieved the highest ever PLF of 101%.
- PLF of 15 thermal power Stations aggregating to 20420 MW was above 90%. Among these 7 were from Central Sector Utility (6 from NTPC and 1 from NSPCL), 4 were from Pvt. Utilities (one from JSW Energy Ltd. and one each from Reliance Infra, CESC and JPL) and 4 were from State Sector Utilities (PSPCL- 1, RRVUNL-1, TNGDCL-1, APGENCO-1). PLF of 52 number Thermal units aggregating to 5703 MW were below 30%. 29 numbers of units of capacity 2444 MW did not contribute to electricity generation during the year under review.
- The coal availability to power stations deteriorated due to Telangana crisis during the month of September,11. Telangana crisis hampered the production in SCCL mines which had affected coal supplies to many generating stations of Southern Region especially Andhra Pradesh, Karnataka and Maharashtra.
- Energy loss on account of planned maintenance was 5.93% as compared to 5.83% during 2009-10. The % increase in Planned maintenance was due to increase in unscheduled Capital maintenance and in unscheduled R&M activity of some units.
- The average duration of boiler overhaul and capital maintenance was achieved as 30 days and 58 days respectively.
- The loss of generation due to non-availability of thermal units due to forced outages during 2011-12 increased to 11.46% as compared to 10.32% during 2009-10. The increased forced outages was due to increased forced shutdown of units due to coal supply problem and transmission constraints and equipment problems of some new units. The details are given in Section 4.
- 59.87% of the total forced shut down were of duration up to 24 hours. 38.67% outages were of duration varying from 1 to 25 days and only 1.45% of shut downs were for more than 25 days.
- The total loss of generation (6574 MU) due to planned maintenance of thermal units was highest in September '2011. Loss of generation due to various forced outages was maximum during the month of September'11 (10436 MU)

- Following loss of generation due to various constraints were reported by the utilities:

Sl. No.	Category	Energy (BU) (2011-12)	Energy (BU) (2010-11)
1	Shortage of coal	11.6	8.4
2	Wet/poor coal quality	17.9	17.4
3	Backing down/Reserve shut down	15.3	13.7
4	Transmission constraints (Mundra TPS, Sterlite TPS, Udupi TPS are some stations which are mainly affected)	3.92	3.7
5	Gas shortage	36.71	28.27

- The generation from gas based plants had negative growth rate on account of low schedules from the beneficiaries coupled with shortage of gas. During the year, the generation from gas based plants (including liquid fuel, Diesel etc) were 93.22 BU in comparison to 99.97 BU. As such the % PLF was also reduced from 66.14% during 2010-11 to 59.94% during 2011-12.
- Energy loss due to partial unavailability of the thermal generating units operating in the country during 2011-12 had increased to 9.43% of the maximum possible generation during the year in comparison to the 9.34% in 2010-11. The increase was mainly attributed to partial unavailability of the thermal generating units on account of backing down of units due to poor quality coal/lignite, coal/Lignite shortage and low system demand.
- JOJOBERA TPS # 1 (120 MW) of TATA PCL had operated continuously for 340 days. 10 coal/lignite based thermal generating units (6 of NTPC, and one of each from Tata PCL, GSECL JSWEL, RIL (DAHANU)) continuously operated for more than 250 days.
- 23 coal/lignite based thermal generating units (NTPC-11, Tata PCL-3, JSWEL-2 and one each of RIL, GSECL, WBPDC, NLC, TNGDCL, APGENCO & CESE) operated continuously for more than 200 days.
- The all India Specific coal consumption of thermal power stations during 2011-12 was 0.72 kg/kWh.
- The All India average auxiliary power consumption by the thermal stations during 2011-12 reduced to 8.44% from 8.49% during 2010-11.
- Additional new features covered in the Review are mentioned below:
 - Performance analysis of Super critical units (660-800 MW Capacity Group in Section -6)

- Details of units which were taken under unscheduled/extended Capital Maintenance and unscheduled/extended R&M activities (Section-3, Para 3.2.1).
- Details of units which were taken unscheduled /extended Annual Over Haul (A.O.H) of more than 40 days(Annexure 3.2, Section- 3).
- Detailed analysis to know the major reasons for increased forced outages is covered in (Section -4, Para 4.2.1 & 4.2.2)
- Details of units which were having Operating Availability less than 50%(Annexure 5.1, Section-5).

SECTION-1

SCOPE OF THE REVIEW

1.1. SCOPE

The total installed capacity of thermal power stations in the country as on 31-03-2012 was 1,31,603 MW comprising 112,022 MW coal / lignite, 18381 MW gas turbines and 1,200 MW diesel plants.

The Review 2011-12 covers the performance of 454 coal / lignite based thermal units (above 25 MW capacity) of 126 thermal power stations aggregating to 97,768 MW. Various new coal/lignite based thermal units have been included for performance analysis from the date from which these units had been considered for Plant Load Factor (PLF) calculation. The criteria adopted for reckoning the date of PLF calculation with effect from 25.10.2010 onwards is as under:

(i) *"The 1st day of the month following the month of declaration of Commercial operation date"*

OR

(ii) *"The first day of the month following the month in which the generating unit attains generation equivalent to National Average PLF, whichever is earlier."*

The National Average PLF would be taken as the actual PLF for the previous financial year (i.e. April to March)".

The 454 coal / lignite based thermal units includes 421 number of units considered in the previous publication and 33 new units of capacity 12360 MW capacity, which were synchronized and reckoned for Plant Load Factor(PLF) calculation during the year 2011-12. However it excludes 7 such units of capacity 729 MW, retired during 2010-11. Details of units covered in the review are as under:

S.No.	Unit Details	No. of Units	Capacity (MW)
1	Units considered in Review 2010-2011	428	86137
2	New units Synchronised during 2009-10,2010-2011 and 2011-2012 and considered in the review for first time (details is given in the Annexure 1.1)	33	12360
3	Units not considered in the review due to retirement(details is given in the Annexure 1.2)	-7	-729
4	Units Considered in the Review	454	97768

The review includes six numbers of units of capacity 455 MW, which were retired during the financial year 2011-12. Details of all such units are given in **Annexure 1.3**

Fuel-wise, sector-wise, state-wise breakup of number of thermal power stations/units with their installed capacities in the country which were operational as on 31st March, 2012 is given at **Annexure 1.4**.

The details of different makes of units considered in the review are given at **Annexure 1.5**

During the financial year 2011-12, 19 (nineteen) new thermal power stations were added, among these 4 thermal stations were from central sector while 15 were from IPPs. Unit No. 1 & 2 of New Parli Station were renamed as 6&7 of existing Parli station and unit no 1 & 2 of Paras Expansion were renamed as Unit No. 3 &4 of existing Paras Station. This has resulted deletion of New Parli and Paras Expansion stations from the list of stations.

The details of new thermal power stations added during the year 2011-12 and changes made in the station with reference to the previous publication are indicated in **Annexure 1.6**

Performance analysis of 3 no. of thermal units aggregating to capacity 1250 MW (Chhabra U#2, 250 MW; Farakka U#6, 500 MW and Mejia U#8, 500 MW which although were commissioned during financial year 2010-11), could not be done as these units were not meeting the criteria adopted for reckoning the date of PLF calculation. Details of new such units which although synchronized during 2010-11 & 2011-12 but not considered in the review are given at **Annexure 1.7**

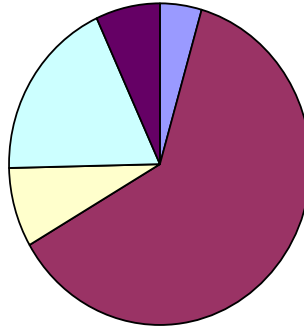
Super Critical Units

During the year 2011-12, 9 Super critical units capacity (≥ 660 MW) were synchronized to the grid. The review covers following 4 super critical units:

SI.No	Name of Station	Unit No	Organisation	Capacity
1	MUNDRA TPS	5	APL	660
2	MUNDRA TPS	6	APL	660
3	MUNDRA TPS	7	APL	660
4	SIPAT STPS	1	NTPC Ltd.	660

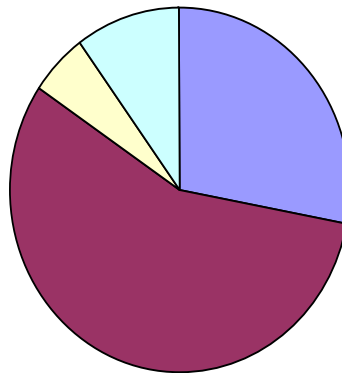
In order to include the performance analysis of above units, a new capacity group the capacity group 660-800 MW (Supercritical units) has been added in the review.

Make-wise details of units reviewed



- Boiler/Turbine Make :ABL/BHEL; No. of Units 20 (4.4%); Capacity 3470 MW (3.55%)
- Boiler/Turbine Make: BHEL/BHEL; No. of Units: 283 (62.33%); Capacity 65838 (67.37%)
- Bolier/Turbine Make :CHINA/CHINA; No. of Units 36(7.91%): Capacity 12645(12.92%)
- Bolier/Turbine Make :OTHERS/OTHERS ;No. of Units : 84(18.46%) ; Capacity:12485 (12.76%)
- Bolier/Turbine Make :RUSSIA/RUSSIA ;No. of Units 31 (6.81); Capacity:3330(3.4%)

Sector-wise details of units reviewed



- CENTRAL SECTOR No. of Units 127 (27.97%) Capacity 34705 MW (35.50%)
- STATE SECTOR No. of Units 257 (56.61%) Capacity 46558 (47.62%)
- PVT. UTILITY No. of Units 24 (5.29%) Capacity 3585 (3.67%)
- IPP No. of Units 46 (10.13%) Capacity 12920 (13.21%)

Annexure-1.1**DETAILS OF NEW UNITS SYNCHRONISED DURING 2009-10, 2010-2011 & 2011-2012 AND CONSIDERED IN THE REVIEW FOR FIRST TIME**

S.No.	Name of Station	Unit No	Organisation	Capacity	Make Boiler/Turbine	Date of Synchronization	Date of Reckoning of PLF
2009-10							
1	RAJIV GANDHI TPS	1	HPGCL	600	SHANGHAI ELECTRIC CHINA/SHANGHAI ELECTRIC CHINA	31-Mar-10	1-Feb-12
2	GIRAL TPS	2	RRVUNL	125	BHEL/BHEL	6-Nov-09	1-Apr-11
3	CHANDRAPURA(DVC) TPS	7	DVC	250	BHEL/BHEL	4-Nov-09	1-Dec-11
4	CHANDRAPURA(DVC) TPS	8	DVC	250	BHEL/BHEL	31-Mar-10	1-Aug-11
	SUB TOTAL	4		1225			
2010-2011							
5	RAJIV GANDHI TPS	2	HPGCL	600	SHANGHAI ELEC CHINA/SHANGHAI ELEC CHINA	1-Oct-10	1-Dec-11
6	INDIRA GANDHI STPP	1	APCPL	500	BHEL/BHEL	31-Oct-10	1-Apr-11
7	BARSINGSAR LIGNITE	1	NLC	125	BHEL/BHEL	28-Jun-10	1-Feb-12
8	BARSINGSAR LIGNITE	2	NLC	125	BHEL/BHEL	25-Jan-11	1-Jan-12
9	SURAT LIG. TPS	4	GIPCL	125	BHEL/BHEL	23-Apr-10	1-May-11
10	*MUNDRA TPS	5	APL	660	HERBIN CHINA/DONGFANG CHINA	26-Dec-10	1-Jun-11
11	KORBA STPS	7	NTPC Ltd.	500	BHEL/BHEL	26-Dec-10	1-Apr-11
12	WARDHA WARORA TPP	3	WPCL	135	DEC CHINA/DONGFANG CHINA	21-Jan-11	1-Jun-11
13	RAYALASEEMA TPS	5	APGENCO	210	BHEL/BHEL	31-Dec-10	1-Jun-11
14	SIMHADRI	3	NTPC Ltd.	500	BHEL/BHEL	31-Mar-11	1-Oct-11
15	UDUPI TPP	1	UPCL	600	DONGFANG CHINA/DONGFANG CHINA	23-Jul-10	1-Dec-10
16	MEJIA TPS	7	DVC	500	BHEL/BHEL	30-Sep-10	1-Sep-11
17	STERLITE TPP	1	SEL	600	HERBIN CHINA/DONGFANG CHINA	29-Dec-10	1-Aug-11
18	STERLITE TPP	2	SEL	600	HERBIN CHINA/DONGFANG CHINA	14-Oct-10	1-Dec-10
	SUB TOTAL	14		5780			
2011-2012							
19	JALIPA KAPURDI TPP	3	RWPL (JSW)	135	DONGFANG CHINA/DONGFANG CHINA	2-Nov-11	1-Dec-11
20	JALIPA KAPURDI TPP	4	RWPL (JSW)	135	DEC CHINA/DEC CHINA	23-Nov-11	1-Jan-12
21	HARDUAGANJ TPS	8	UPRVUNL	250	BHEL/BHEL	27-Sep-11	1-Mar-12
22	ROSA TPP Ph-I	3	RPSCL	300	SEC CHINA/SHANGHAI ELEC CHINA	28-Dec-11	1-Feb-12
23	KHAMBARKHERA TPS	2	BEPL	45	THYSSEN/SIEMENS INDIA	28-Nov-11	1-Jan-12
24	*MUNDRA TPS	6	APL	660	SEPCO III CHINA/SEPCO III CHINA	20-Jul-11	1-Aug-11
25	*MUNDRA TPS	7	APL	660	SEPCO III CHINA/SEPCO III CHINA	7-Nov-11	1-Dec-11
26	*SIPAT STPS	1	NTPC Ltd.	660	DOOSAN KOREA/POWER MACHINE RUSSIA	28-Jun-11	1-Dec-11

DETAILS OF NEW UNITS SYNCHRONISED DURING 2009-10, 2010-2011 & 2011-2012 AND CONSIDERED IN THE REVIEW FOR FIRST TIME

S.No.	Name of Station	Unit No	Organisation	Capacity	Make Boiler/Turbine	Date of Synchronization	Date of Reckoning of PLF
27	KATGHORA TPP	1	VESPL	35	CETHAR LTD/SIEMENS INDIA	14-Feb-12	1-Mar-12
28	JSW RATNAGIRI TPP	3	JSWEL	300	SHANGHAI ELEC CHINA/SHANGHAI ELEC CHINA	6-May-11	1-Aug-11
29	JSW RATNAGIRI TPP	4	JSWEL	300	SHANGHAI ELEC CHINA/SHANGHAI ELEC CHINA	8-Oct-11	1-Nov-11
30	KOTHAGUDEM TPS (NEW)	3	APGENCO	500	BHEL/BHEL	26-Jun-11	1-Nov-11
31	MAITHON RB TPP	1	MPL	525	BHEL/BHEL	30-Jun-11	1-Sep-11
32	STERLITE TPP	3	SEL	600	SEPCO III CHINA/SEPCO III CHINA	16-Aug-11	1-Sep-11
33	SANTALDIH TPS	6	WBPDC	250	BHEL/BHEL	29-Jun-11	1-Oct-11
	SUB TOTAL	15		5355			
	TOTAL	33		12360			

*Supercritical Units

Annexure-1.2**UNITS RETIRED DURING 2010-11 AND ARE NOT CONSIDERED IN THE REVIEW**

S	Name of Station	Unit No	Capacity (MW)	Make Boiler/Turbine	Date of Retirement	Date of Notification
1	OBRA TPS*	6	94	BHEL/BHEL	12-Jan-11	12-Jun-12
2	HARDUAGANJ TPS*	3	55	BHEL/BHEL	20-Nov-10	27-Mar-12
3	DHUVARAN TPS	5	110	Wilcox Co/GEN Electric	02-Feb-11	11-Feb-11
4	DHUVARAN TPS	6	110	Wilcox Co/GEN Electric	02-Feb-11	11-Feb-11
5	CHANDRAPURA(DVC) TPS	4	120	ABL/BHEL	13-Aug-10	03-Sep-10
6	CHANDRAPURA(DVC) TPS	5	120	ABL/BHEL	13-Aug-10	03-Sep-10
7	CHANDRAPURA(DVC) TPS	6	120	ABL/BHEL	13-Aug-10	03-Sep-10
	SUB TOTAL	7	729			

*Note : Units Retired during 2010-11 but notified in 2011-12

Annexure-1.3**DETAILS OF UNITS RETIRED DURING THE YEAR 2011-12 BUT CONSIDERED IN THE REVIEW**

S.No.	Name of Station	Unit No	Capacity (MW)	Make Boiler/Turbine	Date of Retirement	Date of Notification
1	NASIK TPS	1	125	Babcock And Willcock	25-Jun-11	12-Jun-12
2	NASIK TPS	2	125	Babcock And Willcock	30-Jun-11	12-Jun-12
3	PARAS TPS	2	55	CEKOP Poland/General	19-May-11	03-Jun-11
4	BHUSAWAL TPS	1	50	Rafako cekop Poland/Siemens	19-May-11	03-Jun-11
5	BARAUNI TPS	4	50	Rafco Reciborge/Zamec	12-Mar-12	20-Mar-12
6	BARAUNI TPS	5	50	Poland/Poland	12-Mar-12	20-Mar-12
	SUB TOTAL	6	455			

Annexure-1.4

Sheet 1 OF 3

FUEL-WISE BREAKUP OF NUMBER OF THERMAL POWER STATIONS/UNITS WITH THEIR INSTALLED CAPACITIES IN DIFFERENT SECTORS/ STATES IN THE COUNTRY WHICH WERE OPERATIONAL AS ON 31ST MARCH, 2011

Region/State	Central Sector			State Sector			Private Utility			Private IPP's			Total		
	No. of Stations	No. of Units	Installed Capacity (MW)	No. of Stations	No. of Units	Installed Capacity (MW)	No. of Stations	No. of Units	Installed Capacity (MW)	No. of Stations	No. of Units	Installed Capacity (MW)	No. of Stations	No. of Units	Installed Capacity (MW)
NORTHERN REGION															
COAL															
DELHI	1	5	705	1	2	135	0	0	0	0	0	0	2	7	840
HARYANA	1	2	1000	3	12	3160	0	0	0	1	1	660	5	15	4820
PUNJAB	0	0	0	3	14	2620	0	0	0	0	0	0	3	14	2620
RAJASTHAN	0	0	0	3	15	3240	0	0	0	0	0	0	3	15	3240
UTTAR PRADESH	5	26	7310	5	23	4173	0	0	0	7	16	2850	17	65	14333
TOTAL COAL	7	33	9015	15	66	66	0	0	0	8	17	3510	30	116	25853
LIGNITE															
RAJASTHAN	1	2	250	1	2	250	0	0	0	1	4	540	3	8	1040
TOTAL LIGNITE	1	2	250	1	2	2	0	0	0	1	4	540	3	8	1040
TOTAL NORTHERN REGION	8	35	9265	16	68	13578	0	0	0	21	21	4050	33	124	26893
WESTERN REGION															
COAL															
CHHATTISGARH	3	13	5420	4	12	1780	0	0	0	5	9	1833	12	34	9033
GUJARAT	0	0	0	4	19	3430	2	5	400	3	11	6020	9	35	9850
MADHYA PRADESH	1	10	3260	3	17	2932.5	0	0	0	0	0	0	4	27	6192.5

Region/State	Central Sector			State Sector			Private Utility			Private IPP's			Total		
	No. of Stations	No. of Units	Installed Capacity (MW)	No. of Stations	NO. of Units	Installed Capacity (MW)	No. of Stations	No. of Units	Installed Capacity (MW)	No. of Stations	No. of Units	Installed Capacity (MW)	No. of Stations	No. of Units	Installed Capacity (MW)
MAHARASHTRA	0	0	0	7	33	8400	2	6	1900	3	12	1986	12	51	12286
TOTAL COAL	4	23	8680	18	81	81	4	11	2300	11	32	9839	37	147	37361.5
LIGNITE															
GUJARAT	0	0	0	2	6	540	0	0	0	1	4	500	3	10	1040
TOTAL LIGNITE	0	0	0	2	6	6	0	0	0	1	4	500	3	10	1040
TOTAL WESTERN REGION	4	23	8680	20	87	17082.5	4	11	2300	36	36	10339	40	157	38402
SOUTHERN REGION															
COAL															
ANDHRA PRADESH	2	11	4600	6	25	5092.5	0	0	0	1	1	150	9	37	9842.5
KARNATAKA	0	0	0	2	10	2720	0	0	0	3	6	2060	5	16	4780
TAMIL NADU	1	1	500	4	17	2970	0	0	0	0	0	0	5	18	3470
TOTAL COAL	3	12	5100	12	52	52	0	0	0	4	7	2210	19	71	18092.5
LIGNITE															
TAMIL NADU	4	19	2740	0	0	0	0	0	0	1	1	250	5	20	2990
TOTAL LIGNITE	4	19	2740	0	0	0	0	0	0	1	1	250	5	20	2990
TOTAL SOUTHERN REGION	7	31	7840	12	52	10782.5	0	0	0	8	8	2460	24	91	21083
EASTERN REGION															
COAL															
BIHAR	2	9	2560	1	2	210	0	0	0	0	0	0	3	11	2770
JHARKHAND	3	9	2020	2	12	1190	0	0	0	2	5	885	7	26	4095
ORISSA	2	12	3470	1	2	420	0	0	0	1	3	1800	4	17	5690
WEST BENGAL	4	18	5780	6	31	4970	4	13	1285	0	0	0	14	60	12035
TOTAL COAL	11	48	13830	10	45	45	4	13	1285	3	8	2685	28	114	24590
TOTAL EASTERN	11	48	13830	10	45	6850	4	13	1285	8	8	2685	28	114	24590

Region/State	Central Sector			State Sector			Private Utility			Private IPP's			Total		
	No. of Stations	No. of Units	Installed Capacity (MW)	No. of Stations	NO. of Units	Installed Capacity (MW)	No. of Stations	No. of Units	Installed Capacity (MW)	No. of Stations	No. of Units	Installed Capacity (MW)	No. of Stations	No. of Units	Installed Capacity (MW)
REGION															
NORTH EASTERN REGION															
MULTI FUEL															
ASSAM	0	0	0	1	2	60	0	0	0	0	0	0	1	2	60
TOTAL MULTI FUEL	0	0	0	1	2	2	0	0	0	0	0	0	1	2	60
TOTAL NORTH EASTERN REGION	0	0	0	1	2	60	0	0	0	0	0	0	1	2	60
ALL INDIA TOTAL	30	137	39615	59	256	48353	8	24	3585	29	73	20059	126	490	111612*

*Note: -410MW Capacity are of less than 25 MW and not included.

Annexure-1.5

Sheet _ OF 9

DETAILS OF DIFFERENT MAKE OF UNITS CONSIDERED IN THE REVIEW 2011-12

S. NO	NAME	UNIT NO	STATE	ORGANIZATION NAME	SECTOR	CAPACITY (MW)
BHEL/ABL						
1	AMARKANTAK EXT TPS	1	MADHYA PRADESH	MPPGCL	STATE	120
2	AMARKANTAK EXT TPS	2	MADHYA PRADESH	MPPGCL	STATE	120
3	BANDEL TPS	5	WEST BENGAL	WBPDC	STATE	210
4	BOKARO `B` TPS	1	JHARKHAND	DVC	CENTRAL	210
5	BOKARO `B` TPS	2	JHARKHAND	DVC	CENTRAL	210
6	BOKARO `B` TPS	3	JHARKHAND	DVC	CENTRAL	210
7	CHANDRAPUR(MAHARASHTRA) STPS	1	MAHARASHTRA	MAHAGENCO	STATE	210
8	CHANDRAPUR(MAHARASHTRA) STPS	2	MAHARASHTRA	MAHAGENCO	STATE	210
9	D.P.L. TPS	6	WEST BENGAL	DPL	STATE	110
10	KOLAGHAT TPS	1	WEST BENGAL	WBPDC	STATE	210
11	KOLAGHAT TPS	2	WEST BENGAL	WBPDC	STATE	210
12	KOLAGHAT TPS	3	WEST BENGAL	WBPDC	STATE	210
13	KOLAGHAT TPS	4	WEST BENGAL	WBPDC	STATE	210
14	KORBA-III	1	CHHATTISGARH	CSPGCL	STATE	120
15	KORBA-WEST TPS	3	CHHATTISGARH	CSPGCL	STATE	210
16	KORBA-WEST TPS	4	CHHATTISGARH	CSPGCL	STATE	210
17	SANTALDIH TPS	1	WEST BENGAL	WBPDC	STATE	120
18	SANTALDIH TPS	2	WEST BENGAL	WBPDC	STATE	120
19	SANTALDIH TPS	3	WEST BENGAL	WBPDC	STATE	120
20	SANTALDIH TPS	4	WEST BENGAL	WBPDC	STATE	120
Sub Total			20			3470
BHEL/BHEL						
21	AMARKANTAK EXT TPS	3	MADHYA PRADESH	MPPGCL	STATE	210
22	ANPARA TPS	1	UTTAR PRADESH	UPRVUNL	STATE	210
23	ANPARA TPS	2	UTTAR PRADESH	UPRVUNL	STATE	210
24	ANPARA TPS	3	UTTAR PRADESH	UPRVUNL	STATE	210
25	BADARPUR TPS	1	DELHI	NTPC Ltd.	CENTRAL	95
26	BADARPUR TPS	2	DELHI	NTPC Ltd.	CENTRAL	95
27	BADARPUR TPS	3	DELHI	NTPC Ltd.	CENTRAL	95
28	BADARPUR TPS	4	DELHI	NTPC Ltd.	CENTRAL	210
29	BADARPUR TPS	5	DELHI	NTPC Ltd.	CENTRAL	210
30	BARAUNI TPS	6	BIHAR	BSEB	STATE	105
31	BARAUNI TPS	7	BIHAR	BSEB	STATE	105
32	BARSINGSAR LIGNITE	1	RAJASTHAN	NLC	CENTRAL	125
33	BARSINGSAR LIGNITE	2	RAJASTHAN	NLC	CENTRAL	125
34	BELLARY TPS	1	KARNATAKA	KPCL	STATE	500
35	BHILAI TPS	1	CHHATTISGARH	NSPCL	CENTRAL	250
36	BHILAI TPS	2	CHHATTISGARH	NSPCL	CENTRAL	250
37	BHUSAWAL TPS	2	MAHARASHTRA	MAHAGENCO	STATE	210
38	BHUSAWAL TPS	3	MAHARASHTRA	MAHAGENCO	STATE	210
39	BUDGE BUDGE TPS	3	WEST BENGAL	CESC	PVT	250
40	CHANDRAPUR(ASSAM) TPS	2	ASSAM	APGPCL	STATE	30
41	CHANDRAPUR(MAHARASHTRA) STPS	3	MAHARASHTRA	MAHAGENCO	STATE	210
42	CHANDRAPUR(MAHARASHTRA) STPS	4	MAHARASHTRA	MAHAGENCO	STATE	210
43	CHANDRAPUR(MAHARASHTRA) STPS	5	MAHARASHTRA	MAHAGENCO	STATE	500
44	CHANDRAPUR(MAHARASHTRA) STPS	6	MAHARASHTRA	MAHAGENCO	STATE	500
45	CHANDRAPUR(MAHARASHTRA) STPS	7	MAHARASHTRA	MAHAGENCO	STATE	500
46	CHANDRAPURA(DVC) TPS	7	JHARKHAND	DVC	CENTRAL	250
47	CHANDRAPURA(DVC) TPS	8	JHARKHAND	DVC	CENTRAL	250
48	CHHABRA TPP	1	RAJASTHAN	RRVUNL	STATE	250
49	DADRI (NCTPP)	1	UTTAR PRADESH	NTPC Ltd.	CENTRAL	210
50	DADRI (NCTPP)	2	UTTAR PRADESH	NTPC Ltd.	CENTRAL	210
51	DADRI (NCTPP)	3	UTTAR PRADESH	NTPC Ltd.	CENTRAL	210

Annexure-1.5

Sheet _ OF 9

DETAILS OF DIFFERENT MAKE OF UNITS CONSIDERED IN THE REVIEW 2011-12

S. NO	NAME	UNIT NO	STATE	ORGANIZATION NAME	SECTOR	CAPACITY (MW)
52	DADRI (NCTPP)	4	UTTAR PRADESH	NTPC Ltd.	CENTRAL	210
53	DADRI (NCTPP)	5	UTTAR PRADESH	NTPC Ltd.	CENTRAL	490
54	DADRI (NCTPP)	6	UTTAR PRADESH	NTPC Ltd.	CENTRAL	490
55	DAHANU TPS	1	MAHARASHTRA	RIL (DAHANU)	PVT	250
56	DAHANU TPS	2	MAHARASHTRA	RIL (DAHANU)	PVT	250
57	DSPM TPS	1	CHHATTISGARH	CSPGCL	STATE	250
58	DSPM TPS	2	CHHATTISGARH	CSPGCL	STATE	250
59	DURGAPUR TPS	4	WEST BENGAL	DVC	CENTRAL	210
60	Dr. N.TATA RAO TPS	1	ANDHRA PRADESH	APGENCO	STATE	210
61	Dr. N.TATA RAO TPS	2	ANDHRA PRADESH	APGENCO	STATE	210
62	Dr. N.TATA RAO TPS	3	ANDHRA PRADESH	APGENCO	STATE	210
63	Dr. N.TATA RAO TPS	4	ANDHRA PRADESH	APGENCO	STATE	210
64	Dr. N.TATA RAO TPS	5	ANDHRA PRADESH	APGENCO	STATE	210
65	Dr. N.TATA RAO TPS	6	ANDHRA PRADESH	APGENCO	STATE	210
66	Dr. N.TATA RAO TPS	7	ANDHRA PRADESH	APGENCO	STATE	500
67	ENNORE TPS	5	TAMIL NADU	TNGDCL	STATE	110
68	FARAKKA STPS	1	WEST BENGAL	NTPC Ltd.	CENTRAL	200
69	FARAKKA STPS	2	WEST BENGAL	NTPC Ltd.	CENTRAL	200
70	FARAKKA STPS	3	WEST BENGAL	NTPC Ltd.	CENTRAL	200
71	GANDHI NAGAR TPS	1	GUJARAT	GSECL	STATE	120
72	GANDHI NAGAR TPS	2	GUJARAT	GSECL	STATE	120
73	GANDHI NAGAR TPS	3	GUJARAT	GSECL	STATE	210
74	GANDHI NAGAR TPS	4	GUJARAT	GSECL	STATE	210
75	GANDHI NAGAR TPS	5	GUJARAT	GSECL	STATE	210
76	GH TPS (LEH.MOH.)	1	PUNJAB	PSPCL	STATE	210
77	GH TPS (LEH.MOH.)	2	PUNJAB	PSPCL	STATE	210
78	GH TPS (LEH.MOH.)	3	PUNJAB	PSPCL	STATE	250
79	GH TPS (LEH.MOH.)	4	PUNJAB	PSPCL	STATE	250
80	GIRAL TPS	1	RAJASTHAN	RRVUNL	STATE	125
81	GIRAL TPS	2	RAJASTHAN	RRVUNL	STATE	125
82	GND TPS(BHATINDA)	1	PUNJAB	PSPCL	STATE	110
83	GND TPS(BHATINDA)	2	PUNJAB	PSPCL	STATE	110
84	GND TPS(BHATINDA)	3	PUNJAB	PSPCL	STATE	110
85	GND TPS(BHATINDA)	4	PUNJAB	PSPCL	STATE	110
86	HARDUAGANJ TPS	5	UTTAR PRADESH	UPRVUNL	STATE	60
87	HARDUAGANJ TPS	7	UTTAR PRADESH	UPRVUNL	STATE	105
88	HARDUAGANJ TPS	8	UTTAR PRADESH	UPRVUNL	STATE	250
89	IB VALLEY TPS	1	ORISSA	OPGC	STATE	210
90	IB VALLEY TPS	2	ORISSA	OPGC	STATE	210
91	INDIRA GANDHI STPP	1	HARYANA	APCPL	CENTRAL	500
92	JOJOBERA TPS	1	JHARKHAND	TATA PCL	PVT	120
93	JOJOBERA TPS	2	JHARKHAND	TATA PCL	PVT	120
94	JOJOBERA TPS	3	JHARKHAND	TATA PCL	PVT	120
95	KAHALGAON TPS	5	BIHAR	NTPC Ltd.	CENTRAL	500
96	KAHALGAON TPS	6	BIHAR	NTPC Ltd.	CENTRAL	500
97	KAHALGAON TPS	7	BIHAR	NTPC Ltd.	CENTRAL	500
98	KAKATIYA TPS	1	ANDHRA PRADESH	APGENCO	STATE	500
99	KHAPARKHEDA TPS	1	MAHARASHTRA	MAHAGENCO	STATE	210
100	KHAPARKHEDA TPS	2	MAHARASHTRA	MAHAGENCO	STATE	210
101	KHAPARKHEDA TPS	3	MAHARASHTRA	MAHAGENCO	STATE	210
102	KHAPARKHEDA TPS	4	MAHARASHTRA	MAHAGENCO	STATE	210
103	KOLAGHAT TPS	5	WEST BENGAL	WBPDCL	STATE	210
104	KOLAGHAT TPS	6	WEST BENGAL	WBPDCL	STATE	210
105	KORADI TPS	5	MAHARASHTRA	MAHAGENCO	STATE	200
106	KORADI TPS	6	MAHARASHTRA	MAHAGENCO	STATE	210
107	KORADI TPS	7	MAHARASHTRA	MAHAGENCO	STATE	210
108	KORBA STPS	1	CHHATTISGARH	NTPC Ltd.	CENTRAL	200
109	KORBA STPS	2	CHHATTISGARH	NTPC Ltd.	CENTRAL	200
110	KORBA STPS	3	CHHATTISGARH	NTPC Ltd.	CENTRAL	200
111	KORBA STPS	4	CHHATTISGARH	NTPC Ltd.	CENTRAL	500
112	KORBA STPS	5	CHHATTISGARH	NTPC Ltd.	CENTRAL	500
113	KORBA STPS	6	CHHATTISGARH	NTPC Ltd.	CENTRAL	500
114	KORBA STPS	7	CHHATTISGARH	NTPC Ltd.	CENTRAL	500

Annexure-1.5

Sheet _ OF 9

DETAILS OF DIFFERENT MAKE OF UNITS CONSIDERED IN THE REVIEW 2011-12

S. NO	NAME	UNIT NO	STATE	ORGANIZATION NAME	SECTOR	CAPACITY (MW)
115	KORBA-III	2	CHHATTISGARH	CSPGCL	STATE	120
116	KORBA-WEST TPS	1	CHHATTISGARH	CSPGCL	STATE	210
117	KORBA-WEST TPS	2	CHHATTISGARH	CSPGCL	STATE	210
118	KOTA TPS	1	RAJASTHAN	RRVUNL	STATE	110
119	KOTA TPS	2	RAJASTHAN	RRVUNL	STATE	110
120	KOTA TPS	3	RAJASTHAN	RRVUNL	STATE	210
121	KOTA TPS	4	RAJASTHAN	RRVUNL	STATE	210
122	KOTA TPS	5	RAJASTHAN	RRVUNL	STATE	210
123	KOTA TPS	6	RAJASTHAN	RRVUNL	STATE	195
124	KOTA TPS	7	RAJASTHAN	RRVUNL	STATE	195
125	KOTHAGUDEM TPS	5	ANDHRA PRADESH	APGENCO	STATE	120
126	KOTHAGUDEM TPS	6	ANDHRA PRADESH	APGENCO	STATE	120
127	KOTHAGUDEM TPS	7	ANDHRA PRADESH	APGENCO	STATE	120
128	KOTHAGUDEM TPS	8	ANDHRA PRADESH	APGENCO	STATE	120
129	KOTHAGUDEM TPS (NEW)	1	ANDHRA PRADESH	APGENCO	STATE	250
130	KOTHAGUDEM TPS (NEW)	2	ANDHRA PRADESH	APGENCO	STATE	250
131	KOTHAGUDEM TPS (NEW)	3	ANDHRA PRADESH	APGENCO	STATE	500
132	KUTCH LIG. TPS	1	GUJARAT	GSECL	STATE	70
133	KUTCH LIG. TPS	2	GUJARAT	GSECL	STATE	70
134	KUTCH LIG. TPS	4	GUJARAT	GSECL	STATE	75
135	MAITHON RB TPP	1	JHARKHAND	MPL	PVT	525
136	MEJIA TPS	1	WEST BENGAL	DVC	CENTRAL	210
137	MEJIA TPS	2	WEST BENGAL	DVC	CENTRAL	210
138	MEJIA TPS	3	WEST BENGAL	DVC	CENTRAL	210
139	MEJIA TPS	4	WEST BENGAL	DVC	CENTRAL	210
140	MEJIA TPS	5	WEST BENGAL	DVC	CENTRAL	250
141	MEJIA TPS	6	WEST BENGAL	DVC	CENTRAL	250
142	MEJIA TPS	7	WEST BENGAL	DVC	CENTRAL	500
143	METTUR TPS	1	TAMIL NADU	TNGDCL	STATE	210
144	METTUR TPS	2	TAMIL NADU	TNGDCL	STATE	210
145	METTUR TPS	3	TAMIL NADU	TNGDCL	STATE	210
146	METTUR TPS	4	TAMIL NADU	TNGDCL	STATE	210
147	MUZAFFARPUR TPS	1	BIHAR	K.B.U.N.L	CENTRAL	110
148	MUZAFFARPUR TPS	2	BIHAR	K.B.U.N.L	CENTRAL	110
149	NASIK TPS	3	MAHARASHTRA	MAHAGENCO	STATE	210
150	NASIK TPS	4	MAHARASHTRA	MAHAGENCO	STATE	210
151	NASIK TPS	5	MAHARASHTRA	MAHAGENCO	STATE	210
152	NEYVELI TPS-II	4	TAMIL NADU	NLC	CENTRAL	210
153	NEYVELI TPS-II	5	TAMIL NADU	NLC	CENTRAL	210
154	NEYVELI TPS-II	6	TAMIL NADU	NLC	CENTRAL	210
155	NEYVELI TPS-II	7	TAMIL NADU	NLC	CENTRAL	210
156	NORTH CHENNAI TPS	1	TAMIL NADU	TNGDCL	STATE	210
157	NORTH CHENNAI TPS	2	TAMIL NADU	TNGDCL	STATE	210
158	NORTH CHENNAI TPS	3	TAMIL NADU	TNGDCL	STATE	210
159	OBRA TPS	7	UTTAR PRADESH	UPRVUNL	STATE	94
160	OBRA TPS	8	UTTAR PRADESH	UPRVUNL	STATE	94
161	OBRA TPS	9	UTTAR PRADESH	UPRVUNL	STATE	200
162	OBRA TPS	10	UTTAR PRADESH	UPRVUNL	STATE	200
163	OBRA TPS	11	UTTAR PRADESH	UPRVUNL	STATE	200
164	OBRA TPS	12	UTTAR PRADESH	UPRVUNL	STATE	200
165	OBRA TPS	13	UTTAR PRADESH	UPRVUNL	STATE	200
166	OP JINDAL TPS	1	CHHATTISGARH	JPL	PVT	250
167	OP JINDAL TPS	2	CHHATTISGARH	JPL	PVT	250
168	OP JINDAL TPS	3	CHHATTISGARH	JPL	PVT	250
169	OP JINDAL TPS	4	CHHATTISGARH	JPL	PVT	250
170	PANIPAT TPS	1	HARYANA	HPGCL	STATE	110
171	PANIPAT TPS	2	HARYANA	HPGCL	STATE	110
172	PANIPAT TPS	3	HARYANA	HPGCL	STATE	110
173	PANIPAT TPS	4	HARYANA	HPGCL	STATE	110
174	PANIPAT TPS	5	HARYANA	HPGCL	STATE	210
175	PANIPAT TPS	6	HARYANA	HPGCL	STATE	210
176	PANIPAT TPS	7	HARYANA	HPGCL	STATE	250
177	PANIPAT TPS	8	HARYANA	HPGCL	STATE	250

Annexure-1.5

Sheet _ OF 9

DETAILS OF DIFFERENT MAKE OF UNITS CONSIDERED IN THE REVIEW 2011-12

S. NO	NAME	UNIT NO	STATE	ORGANIZATION NAME	SECTOR	CAPACITY (MW)
178	PANKI TPS	3	UTTAR PRADESH	UPRVUNL	STATE	105
179	PANKI TPS	4	UTTAR PRADESH	UPRVUNL	STATE	105
180	PARAS TPS	3	MAHARASHTRA	MAHAGENCO	STATE	250
181	PARAS TPS	4	MAHARASHTRA	MAHAGENCO	STATE	250
182	PARICHHA TPS	1	UTTAR PRADESH	UPRVUNL	STATE	110
183	PARICHHA TPS	2	UTTAR PRADESH	UPRVUNL	STATE	110
184	PARICHHA TPS	3	UTTAR PRADESH	UPRVUNL	STATE	210
185	PARICHHA TPS	4	UTTAR PRADESH	UPRVUNL	STATE	210
186	PARLI TPS	3	MAHARASHTRA	MAHAGENCO	STATE	210
187	PARLI TPS	4	MAHARASHTRA	MAHAGENCO	STATE	210
188	PARLI TPS	5	MAHARASHTRA	MAHAGENCO	STATE	210
189	PARLI TPS	6	MAHARASHTRA	MAHAGENCO	STATE	250
190	PARLI TPS	7	MAHARASHTRA	MAHAGENCO	STATE	250
191	PATRATU TPS	7	JHARKHAND	JSEB	STATE	105
192	PATRATU TPS	8	JHARKHAND	JSEB	STATE	105
193	PATRATU TPS	9	JHARKHAND	JSEB	STATE	110
194	PATRATU TPS	10	JHARKHAND	JSEB	STATE	110
195	RAICHUR TPS	1	KARNATAKA	KPCL	STATE	210
196	RAICHUR TPS	2	KARNATAKA	KPCL	STATE	210
197	RAICHUR TPS	3	KARNATAKA	KPCL	STATE	210
198	RAICHUR TPS	5	KARNATAKA	KPCL	STATE	210
199	RAICHUR TPS	6	KARNATAKA	KPCL	STATE	210
200	RAICHUR TPS	7	KARNATAKA	KPCL	STATE	210
201	RAICHUR TPS	8	KARNATAKA	KPCL	STATE	250
202	RAJGHAT TPS	1	DELHI	IPGPCL	STATE	67.5
203	RAJGHAT TPS	2	DELHI	IPGPCL	STATE	67.5
204	RAMAGUNDEM STPS	4	ANDHRA PRADESH	NTPC Ltd.	CENTRAL	500
205	RAMAGUNDEM STPS	5	ANDHRA PRADESH	NTPC Ltd.	CENTRAL	500
206	RAMAGUNDEM STPS	6	ANDHRA PRADESH	NTPC Ltd.	CENTRAL	500
207	RAMAGUNDEM STPS	7	ANDHRA PRADESH	NTPC Ltd.	CENTRAL	500
208	RAYALASEEMA TPS	1	ANDHRA PRADESH	APGENCO	STATE	210
209	RAYALASEEMA TPS	2	ANDHRA PRADESH	APGENCO	STATE	210
210	RAYALASEEMA TPS	3	ANDHRA PRADESH	APGENCO	STATE	210
211	RAYALASEEMA TPS	4	ANDHRA PRADESH	APGENCO	STATE	210
212	RAYALASEEMA TPS	5	ANDHRA PRADESH	APGENCO	STATE	210
213	RIHAND STPS	3	UTTAR PRADESH	NTPC Ltd.	CENTRAL	500
214	RIHAND STPS	4	UTTAR PRADESH	NTPC Ltd.	CENTRAL	500
215	ROPAR TPS	1	PUNJAB	PSPCL	STATE	210
216	ROPAR TPS	2	PUNJAB	PSPCL	STATE	210
217	ROPAR TPS	3	PUNJAB	PSPCL	STATE	210
218	ROPAR TPS	4	PUNJAB	PSPCL	STATE	210
219	ROPAR TPS	5	PUNJAB	PSPCL	STATE	210
220	ROPAR TPS	6	PUNJAB	PSPCL	STATE	210
221	SABARMATI (D-F STATIONS)	1	GUJARAT	TOR. POW. (AECO)	PVT	120
222	SABARMATI (D-F STATIONS)	2	GUJARAT	TOR. POW. (AECO)	PVT	110
223	SABARMATI (D-F STATIONS)	3	GUJARAT	TOR. POW. (AECO)	PVT	110
224	SANJAY GANDHI TPS	1	MADHYA PRADESH	MPPGCL	STATE	210
225	SANJAY GANDHI TPS	2	MADHYA PRADESH	MPPGCL	STATE	210
226	SANJAY GANDHI TPS	3	MADHYA PRADESH	MPPGCL	STATE	210
227	SANJAY GANDHI TPS	4	MADHYA PRADESH	MPPGCL	STATE	210
228	SANJAY GANDHI TPS	5	MADHYA PRADESH	MPPGCL	STATE	500
229	SANTALDIH TPS	5	WEST BENGAL	WBPDC	STATE	250
230	SANTALDIH TPS	6	WEST BENGAL	WBPDC	STATE	250
231	SATPURA TPS	6	MADHYA PRADESH	MPPGCL	STATE	200
232	SATPURA TPS	7	MADHYA PRADESH	MPPGCL	STATE	210
233	SATPURA TPS	8	MADHYA PRADESH	MPPGCL	STATE	210
234	SATPURA TPS	9	MADHYA PRADESH	MPPGCL	STATE	210
235	SIKKA REP. TPS	1	GUJARAT	GSECL	STATE	120
236	SIKKA REP. TPS	2	GUJARAT	GSECL	STATE	120
237	SIMHADRI	1	ANDHRA PRADESH	NTPC Ltd.	CENTRAL	500

Annexure-1.5

Sheet _ OF 9

DETAILS OF DIFFERENT MAKE OF UNITS CONSIDERED IN THE REVIEW 2011-12

S. NO	NAME	UNIT NO	STATE	ORGANIZATION NAME	SECTOR	CAPACITY (MW)
238	SIMHADRI	2	ANDHRA PRADESH	NTPC Ltd.	CENTRAL	500
239	SIMHADRI	3	ANDHRA PRADESH	NTPC Ltd.	CENTRAL	500
240	SINGRAULI STPS	1	UTTAR PRADESH	NTPC Ltd.	CENTRAL	200
241	SINGRAULI STPS	2	UTTAR PRADESH	NTPC Ltd.	CENTRAL	200
242	SINGRAULI STPS	3	UTTAR PRADESH	NTPC Ltd.	CENTRAL	200
243	SINGRAULI STPS	4	UTTAR PRADESH	NTPC Ltd.	CENTRAL	200
244	SINGRAULI STPS	5	UTTAR PRADESH	NTPC Ltd.	CENTRAL	200
245	SINGRAULI STPS	6	UTTAR PRADESH	NTPC Ltd.	CENTRAL	500
246	SINGRAULI STPS	7	UTTAR PRADESH	NTPC Ltd.	CENTRAL	500
247	SIPAT STPS	4	CHHATTISGARH	NTPC Ltd.	CENTRAL	500
248	SIPAT STPS	5	CHHATTISGARH	NTPC Ltd.	CENTRAL	500
249	SOUTHERN REPL. TPS	1	WEST BENGAL	CESC	PVT	67.5
250	SOUTHERN REPL. TPS	2	WEST BENGAL	CESC	PVT	67.5
251	SURAT LIG. TPS	1	GUJARAT	GIPCL	PVT	125
252	SURAT LIG. TPS	2	GUJARAT	GIPCL	PVT	125
253	SURAT LIG. TPS	3	GUJARAT	GIPCL	PVT	125
254	SURAT LIG. TPS	4	GUJARAT	GIPCL	PVT	125
255	SURATGARH TPS	1	RAJASTHAN	RRVUNL	STATE	250
256	SURATGARH TPS	2	RAJASTHAN	RRVUNL	STATE	250
257	SURATGARH TPS	3	RAJASTHAN	RRVUNL	STATE	250
258	SURATGARH TPS	4	RAJASTHAN	RRVUNL	STATE	250
259	SURATGARH TPS	5	RAJASTHAN	RRVUNL	STATE	250
260	SURATGARH TPS	6	RAJASTHAN	RRVUNL	STATE	250
261	TALCHER (OLD) TPS	5	ORISSA	NTPC Ltd.	CENTRAL	110
262	TALCHER (OLD) TPS	6	ORISSA	NTPC Ltd.	CENTRAL	110
263	TALCHER STPS	3	ORISSA	NTPC Ltd.	CENTRAL	500
264	TALCHER STPS	4	ORISSA	NTPC Ltd.	CENTRAL	500
265	TALCHER STPS	5	ORISSA	NTPC Ltd.	CENTRAL	500
266	TALCHER STPS	6	ORISSA	NTPC Ltd.	CENTRAL	500
267	TANDA TPS	1	UTTAR PRADESH	NTPC Ltd.	CENTRAL	110
268	TANDA TPS	2	UTTAR PRADESH	NTPC Ltd.	CENTRAL	110
269	TANDA TPS	3	UTTAR PRADESH	NTPC Ltd.	CENTRAL	110
270	TANDA TPS	4	UTTAR PRADESH	NTPC Ltd.	CENTRAL	110
271	TENUGHAT TPS	1	JHARKHAND	TVNL	STATE	210
272	TENUGHAT TPS	2	JHARKHAND	TVNL	STATE	210
273	TORANGALLU TPS(SBU-I)	1	KARNATAKA	JSWEL	PVT	130
274	TORANGALLU TPS(SBU-I)	2	KARNATAKA	JSWEL	PVT	130
275	TROMBAY TPS	5	MAHARASHTRA	TATA PCL	PVT	500
276	TROMBAY TPS	6	MAHARASHTRA	TATA PCL	PVT	500
277	TROMBAY TPS	8	MAHARASHTRA	TATA PCL	PVT	250
278	TUTICORIN TPS	1	TAMIL NADU	TNGDCL	STATE	210
279	TUTICORIN TPS	2	TAMIL NADU	TNGDCL	STATE	210
280	TUTICORIN TPS	3	TAMIL NADU	TNGDCL	STATE	210
281	TUTICORIN TPS	4	TAMIL NADU	TNGDCL	STATE	210
282	TUTICORIN TPS	5	TAMIL NADU	TNGDCL	STATE	210
283	UKAI TPS	1	GUJARAT	GSECL	STATE	120
284	UKAI TPS	2	GUJARAT	GSECL	STATE	120
285	UKAI TPS	3	GUJARAT	GSECL	STATE	200
286	UKAI TPS	4	GUJARAT	GSECL	STATE	200
287	UKAI TPS	5	GUJARAT	GSECL	STATE	210
288	UNCHAHAHAR TPS	1	UTTAR PRADESH	NTPC Ltd.	CENTRAL	210
289	UNCHAHAHAR TPS	2	UTTAR PRADESH	NTPC Ltd.	CENTRAL	210
290	UNCHAHAHAR TPS	3	UTTAR PRADESH	NTPC Ltd.	CENTRAL	210
291	UNCHAHAHAR TPS	4	UTTAR PRADESH	NTPC Ltd.	CENTRAL	210
292	UNCHAHAHAR TPS	5	UTTAR PRADESH	NTPC Ltd.	CENTRAL	210
293	VINDHYACHAL STPS	7	MADHYA PRADESH	NTPC Ltd.	CENTRAL	500
294	VINDHYACHAL STPS	8	MADHYA PRADESH	NTPC Ltd.	CENTRAL	500
295	VINDHYACHAL STPS	9	MADHYA PRADESH	NTPC Ltd.	CENTRAL	500
296	VINDHYACHAL STPS	10	MADHYA PRADESH	NTPC Ltd.	CENTRAL	500
297	WANAKBORI TPS	1	GUJARAT	GSECL	STATE	210
298	WANAKBORI TPS	2	GUJARAT	GSECL	STATE	210
299	WANAKBORI TPS	3	GUJARAT	GSECL	STATE	210
300	WANAKBORI TPS	4	GUJARAT	GSECL	STATE	210

Annexure-1.5

Sheet _ OF 9

DETAILS OF DIFFERENT MAKE OF UNITS CONSIDERED IN THE REVIEW 2011-12

S. NO	NAME	UNIT NO	STATE	ORGANIZATION NAME	SECTOR	CAPACITY (MW)
301	WANAKBORI TPS	5	GUJARAT	GSECL	STATE	210
302	WANAKBORI TPS	6	GUJARAT	GSECL	STATE	210
303	WANAKBORI TPS	7	GUJARAT	GSECL	STATE	210
Sub Total		283				65838
CHINA/CHINA						
304	D.P.L. TPS	7	WEST BENGAL	DPL	STATE	300
305	JALIPA KAPURDI TPP	1	RAJASTHAN	RWPL (JSW)	PVT	135
306	JALIPA KAPURDI TPP	2	RAJASTHAN	RWPL (JSW)	PVT	135
307	JALIPA KAPURDI TPP	3	RAJASTHAN	RWPL (JSW)	PVT	135
308	JALIPA KAPURDI TPP	4	RAJASTHAN	RWPL (JSW)	PVT	135
309	JSW RATNAGIRI TPP	1	MAHARASHTRA	JSWEL	PVT	300
310	JSW RATNAGIRI TPP	2	MAHARASHTRA	JSWEL	PVT	300
311	JSW RATNAGIRI TPP	3	MAHARASHTRA	JSWEL	PVT	300
312	JSW RATNAGIRI TPP	4	MAHARASHTRA	JSWEL	PVT	300
313	MUNDRA TPS	1	GUJARAT	APL	PVT	330
314	MUNDRA TPS	2	GUJARAT	APL	PVT	330
315	MUNDRA TPS	3	GUJARAT	APL	PVT	330
316	MUNDRA TPS	4	GUJARAT	APL	PVT	330
317	MUNDRA TPS	5	GUJARAT	APL	PVT	660
318	MUNDRA TPS	6	GUJARAT	APL	PVT	660
319	MUNDRA TPS	7	GUJARAT	APL	PVT	660
320	PATHADI TPP	1	CHHATTISGARH	LANCO	PVT	300
321	PATHADI TPP	2	CHHATTISGARH	LANCO	PVT	300
322	RAJIV GANDHI TPS	1	HARYANA	HPGCL	STATE	600
323	RAJIV GANDHI TPS	2	HARYANA	HPGCL	STATE	600
324	ROSA TPP Ph-I	1	UTTAR PRADESH	RPSCCL	PVT	300
325	ROSA TPP Ph-I	2	UTTAR PRADESH	RPSCCL	PVT	300
326	ROSA TPP Ph-I	3	UTTAR PRADESH	RPSCCL	PVT	300
327	SAGARDIGHI TPS	1	WEST BENGAL	WBPDC	STATE	300
328	SAGARDIGHI TPS	2	WEST BENGAL	WBPDC	STATE	300
329	STERLITE TPP	1	ORISSA	SEL	PVT	600
330	STERLITE TPP	2	ORISSA	SEL	PVT	600
331	STERLITE TPP	3	ORISSA	SEL	PVT	600
332	TORANGALLU TPS(SBU-II)	3	KARNATAKA	JSWEL	PVT	300
333	TORANGALLU TPS(SBU-II)	4	KARNATAKA	JSWEL	PVT	300
334	UDUPI TPP	1	KARNATAKA	UPCL	PVT	600
335	WARDHA WARORA TPP	1	MAHARASHTRA	WPCL	PVT	135
336	WARDHA WARORA TPP	2	MAHARASHTRA	WPCL	PVT	135
337	WARDHA WARORA TPP	3	MAHARASHTRA	WPCL	PVT	135
338	YAMUNA NAGAR TPS	1	HARYANA	HPGCL	STATE	300
339	YAMUNA NAGAR TPS	2	HARYANA	HPGCL	STATE	300
Sub Total		36				12645
OTHERS/OTHERS						
340	AKRIMOTA LIG TPS	1	GUJARAT	GMDCL	STATE	125
341	AKRIMOTA LIG TPS	2	GUJARAT	GMDCL	STATE	125
342	ANPARA TPS	4	UTTAR PRADESH	UPRVUNL	STATE	500
343	ANPARA TPS	5	UTTAR PRADESH	UPRVUNL	STATE	500
344	BAKRESWAR TPS	1	WEST BENGAL	WBPDC	STATE	210
345	BAKRESWAR TPS	2	WEST BENGAL	WBPDC	STATE	210
346	BAKRESWAR TPS	3	WEST BENGAL	WBPDC	STATE	210
347	BAKRESWAR TPS	4	WEST BENGAL	WBPDC	STATE	210
348	BAKRESWAR TPS	5	WEST BENGAL	WBPDC	STATE	210
349	BANDEL TPS	1	WEST BENGAL	WBPDC	STATE	60
350	BANDEL TPS	2	WEST BENGAL	WBPDC	STATE	60
351	BANDEL TPS	3	WEST BENGAL	WBPDC	STATE	60
352	BANDEL TPS	4	WEST BENGAL	WBPDC	STATE	60
353	BARAUNI TPS	4	BIHAR	BSEB	STATE	50
354	BARAUNI TPS	5	BIHAR	BSEB	STATE	50
355	BHUSAWAL TPS	1	MAHARASHTRA	MAHAGENCO	STATE	50
356	BUDGE BUDGE TPS	1	WEST BENGAL	CESC	PVT	250
357	BUDGE BUDGE TPS	2	WEST BENGAL	CESC	PVT	250
358	CHANDRAPUR(ASSAM) TPS	1	ASSAM	APGPCL	STATE	30

Annexure-1.5

Sheet _ OF 9

DETAILS OF DIFFERENT MAKE OF UNITS CONSIDERED IN THE REVIEW 2011-12

S. NO	NAME	UNIT NO	STATE	ORGANIZATION NAME	SECTOR	CAPACITY (MW)
359	CHANDRAPURA(DVC) TPS	1	JHARKHAND	DVC	CENTRAL	130
360	CHANDRAPURA(DVC) TPS	2	JHARKHAND	DVC	CENTRAL	130
361	CHANDRAPURA(DVC) TPS	3	JHARKHAND	DVC	CENTRAL	130
362	D.P.L. TPS	1	WEST BENGAL	DPL	STATE	30
363	D.P.L. TPS	2	WEST BENGAL	DPL	STATE	30
364	D.P.L. TPS	3	WEST BENGAL	DPL	STATE	70
365	D.P.L. TPS	4	WEST BENGAL	DPL	STATE	75
366	D.P.L. TPS	5	WEST BENGAL	DPL	STATE	75
367	DURGAPUR TPS	3	WEST BENGAL	DVC	CENTRAL	130
368	ENNORE TPS	1	TAMIL NADU	TNGDCL	STATE	60
369	ENNORE TPS	2	TAMIL NADU	TNGDCL	STATE	60
370	ENNORE TPS	3	TAMIL NADU	TNGDCL	STATE	110
371	ENNORE TPS	4	TAMIL NADU	TNGDCL	STATE	110
372	FARAKKA STPS	4	WEST BENGAL	NTPC Ltd.	CENTRAL	500
373	FARAKKA STPS	5	WEST BENGAL	NTPC Ltd.	CENTRAL	500
374	KATGHORA TPP	1	CHHATTISGARH	VESPL	PVT	35
375	KHAMBARKHERA TPS	2	UTTAR PRADESH	BEPL	PVT	45
376	KORADI TPS	1	MAHARASHTRA	MAHAGENCO	STATE	105
377	KORADI TPS	2	MAHARASHTRA	MAHAGENCO	STATE	105
378	KORADI TPS	3	MAHARASHTRA	MAHAGENCO	STATE	105
379	KORADI TPS	4	MAHARASHTRA	MAHAGENCO	STATE	105
380	KOTHAGUDEM TPS	1	ANDHRA PRADESH	APGENCO	STATE	60
381	KOTHAGUDEM TPS	2	ANDHRA PRADESH	APGENCO	STATE	60
382	KOTHAGUDEM TPS	3	ANDHRA PRADESH	APGENCO	STATE	60
383	KOTHAGUDEM TPS	4	ANDHRA PRADESH	APGENCO	STATE	60
384	KUTCH LIG. TPS	3	GUJARAT	GSECL	STATE	75
385	NASIK TPS	1	MAHARASHTRA	MAHAGENCO	STATE	125
386	NASIK TPS	2	MAHARASHTRA	MAHAGENCO	STATE	125
387	NEW COSSIPORE TPS	1	WEST BENGAL	CESC	PVT	30
388	NEW COSSIPORE TPS	2	WEST BENGAL	CESC	PVT	30
389	NEW COSSIPORE TPS	3	WEST BENGAL	CESC	PVT	50
390	NEW COSSIPORE TPS	4	WEST BENGAL	CESC	PVT	50
391	NEYVELI (EXT) TPS	1	TAMIL NADU	NLC	CENTRAL	210
392	NEYVELI (EXT) TPS	2	TAMIL NADU	NLC	CENTRAL	210
393	NEYVELI TPS(Z)	1	TAMIL NADU	ST-CMSECP	PVT	250
394	NEYVELI TPS-II	1	TAMIL NADU	NLC	CENTRAL	210
395	NEYVELI TPS-II	2	TAMIL NADU	NLC	CENTRAL	210
396	NEYVELI TPS-II	3	TAMIL NADU	NLC	CENTRAL	210
397	PARAS TPS	2	MAHARASHTRA	MAHAGENCO	STATE	55
398	RAICHUR TPS	4	KARNATAKA	KPCL	STATE	210
399	RAMAGUNDEM - B TPS	1	ANDHRA PRADESH	APGENCO	STATE	62.5
400	RAMAGUNDEM STPS	1	ANDHRA PRADESH	NTPC Ltd.	CENTRAL	200
401	RAMAGUNDEM STPS	2	ANDHRA PRADESH	NTPC Ltd.	CENTRAL	200
402	RAMAGUNDEM STPS	3	ANDHRA PRADESH	NTPC Ltd.	CENTRAL	200
403	RIHAND STPS	1	UTTAR PRADESH	NTPC Ltd.	CENTRAL	500
404	RIHAND STPS	2	UTTAR PRADESH	NTPC Ltd.	CENTRAL	500
405	SABARMATI (C STATION)	15	GUJARAT	TOR. POW. (AECO)	PVT	30
406	SABARMATI (C STATION)	16	GUJARAT	TOR. POW. (AECO)	PVT	30
407	SATPURA TPS	1	MADHYA PRADESH	MPPGCL	STATE	62.5
408	SATPURA TPS	2	MADHYA PRADESH	MPPGCL	STATE	62.5
409	SATPURA TPS	3	MADHYA PRADESH	MPPGCL	STATE	62.5
410	SATPURA TPS	4	MADHYA PRADESH	MPPGCL	STATE	62.5
411	SATPURA TPS	5	MADHYA PRADESH	MPPGCL	STATE	62.5
412	SIPAT STPS	1	CHHATTISGARH	NTPC Ltd.	CENTRAL	660
413	TALCHER (OLD) TPS	1	ORISSA	NTPC Ltd.	CENTRAL	62.5
414	TALCHER (OLD) TPS	2	ORISSA	NTPC Ltd.	CENTRAL	62.5
415	TALCHER (OLD) TPS	3	ORISSA	NTPC Ltd.	CENTRAL	62.5
416	TALCHER (OLD) TPS	4	ORISSA	NTPC Ltd.	CENTRAL	62.5
417	TALCHER STPS	1	ORISSA	NTPC Ltd.	CENTRAL	500
418	TALCHER STPS	2	ORISSA	NTPC Ltd.	CENTRAL	500
419	TITAGARH TPS	1	WEST BENGAL	CESC	PVT	60

Annexure-1.5

Sheet _ OF 9

DETAILS OF DIFFERENT MAKE OF UNITS CONSIDERED IN THE REVIEW 2011-12

S. NO	NAME	UNIT NO	STATE	ORGANIZATION NAME	SECTOR	CAPACITY (MW)
420	TITAGARH TPS	2	WEST BENGAL	CESC	PVT	60
421	TITAGARH TPS	3	WEST BENGAL	CESC	PVT	60
422	TITAGARH TPS	4	WEST BENGAL	CESC	PVT	60
423	TROMBAY TPS	4	MAHARASHTRA	TATA PCL	PVT	150
Sub Total		84				12485
RUSSIA/RUSSIA						
424	KAHALGAON TPS	1	BIHAR	NTPC Ltd.	CENTRAL	210
425	KAHALGAON TPS	2	BIHAR	NTPC Ltd.	CENTRAL	210
426	KAHALGAON TPS	3	BIHAR	NTPC Ltd.	CENTRAL	210
427	KAHALGAON TPS	4	BIHAR	NTPC Ltd.	CENTRAL	210
428	KORBA-II	1	CHHATTISGARH	CSPGCL	STATE	50
429	KORBA-II	2	CHHATTISGARH	CSPGCL	STATE	50
430	KORBA-II	3	CHHATTISGARH	CSPGCL	STATE	50
431	KORBA-II	4	CHHATTISGARH	CSPGCL	STATE	50
432	NEYVELI TPS- I	1	TAMIL NADU	NLC	CENTRAL	50
433	NEYVELI TPS- I	2	TAMIL NADU	NLC	CENTRAL	50
434	NEYVELI TPS- I	3	TAMIL NADU	NLC	CENTRAL	50
435	NEYVELI TPS- I	4	TAMIL NADU	NLC	CENTRAL	50
436	NEYVELI TPS- I	5	TAMIL NADU	NLC	CENTRAL	50
437	NEYVELI TPS- I	6	TAMIL NADU	NLC	CENTRAL	50
438	NEYVELI TPS- I	7	TAMIL NADU	NLC	CENTRAL	100
439	NEYVELI TPS- I	8	TAMIL NADU	NLC	CENTRAL	100
440	NEYVELI TPS- I	9	TAMIL NADU	NLC	CENTRAL	100
441	OBRA TPS	1	UTTAR PRADESH	UPRVUNL	STATE	40
442	OBRA TPS	2	UTTAR PRADESH	UPRVUNL	STATE	50
443	PATRATU TPS	1	JHARKHAND	JSEB	STATE	40
444	PATRATU TPS	2	JHARKHAND	JSEB	STATE	40
445	PATRATU TPS	3	JHARKHAND	JSEB	STATE	40
446	PATRATU TPS	4	JHARKHAND	JSEB	STATE	40
447	PATRATU TPS	5	JHARKHAND	JSEB	STATE	90
448	PATRATU TPS	6	JHARKHAND	JSEB	STATE	90
449	VINDHYACHAL STPS	1	MADHYA PRADESH	NTPC Ltd.	CENTRAL	210
450	VINDHYACHAL STPS	2	MADHYA PRADESH	NTPC Ltd.	CENTRAL	210
451	VINDHYACHAL STPS	3	MADHYA PRADESH	NTPC Ltd.	CENTRAL	210
452	VINDHYACHAL STPS	4	MADHYA PRADESH	NTPC Ltd.	CENTRAL	210
453	VINDHYACHAL STPS	5	MADHYA PRADESH	NTPC Ltd.	CENTRAL	210
454	VINDHYACHAL STPS	6	MADHYA PRADESH	NTPC Ltd.	CENTRAL	210
Sub Total		31				3330
Total		454				97768

Annexure- 1.6**DETAILS OF NEW THERMAL POWER STATION WHICH COMMENCED THEIR OPERATION /
WERE COMBINED DURING 2011-12**

S.NO.	Name of the Station	Organisation	Sector	Location
New Stations added during 2011-12				
1	Mahatma Gandhi TPS	JHPL(HR)	PVT	Haryana
2	Anpara C TPS	LAPPL	PVT	Uttar Pradesh
3	Barkhera TPS	BEPL	PVT	Uttar Pradesh
4	Khambarkhera TPS	BEPL	PVT	Uttar Pradesh
5	Kundarki TPS	BEPL	PVT	Uttar Pradesh
6	Maqsoodpur TPS	BEPL	PVT	Uttar Pradesh
7	Utraula TPS	BEPL	PVT	Uttar Pradesh
8	Kasaipalli TPP	ACB	PVT	Chhattisgarh
9	Katghora TPP	VESPL	PVT	Chhattisgarh
10	SVPL TPP	SVPPL	PVT	Chhattisgarh
11	Mundra UMTTP	CGPL	PVT	Gujarat
12	Salaya TPP	EPGL	PVT	Gujarat
13	Mihan TPS	AMNEPL	PVT	Maharashtra
14	Simhapuri TPS	SEPL	PVT	Andhra Pradesh
15	Vallur TPP	NTECL	Central	Tamil Nadu
16	Maithon RB TPP	MPL	PVT	Jharkhand
17	Durgapur Steel TPS	DVC	Central	West Bengal
18	Neyveli TPS-II EXP	NLC	Central	Tamil Nadu
19	Kodarma TPP	DVC	Central	Jharkhand
*Note:- 1. Unit No. 1,2 of New Parli Station are renamed as Unit No. 6,7 of Parli Station (already existing)				
2. Unit No. 1,2 of Paras Exp. Station are renamed as Unit 3,4 of Paras Station(already existing).				

Annexure-1.7**DETAILS OF NEW UNITS COMMISSIONED BUT NOT CONSIDERED IN THE REVIEW 2011-12**

S. No.	Name of Station	Unit No	Organisation	Capacity (MW)	Make Boiler/Turbine	Date of Commissioning
Central Sector (2010-11)						
1	CHHABRA TPP	2	RRVUNL	250	BHEL/BHEL	04-May-10
2	FARAKKA STPS	6	NTPC Ltd.	500	BHEL/BHEL	23-Mar-11
3	MEJIA TPS	8	DVC	500	BHEL/BHEL	26-Mar-11
Central Sector (2011-12)						
4	ANPARA C TPS	1	LAPPL	600	DONGFANG CHINA/DONGFANG	15-Nov-11
5	ANPARA C TPS	2	LAPPL	600	DONGFANG CHINA/DONGFANG	12-Nov-11
6	BARKHERA TPS	1	BEPL	45	THYSSEN/SIEMENS INDIA	06-Nov-11
7	BARKHERA TPS	2	BEPL	45	THYSSEN/SIEMENS INDIA	28-Jan-12
8	BELLARY TPS	2	KPCL	500	BHEL/BHEL	23-Mar-12
9	BHUSAWAL TPS	4	MAHAGENCO	500	BHEL/BHEL	07-Mar-12
10	BHUSAWAL TPS	5	MAHAGENCO	500	BHEL/BHEL	30-Mar-12
11	DURGAPUR STEEL TPS	1	DVC	500	BHEL/BHEL	29-Jul-11
12	DURGAPUR STEEL TPS	2	DVC	500	BHEL/BHEL	23-Mar-12
13	INDIRA GANDHI STPP	2	APCPL	500	BHEL/BHEL	05-Nov-11
14	KASAIPALLI TPP	1	ACB	135	CETHAV VESSELS/HARBIN-CHINA	13-Dec-11
15	KHAMBARKHERA TPS	1	BEPL	45	THYSSEN/SIEMENS INDIA	17-Oct-11
16	KHAPARKHEDA TPS	5	MAHAGENCO	500	BHEL/BHEL	05-Aug-11
17	KODARMA TPP	1	DVC	500	BHEL/BHEL	20-Jul-11
18	KUNDARKI TPS	1	BEPL	45	THYSSEN/SIEMENS	10-Jan-12
19	KUNDARKI TPS	2	BEPL	45	THYSSEN/SIEMENS	29-Feb-12
20	*MAHATMA GANDHI TPS	1	JHPL(HR)	660	SEPCO III CHINA/SEPCO III	12-Jan-12
21	MAITHON RB TPP	2	MPL	525	BHEL/BHEL	23-Mar-12
22	MAQSOODPUR TPS	1	BEPL	45	THYSSEN/SIEMENS	03-Nov-11
23	MAQSOODPUR TPS	2	BEPL	45	THYSSEN/SIEMENS	21-Jan-12
24	MIHAN TPS	1	AMNEPL	61.5	WUXI HUAGUANG CHINA/DONGFANG	09-Feb-12
25	MIHAN TPS	2	AMNEPL	61.5	WUXI HUAGUANG CHINA/DONGFANG	09-Feb-12
26	MIHAN TPS	3	AMNEPL	61.5	WUXI HUAGUANG CHINA/DONGFANG	09-Feb-12
27	MIHAN TPS	4	AMNEPL	61.5	WUXI HUAGUANG CHINA/DONGFANG	09-Feb-12
28	*MUNDRA TPS	8	APL	660	SEPCO III CHINA/SEPCO III	03-Mar-12
29	*MUNDRA TPS	9	APL	660	SEPCO III CHINA/SEPCO III	09-Mar-12
30	*MUNDRA UMTTP	1	CGPL	800	DOOSAN KOREA/TOSHIBA	25-Feb-12
31	NEYVELI TPS-II EXP	1	NLC	250	BHEL/BHEL	04-Feb-12

DETAILS OF NEW UNITS COMMISSIONED BUT NOT CONSIDERED IN THE REVIEW 2011-12

S. No.	Name of Station	Unit No	Organisation	Capacity (MW)	Make Boiler/Turbine	Date of Commissioning
32	ROSA TPP Ph-I	4	RPSCCL	300	SEHANGHAI ELEC CHINA/SHANGHAI	28-Mar-12
33	SALAYA TPP	1	EPGL	600	HARBIN CHINA/HARBIN	22-Feb-12
34	SIMHADRI	4	NTPC Ltd.	500	BHEL/BHEL	30-Mar-12
35	SIMHAPURI TPS	1	SEPL	150	WUXI CHINA/HARBIN CHINA	24-Mar-12
36	*SIPAT STPS	2	NTPC Ltd.	660	DOOSAN KOREA/POWER	24-Dec-11
37	SVPL TPP	1	SVPPL	63	WUXI HUAGUANG CHINA/HANGZ	07-Dec-11
38	UDUPI TPP	2	UPCL	600	DONGFANG CHINA/DONGFANG	16-Apr-11
39	UTRAULA TPS	1	BEPL	45	THYSSEN/SIEMENS	21-Feb-12
40	UTRAULA TPS	2	BEPL	45	THYSSEN/SIEMENS	19-Mar-12
41	VALLUR TPP	1	NTECL	500	BHEL/BHEL	28-Mar-12
42	WARDHA WARORA TPP	4	WPCL	135	DEC CHINA/DEC CHINA	30-Apr-11
	Total	42		14299		

*Supercritical Units

SECTION-2

GENERATION PERFORMANCE

2.1 OVERALL GENERATION PERFORMANCE

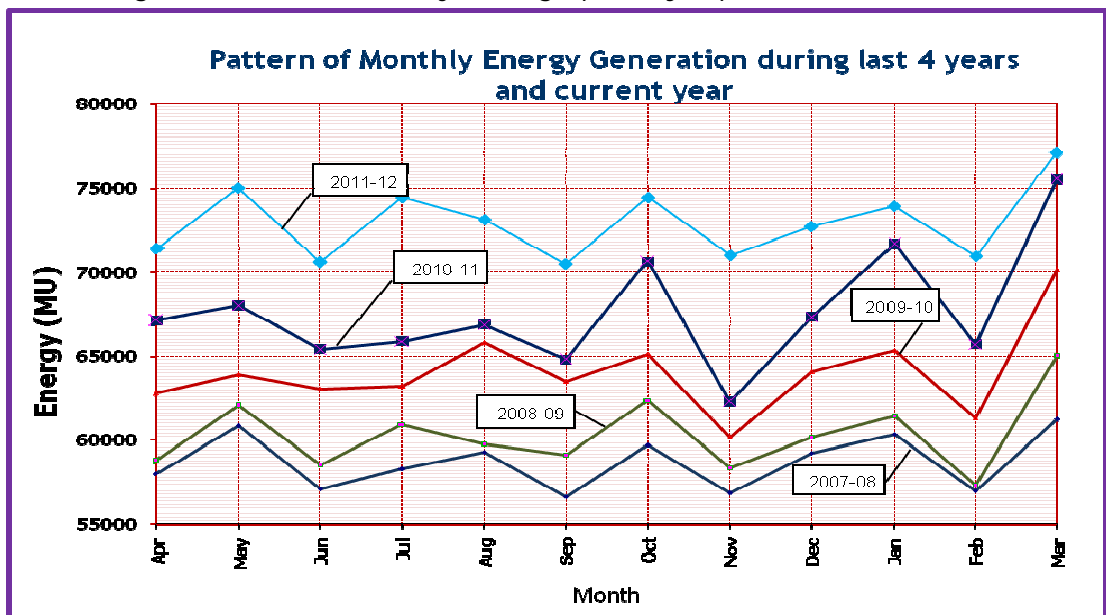
In making performance assessment, no single performance index has been taken as the sole indication of overall performance. Forced Outage (FO), Planned Maintenance (PM), Operating Availability (Op. Av.), Partial unavailability (Partial loss) and the Plant Load Factor (PLF) have been considered for evaluating the over all performance of thermal power station for the purpose of analysis. A detailed review of generation with reference to the targets and PLF is brought out in this section while the other performance indices are covered in Sections 3 to 7.

All India target for annual electricity generation in the country for the year 2011-12 was fixed at 855 BU. Generation achievement during the year was 102.56% of the program, achieving a growth rate of 8.11% in comparison to last year. Details of energy generation target, actual generation, etc. are given below: -

Category	Target 2011-12 (BU)	Actual 2011-12 (BU)	Short fall(-) / Surplus(+) (BU)	% of Target 2011-12	Actual Last Year (2010-11) (BU)	% of Last Year (2010-11)
Thermal	712.23	708.81	-3.43	99.52	665.01	6.59
Nuclear	25.13	32.29	7.16	128.48	26.27	22.92
Hydro	112.05	130.51	18.46	116.47	114.26	14.22
Bhutan Import	5.59	5.28	-0.30	94.6	5.61	-5.82
Total	855.00	876.89	21.89	102.56	811.14	8.11

Month wise generation analysis

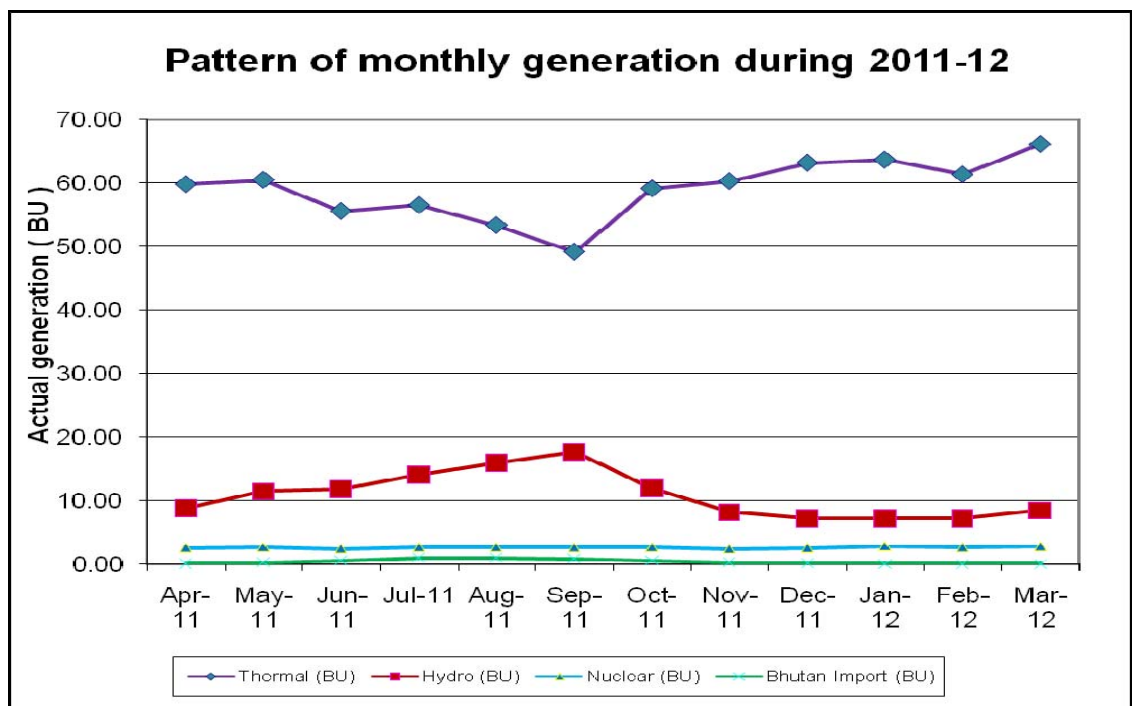
The pattern of monthly energy generation in the country during the last 4 years and during the current financial year is graphically represented below: -



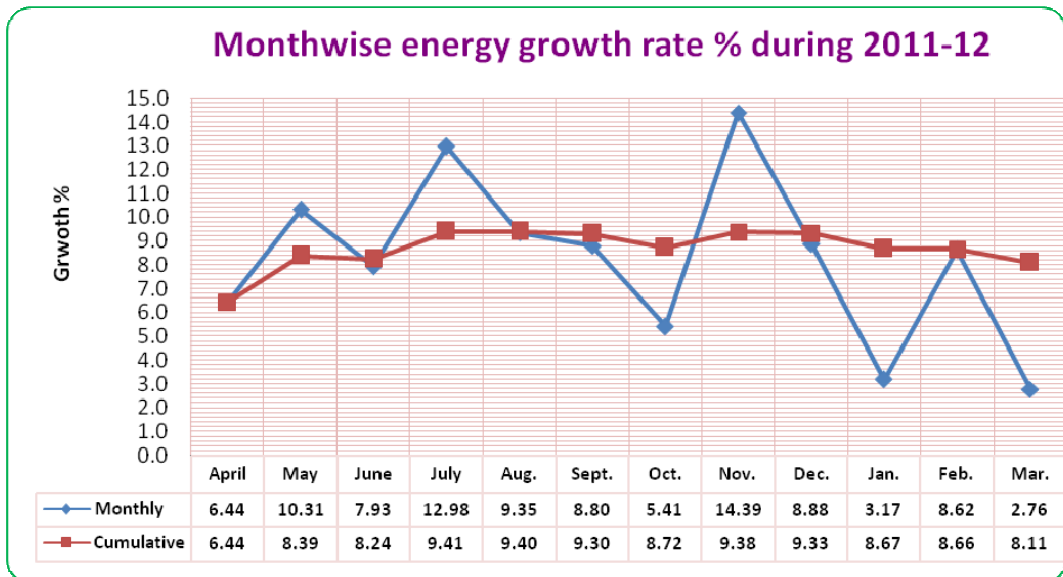
The month wise energy generation targets vis-à-vis actual generation from Thermal, Nuclear & hydro stations and imports from Bhutan during 2011-12 were as shown below:

Month	Target (BU)	Thermal (BU)	Hydro (BU)	Nuclear (BU)	Bhutan Import (BU)	Total Actual 2011-12 (BU)	Actual 2010-11 (BU)	Actual as % of target	Growth rate %
Apr-11	67.95	59.82	8.84	2.66	0.11	71.43	67.1	105.11	6.44
May-11	72.04	60.50	11.48	2.73	0.30	75.01	68.0	104.12	10.31
Jun-11	69.26	55.59	11.88	2.50	0.63	70.60	65.4	101.94	7.93
Jul-11	71.96	56.52	14.15	2.72	1.04	74.43	65.9	103.43	12.98
Aug-11	72.76	53.35	16.00	2.72	1.02	73.10	66.8	100.47	9.35
Sep-11	71.24	49.17	17.74	2.68	0.90	70.50	64.8	98.96	8.80
Oct-11	72.91	59.14	11.96	2.71	0.62	74.43	70.6	102.10	5.41
Nov-11	69.67	60.31	8.19	2.45	0.29	71.23	62.3	102.24	14.39
Dec-11	71.24	63.21	7.30	2.63	0.16	73.30	67.3	102.89	8.88
Jan-12	73.38	63.68	7.26	2.90	0.09	73.93	71.7	100.75	3.17
Feb-12	68.54	61.37	7.23	2.71	0.06	71.37	65.7	104.13	8.62
Mar-12	74.05	66.14	8.47	2.86	0.08	77.56	75.5	104.73	2.76
Total	855.00	708.81	130.51	32.29	5.28	876.89	811.1	102.56	8.11

The graphical representation of month wise pattern of energy generation from Thermal, Nuclear & Hydro stations and imports from Bhutan are shown below:



The variations in the monthly and cumulative growth rates achieved in energy generation during the year 2011-12 are presented in the figure below:



Following points have been observed in the monthly generation pattern:

- The total monthly generation varied in the range of 70.50 BU (during the month of September'11) to the maximum value of 77.56 BU (achieved during the month of March'12).
- After arrival of good Monsoon in the country during August'11-September'11, there was increase in hydro generation and subsequently lower thermal generation.
- During the month of September'11, the coal availability to power stations deteriorated due to Telangana crisis. Telangana crisis hampered the production in SCCL mines which had affected coal supplies to many generating stations of Southern Region especially Andhra Pradesh, Karnataka and Maharastra.
- Due to less generation in November'2010 last year, the growth rate during November '2011 was highest.
- Hydro generation, which is mainly dependent on the inflows and had a peak value in the month of September (17.74 BU). It was minimum in the month of February'12(7.23 BU)
- Total generation had a minimum value in the month of September'11. It was mainly due to reduced domestic load due to pleasant season and reduced agriculture load following good monsoon.
- The nuclear generation varied in range between 2.45 BU to 2.90 BU.
- Many thermal power plants continued to face the problem of coal shortages, receipt of inferior/wet quality of coal.

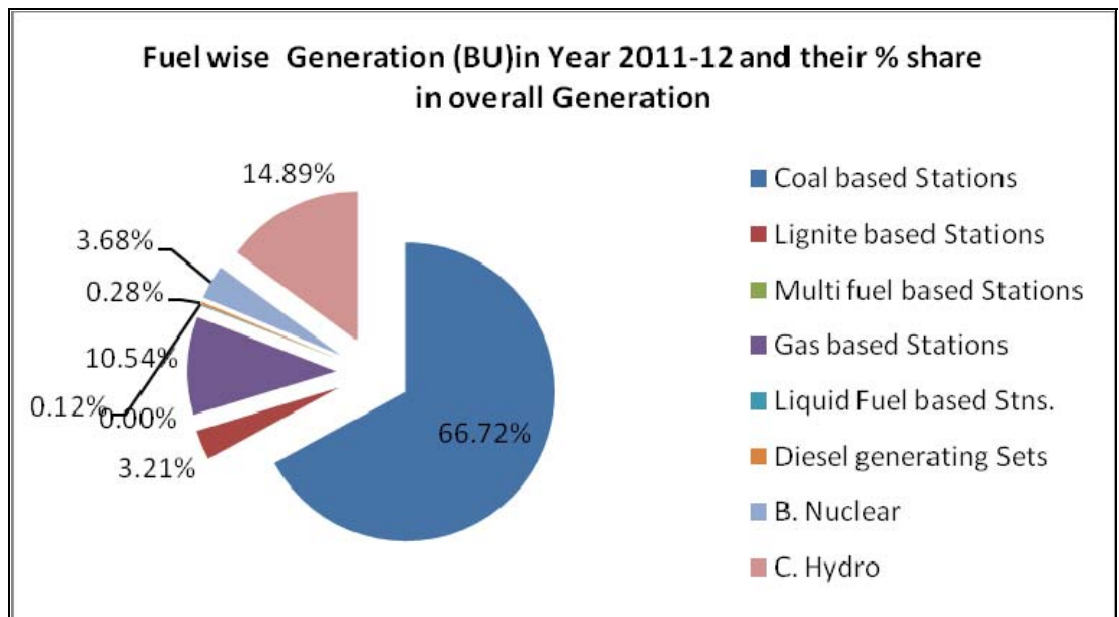
Fuel wise generation analysis

The fuel wise annual energy generation vis-à-vis target generation during the year 2011-12 and growth rates achieved are given below:

Category	Target Generation (BU)	Actual Generation (BU)	Short fall (-) / Surplus (+) (BU)	% of Target 2011-12	Actual 2010-11 (BU)	Growth (%)
A. <u>Thermal</u>						
Coal based Stations	577.76	584.79	7.03	101.22	535.34	9.24
Lignite based Stations	28.26	28.09	-0.17	99.41	26.42	6.35
Multi fuel based Stations#	0.00	0.00	0.00	100	0.00	0.00
Gas based Stations	99.97	92.4	-7.57	92.42	97.77	-5.5
Liquid Fuel based Stns.	2.8	1.07	-1.73	38.17	2.48	-57.04
Diesel generating Sets	3.45	2.46	-0.99	71.38	2.99	-17.79
Thermal (total)	712.23	708.81	-3.43	99.52	665.01	6.59
B. Nuclear	25.13	32.29	7.16	128.48	26.27	22.92
C. Hydro	112.05	130.51	18.46	116.47	114.26	14.22
D. Bhutan Import	5.59	5.28	-0.3	94.6	5.61	-5.82
Total	855	876.89	21.89	102.56	811.14	8.11

Chandrapur (ASSAM), (2X30 MW) are under forced outage due to uneconomical problem

The fuel wise annual energy generation during the year 2011-12, their percent share in total generation and growth rates achieved are presented in the figure below



Following observations have been made from the analysis of fuel wise performance of generating stations in the country during the year 2011-12:

- Gross annual generation of the country has crossed the 850 BU mark (876.89 BU).
- Though the total thermal generation was less by 3.43 BU with respect to targets fixed for the year, the generation from coal based plants exceeded their targets by 7.03 BU.

- The nuclear generation achieved a remarkable growth rate of 22.92% due to improved availability of nuclear fuel to the nuclear plants.
- The generation from hydro based plants also improved with a growth rate of 14.22% due to revival of good monsoon.
- The total thermal generation has achieved a growth rate of 6.59%. Coal based generation recorded a remarkable growth rate of 9.24 %.
- Availability and quality of coal & availability of gas for power sector continued to be critical input for thermal generation growth.
- Since the demand of power was primarily met by the increased generation from hydro, nuclear and coal / lignite based power plants, the energy demand from gas, liquid fuel and diesel based stations have reduced. As a result, the growth rate in respect of Liquid fuel based GTs, Multi-fuel Stations as well as DG sets was negative.

2.2 THERMAL GENERATION

Region wise thermal generation performance

The thermal generation in all the regions, except Eastern Region, was above their respective targets. The shortfall was been largest in case of Eastern Region. The main reason for shortfall in generation in Eastern Region is due to coal supply problem at Kahalgaon STPS (NTPC), Muzaffarpur TPS(KBUNL), MejiaTPS (DVC). There was generation loss due to transmission constraints at Sterlite TPS. There was also generation loss due to turbine rotor failure of U#7 at DPL TPS, milling system/ RC feeder problem of U#2,3,4 of Santaldih TPS, Misc problem at Patraru TPS.

Region-wise generation performance of thermal power stations during the year under review is given below: -

Region/ Category	Target (BU)	Actual (BU)	Short fall(-)/ Surplus(+)(BU)
Northern	173.76	178.24	4.49
Western	246.63	248.05	1.43
Southern	156.40	157.81	1.41
Eastern	131.05	120.16	-10.89
North -Eastern	4.41	4.55	0.14
Total (All India)	712.23	708.81	-3.43

Sector wise thermal generation performance

Sector-wise generation performance of thermal power stations during 2011-12 is given below. One unit of K.B.U.N.L was under R&M while the other was not operational on account of coal related problems, the generation of K.B.U.N.L went down from 302 MU to 207 MU with a negative growth rate of 35.11%.

Category / Sectors	Monitored Capacity as on 31.03.2012 (MW)	April 2011 - March 2012		Actual Generation 2010-11 (MU)	% of Program	Growth (%)
		Program (MU)	Actual (MU)			
CENTRAL SECTOR						
APCPL	500	2196	2422	132	110.27	1740.83
NTPC Ltd.	30902	222813	222083	220522	99.67	0.71
NLC	2740	17906	18759	17879	104.77	4.92
NEEPCO.	375	2336	2431	2478	104.08	-1.88
RGPPPL	2220	9477	11619	11877	122.60	-2.17
NSPCL	500	2840	3978	4018	140.07	-0.99
K.B.U.N.L	220	500	207	320	41.48	-35.11
DVC	4290	21493	19537	16550	90.90	18.05
CENTRAL SEC.	41747	279561	281036	273775	100.53	2.65
STATE SEC.	50584	297818	296929	280435	99.70	5.88
IPP SEC.	16783	108835	104822	84473	96.31	24.09
PVT. UTL. SEC.	3865	26020	26019	26325	100.00	-1.16
TOTAL THERMAL	112978	712234	708806	665008	99.52	6.59

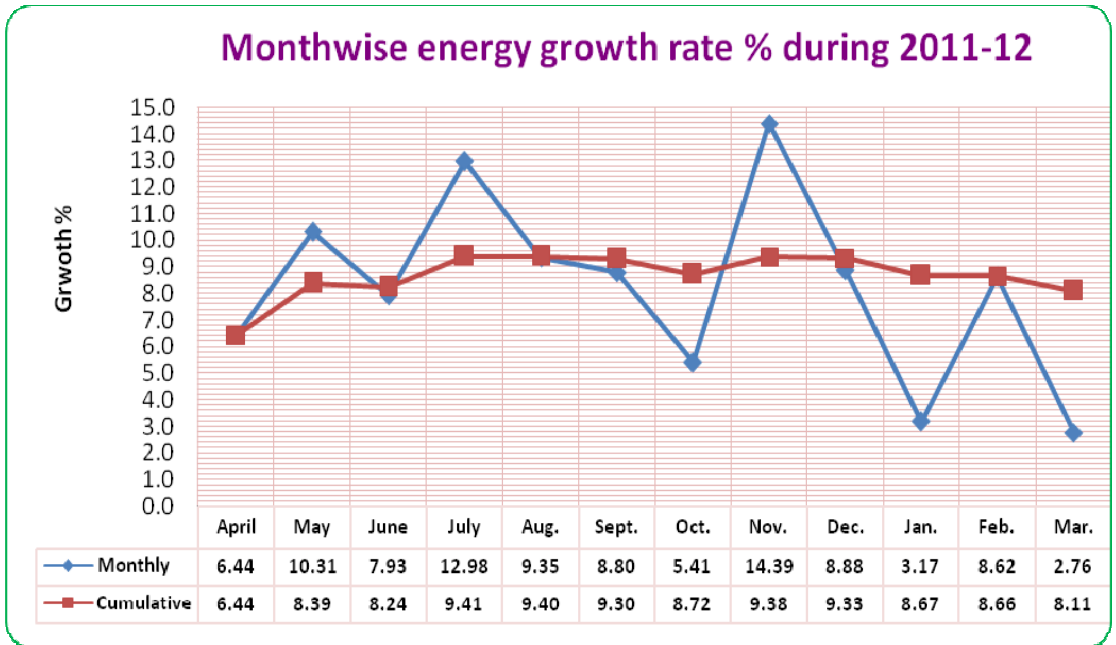
Month wise thermal generation performance

Month-wise and cumulative thermal generation performance vis-à-vis targets are given below: -

Month	Thermal generation target 2011-12 (MU)		Actual generation 2011-12(MU)		Previous year generation 2010-11(MU)	
	Monthly	Cumulative	Monthly	Cumulative	Monthly	Cumulative
April' 11	58218	58218	59818	59818	56699	56699
May' 11	60582	118800	60504	120322	56520	113219
June' 11	57085	175885	55588	175910	53271	166490
July' 11	56866	232751	56519	232429	52384	218874
August' 11	56189	288940	53353	285782	51547	270421
September' 11	55370	344310	49173	334955	47303	317724
October' 11	59580	403890	59142	394098	57084	374809
November' 11	58960	462850	60307	454404	52302	427111
December' 11	61512	524362	63214	517619	57750	484860
January'12	63966	588328	63676	581295	61150	546010
February' 12	59922	648250	61367	642662	55749	601759
March' 12	63984	712234	66144	708806	63249	665008

]

Month-wise and cumulative thermal generation growth during the year 2011-12 is depicted in the following chart: -

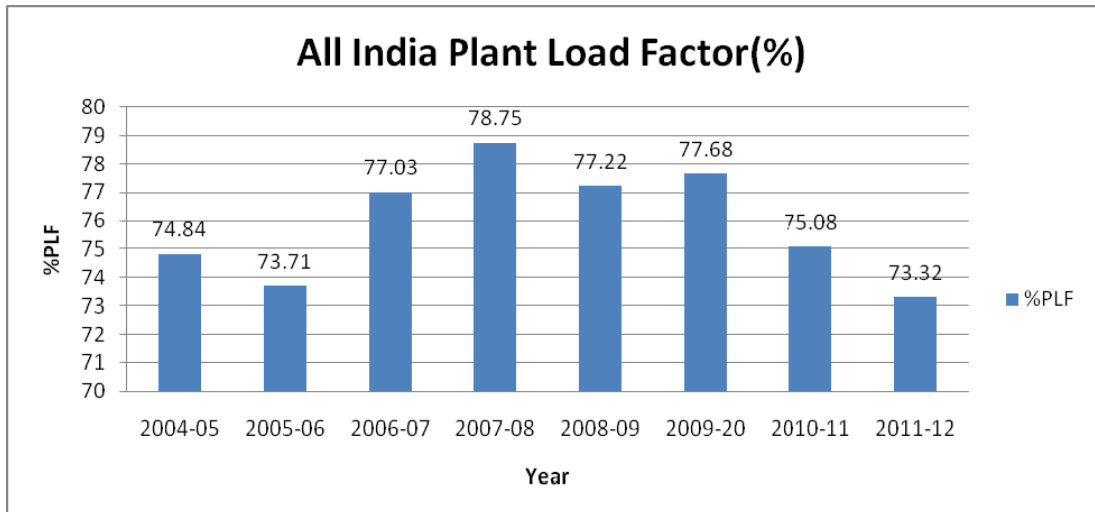


- The total monthly thermal generation varied in the range of 49.17 BU (during the month of September'11) to the maximum value of 66.14 BU (achieved during the month of March'12).
- The total thermal generation during the year 2011-12 has achieved a growth rate of 6.59%, though it fell short of target by 3.43 BU. The shortfall was mainly due to shortfall in generation in respect of natural gas based plants, liquid fuel based plants and DG sets with respect to their generation targets. The shortfall in generation for natural gas based plants, liquid fuel based plants and DG sets for the year 2011-12 were of the order of 7.57 BU, 1.73 BU and 0.99 BU respectively.
- Reasons for lower thermal generation during the month of September'11 were mainly due to coal availability to power stations deteriorated due to Telangana crisis. Telangana crisis hampered the production in SCCL mines which had affected coal supplies to Ramagundam STPS of NTPC, Rayalseema and Kothagudem Thermal Power Stations of APGENCO, Raichur Thermal Power Station of KPCL and Parli Thermal Power Station of MSPGCL.
- During the month September'11 and October'11 there was maximum utilization of hydro capacities on account of increased inflows after arrival of good monsoon and also due to reduced domestic and agriculture loads due to pleasant season leading to low demand during the month. Many thermal units additionally faced the problem of wet coal, as such their performance got adversely affected during this season.

2.3 PLANT LOAD FACTOR (PLF%)

National average PLF % of coal/lignite based plants during the financial year 2011-12 reduced to 73.32% against 75.08% during 2010-11.

The details of PLF at National level from the financial year 2004-05 onwards are depicted in the following chart:



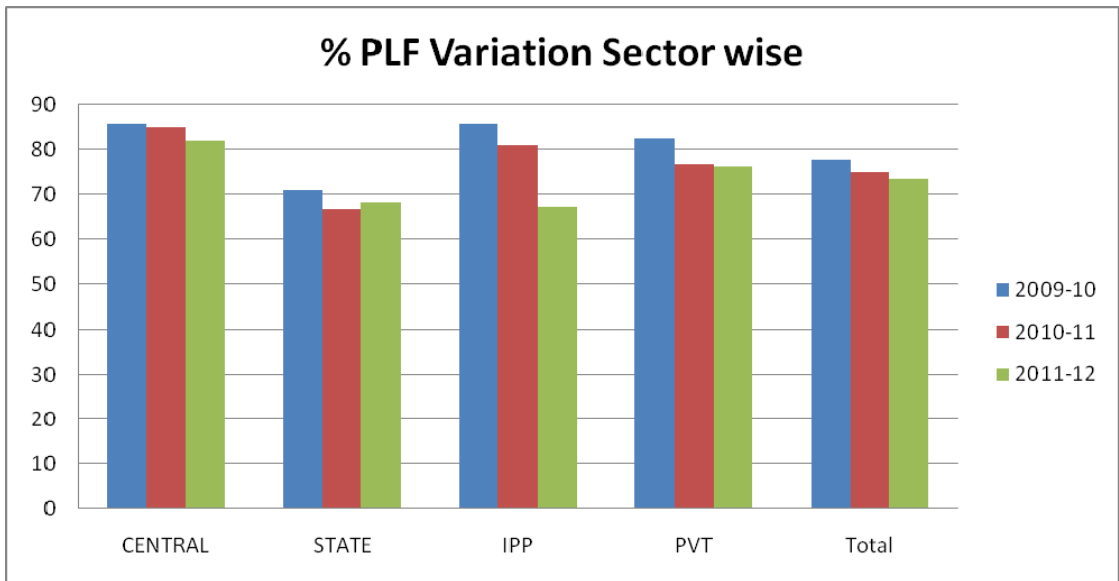
Following were the external factors which affected the performance of coal/lignite based Thermal Power Stations. The total energy loss on account of these factors works out to be 50.8 BU. The impact of these factors on % PLF was worked out as follows:

S No.	Reasons for loss of generation	Energy Loss due to Shut down of the thermal units		Energy Loss due to backing down of the thermal units		Total energy loss	
		BU	Impact on PLF (%)	BU	Impact on PLF (%)	BU	Impact on PLF (%)
1	Coal/lignite shortage (includes unloading/infrastructure/feeding/ transportation problems at some stations.	7.4	0.77%	6.3	0.65%	13.7	1.42%
2	Poor quality coal/lignite	0.6	0.06%	17.3	1.79%	17.9	1.86%
3	Reserve shut down/ backing down of thermal units on account of receipt of low schedules from beneficiary states and discontinuing the operation of some vintage units and environmental issues etc.	6.5	0.67%	8.8	0.91%	15.3	1.59%
4	Evacuation problem/ Transmission constraint	3.9	0.40%	0.015	0.00%	3.915	0.41%
	Total	18.4	1.91%	32.415	3.36%	50.815	5.27%

Sector-wise Plant Load Factor (PLF %)

PLF % of Central Sector Stations during 2011-12 was the highest among all Sectors. The PLF % of IPP sector have reduced from 80.97% during 2010-11 to 67.27% in 2011-12 on account of shortage of coal, transmission constraints and increased unforeseen forced outages. The PLF of State sector was improved to 68.43% during 2011-12 from 66.77% during 2010-11. Sector wise PLF of thermal power plants during the last three years are given in the following table: -

Sector	Capacity			Plant load factor		
	2009-10	2010-11	2011-12	2009-10	2010-11	2011-12
CENTRAL	30665	31655	34705	85.64	85.12	82.12
STATE	43004.5	44392	46558	71.13	66.77	68.43
IPP	3185	6505	12920	85.68	80.97	67.27
PVT	3585	3585	3585	82.41	76.70	76.19
Total	80439.5	86137	97768	77.68	75.08	73.32

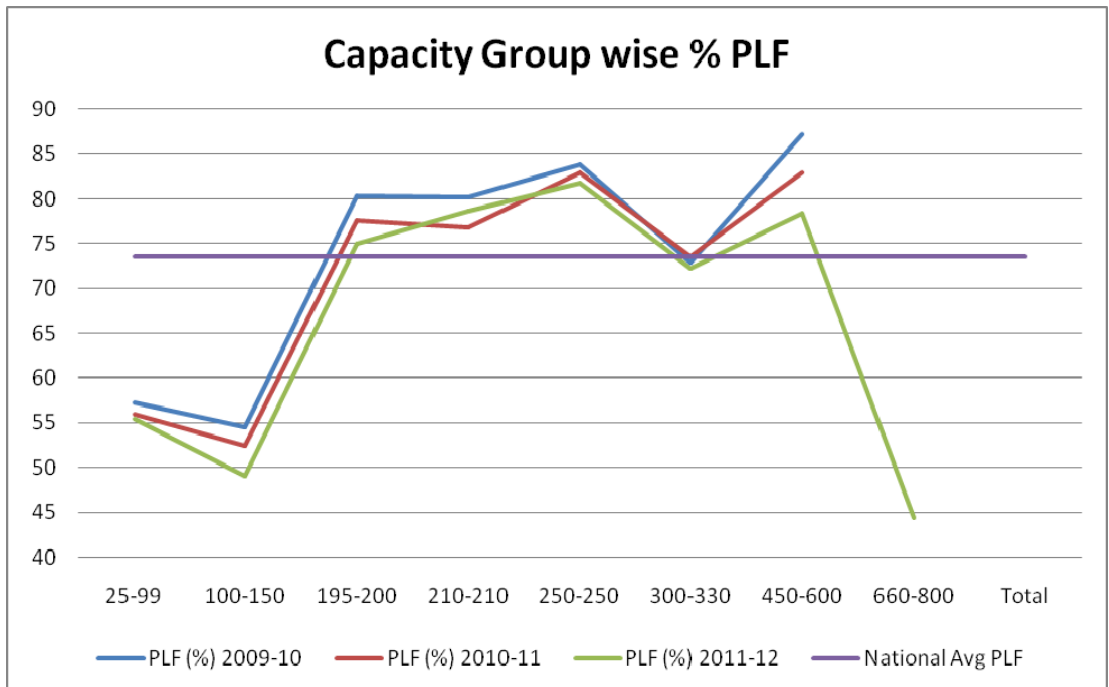


Capacity group-wise Plant Load Factor

The capacity group wise details of units under review and PLF (%) are given below. Though the supercritical units of 660-800 MW group were new, the Plant load factor of group was 44.31% because Mundra U # 6 was having transmission constraints and Mundra U #5 was having boiler feed pump problem and was on long duration forced shutdown. The details are given in Section 4.

Capacity Group (MW)	Units Operating as on 31-MAR-2012		Units Reviewed		PLF (%)		
	No. of Units	Capacity (MW)	No. of Units	Capacity (MW)	2009-10	2010-11	2011-12
25-99	85	4842	75	4333	57.2	55.8	55.46
100-150	91	10720	90	10550	54.5	52.39	49.11
195-200	25	4990	25	4990	80.35	77.56	74.98
210	143	30030	143	30030	80.24	76.69	78.67
250	42	10500	40	10000	83.8	82.94	81.75
300-330	21	6420	20	6120	72.9	73.48	72.26
450-600	74	38030	57	29105	87.21	83.58	78.38
660-800	9	6080	4	2640	NA	NA	44.31
Total	490	111612	454	97768	77.68	75.08	73.32

NA : Not Applicable



Make-wise PLF%

The PLF% of different makes wise units under review during last three years is given as under. The PLF % of China / China make units was reduced from 72.33% during 2010-11 to 62.48% during 2011-12 due to increased forced outages of China/China make units at Mundra TPS (U #5, 6 of capacity 660 MW eac), Jallipa Kupurdi TPS(U#1,2 of 135 MW each), Yamuna Nagar TPS (U#2 of 300 MW). The details are given in section 4.

Make TG/Boiler	Units operating as on 31-03-2012		Reviewed during 2011-12		PLF % *		
	No. of units	Capacity (MW)	No. of units	Capacity (MW)	09-10	10-11	11-12
BHEL/BHEL	297	72338	283	65838	80.65	77.41	77
BHEL/ABL	20	3470	20	3470	50.12	49.89	51.33
RUSSIA/RUSSIA	31	3330	31	3330	76.84	75.88	75.28
CHINA/CHINA	51	17919	36	12645	72.3	72.33	62.48
OTHERS/OTHERS	90	14030	84	12485	73.46	72.02	69.99
TOTAL	489	111087	454	97768	77.68	75.08	73.32

2.4 STATION-WISE & UNIT-WISE PERFORMANCE INDICES

Highlights of the Station wise performance during the year 2011-12 are as under:

- PLF% of Dahanu TPS (2x250 MW) of Reliance Energy was above 100%(101.33%).
- PLF% of GHTPS at Lehra Mohabbat (920 MW) was maximum (94.31%) among all State Sector Stations.

- PLF% of Sipat STPS (3x200+3x500 MW) was maximum (93.93 %) among all Central Sector Stations.
- Following 15 Stations (total capacity 20420 MW) achieved PLF above 90%:

S NO.	STATION	Capacity (MW)	Organisation	Sector	PLF%
1	DAHANU TPS	500	RIL (DAHANU)	PVT	101.34
2	OP JINDAL TPS	1000	JPL	PVT	97.75
3	TORANGALLU TPS(SBU-I)	260	JSWEL	PVT	96.06
4	GH TPS (LEH.MOH.)	920	PSPCL	STATE	94.31
5	SIPAT STPS	2320	NTPC Ltd.	CENTRAL	93.93
6	RAMAGUNDEM STPS	2600	NTPC Ltd.	CENTRAL	93.09
7	SIMHADRI	2000	NTPC Ltd.	CENTRAL	92.78
8	METTUR TPS	840	TNGDCL	STATE	92.77
9	KOTA TPS	1240	RRVUNL	STATE	92.45
10	RIHAND STPS	2000	NTPC Ltd.	CENTRAL	92.09
11	Dr. N.TATA RAO TPS	1760	APGENCO	STATE	91.57
12	BHILAI TPS	500	NSPCL	CENTRAL	90.57
13	TALCHER (OLD) TPS	470	NTPC Ltd.	CENTRAL	90.53
14	VINDHYACHAL STPS	3260	NTPC Ltd.	CENTRAL	90.40
15	BUDGE BUDGE TPS	750	CESC	PVT	90.16

The details of some of the best/worst performing thermal units during the year are as under:

- (a) 5 thermal units aggregating to 1500 MW achieved PLF of 100% or more. Among these 4 units were from PVT Sector Utility one unit from Central sector. The details are given below:

STATION	Unit no	Capacity (MW)	Organisation	Sector	PLF%
SIPAT STPS	4	500	NTPC Ltd.	CENTRAL	101.23
OP JINDAL TPS	2	250	JPL	PVT	101.24
OP JINDAL TPS	4	250	JPL	PVT	100.18
DAHANU TPS	1	250	RIL (DAHANU)	PVT	101.41
DAHANU TPS	2	250	RIL (DAHANU)	PVT	101.26
Total		1500			

- (b) PLF of 52 number Thermal units aggregating to 5703 MW were below 30%. 29 number of units of capacity 2444 MW did not contribute to electricity generation during the year under review. The main reason for low PLF of these poor performing units are summarized below:

PLF Range : 30% to 20% : This PLF range includes 785 MW capacity.

sN	Station	Unit name	Capacity	Organisation	Sector	PLF%	Reasons
1	D.P.L. TPS	6	110	DPL	STATE	26.87	Misc Forced outages and subsequently taken under R&M from 06.11.2011
2	GIRAL TPS	2	125	RRVUNL	STATE	26.56	Multiple forced outages, Lignite feeder out.
3	D.P.L. TPS	3	70	DPL	STATE	26.35	Boiler Misc Problem
4	ENNORE TPS	5	110	TNGDCL	STATE	25.02	Water treatment plant failure
5	PATRATU TPS	6	90	JSEB	STATE	24.3	Misc forced outage, Fire in C&I cable
6	ENNORE TPS	4	110	TNGDCL	STATE	22.88	Generator bearing problem
7	MUZAFFARPUR TPS	2	110	K.B.U.N.L	CENTRAL	21.46	Coal supply problem and subsequently taken to R&M from 29.03.12
8	BANDEL TPS	2	60	WBPDC	STATE	21.14	U# 2 - S/D from June to November'2011 for AOH
	Total		785				

PLF Range : 20% to 10% : PLF of 9 number Thermal units aggregating to 1310 MW were between 20 to 30% PLF.

sN	Station	Unit name	Capacity	Organisation	Sector	PLF%	Reasons
1	HARDUAGANJ TPS	8	250	UPRVUNL	STATE	19.8	Furnace Draft Prob
2	BARAUNI TPS	6	105	BSEB	STATE	18.08	Coal Handling problem,U#7 R&M
3	GIRAL TPS	1	125	RRVUNL	STATE	17.93	Frequent forced outages of Unit 1 &2. Due to wet Lignite,Grid disturbance/Voltage,BTL,Turbine vibration high etc.
4	OBRA TPS	11	200	UPRVUNL	STATE	14.59	Turbine problem
5	NASIK TPS	2	125	MAHAGENCO	STATE	13.27	closed prior to retirement.
6	ROSA TPP Ph-I	3	300	RPSCL	PVT	13.04	Tr. Constraints, coal problem
7	NASIK TPS	1	125	MAHAGENCO	STATE	13.01	closed prior to retirement.
8	NEW COSSIPORE TPS	3	50	CESC	PVT	12.6	Multiple forced outages/Costly power
9	NEW COSSIPORE TPS	1	30	CESC	PVT	10.79	Multiple forced outages/Costly power
	Total		1310				

PLF Range : 10% to 0%: PLF of 35 no of units were below 10%. Out of 35 nos of units of capacity 3608 MW, 29 number of units of capacity 2444 MW did not contribute to electricity generation during the year under review. The list of such units are listed below:

sN	Station	Unit name	Capacity	Organisation	Sector	PLF%	Reasons
1	MUNDRA TPS	6	660	APL	PVT	8.57	Transmission constraints
2	NEW COSSIPORE TPS	2	30	CESC	PVT	7.07	Multiple forced outages/Costly power
3	OBRA TPS	8	94	UPRVUNL	STATE	6.63	ESP Problem
4	AMARKANTAK EXT TPS	1	120	MPPGCL	STATE	3.94	Shutdown due to Misc Forced outages
5	TROMBAY TPS	4	150	TATA PCL	PVT	0.12	unit was under reserve shut
6	ENNORE TPS	3	110	TNGDCL	STATE	0.01	Water treatment Plant failure
7	GND TPS(BHATINDA)	3	110	PSPCL	STATE	0	Unit under R&M since 14th Jan,2010
8	OBRA TPS	7	94	UPRVUNL	STATE	0	unit under R&M since 26th June,2010
9	HARDUAGANJ TPS	7	105	UPRVUNL	STATE	0	R&M (5.03.2011)
10	PARICHHA TPS	2	110	UPRVUNL	STATE	0	R&M
11	KORADI TPS	1	105	MAHAGENCO	STATE	0	Vintage unit closed for operation since Jan,2011
12	KORADI TPS	2	105	MAHAGENCO	STATE	0	Vintage unit closed for operation since Jan,2011
13	KORADI TPS	3	105	MAHAGENCO	STATE	0	Vintage unit closed for operation since Jan,2011
14	KORADI TPS	4	105	MAHAGENCO	STATE	0	Vintage unit closed for operation since Jan,2011
15	BHUSAWAL TPS	1	50	MAHAGENCO	STATE	0	Vintage unit closed for operation since Dec,2010
16	PATRATU TPS	1	40	JSEB	STATE	0	Turbine Axial Shift/ Thrust pad problem since 11.10.2010

sN	Station	Unit name	Capacity	Organisation	Sector	PLF%	Reasons
17	PATRATU TPS	2	40	JSEB	STATE	0	Vintage unit , shut down since 10.03.2010 due to misc prob
18	PATRATU TPS	3	40	JSEB	STATE	0	Vintage unit , shut down since 31.03.2003 due to major repair work
19	PATRATU TPS	5	90	JSEB	STATE	0	Vintage unit , shut down since 23.05.2004 due to ESP prob
20	PATRATU TPS	7	105	JSEB	STATE	0	Stator earth fault 30.09.10
21	PATRATU TPS	8	105	JSEB	STATE	0	Vintage unit, shutdown17.10.2005 due to turbine misc prob
22	PATRATU TPS	9	110	JSEB	STATE	0	Unit under R&M work since 10.08.2006
23	PATRATU TPS	10	110	JSEB	STATE	0	R&M(5.8.06 to 24.05.12)
24	BARAUNI TPS	4	50	BSEB	STATE	0	Pollution high shut down 24.04.1996
25	BARAUNI TPS	5	50	BSEB	STATE	0	Pollution high shut down 16.03.1995
26	BARAUNI TPS	7	105	BSEB	STATE	0	R&M since 23.08.06
27	MUZAFFARPUR TPS	1	110	K.B.U.N.L	CENTRAL	0	Unit under R&M since 06.10.03
28	SANTALDIH TPS	1	120	WBPCD	STATE	0	Unit under shutdown since 18.12.09 due to turbine oil system problem
29	SANTALDIH TPS	2	120	WBPCD	STATE	0	unit under shutdown since 04.10.09 due to milling system problem
30	SANTALDIH TPS	3	120	WBPCD	STATE	0	unit under shut down since 20.01.09 due to misc. fire hazard
31	SANTALDIH TPS	4	120	WBPCD	STATE	0	Vintage unit closed for operation since 7.10.08
32	D.P.L. TPS	1	30	DPL	STATE	0	Vintage unit closed for operation since 4.03.09 and subsequently retired in May'12
33	D.P.L. TPS	2	30	DPL	STATE	0	Vintage unit closed for operation and subsequently retired in May'12
34	CHANDARPUR(ASSAM)	1	30	APGPCL	STATE	0	Vintage units closed for operation since 7.05.99 due to uneconomical operation
35	CHANDARPUR(ASSAM)	2	30	APGPCL	STATE	0	Vintage units closed for operation since 16.06.91 due to uneconomical operation
	Total		3608				

Unit wise and Station wise Performance Indices for 2011-12 are shown in Annexure 2.1

Annexure-2.1

SHEET ..OF 11

UNIT WISE AND STATION WISE PERFORMANCE INDICES FOR 2011-12

NAME OF UNIT/ SYSTEM	UNI T NO.	CAP (MW)	GEN (MU)	Planned Mainten ance (%)	Forced outage (%)	Operating Availability (%)	Reserve Shutdo wn + Low system demand (%)	Partial Unavaila- bility including Low system demand (%)	PLF (%)
NORTHERN REGION									
BADARPUR TPS	1	95	625.09	5.69	4.08	90.23	5.28	15.32	74.90
BADARPUR TPS	2	95	641.51	4.88	5.30	89.82	5.56	12.94	76.90
BADARPUR TPS	3	95	610.99	5.35	8.36	86.30	5.33	13.14	73.20
BADARPUR TPS	4	210	1334.49	15.38	3.45	81.17	1.86	8.83	72.30
BADARPUR TPS	5	210	1563.15	0.00	6.77	93.23	4.17	8.50	84.70
BADARPUR TPS		705	4775.20	6.73	5.43	87.84	3.97	10.74	77.11
INDIRA GANDHI STPP	1	500	2421.61	0.00	31.60	68.40	9.37	13.41	55.10
INDIRA GANDHI STPP		500	2421.60	0.00	31.60	68.40	9.37	13.41	55.14
BARSINGAR LIGNITE	1	125	343.32	0.00	16.80	83.20	0.00	0.00	79.50
BARSINGAR LIGNITE	2	125	273.76	0.00	29.17	70.83	0.00	0.00	63.20
BARSINGAR LIGNITE		250	617.08	0.00	24.25	75.75	0.00	0.00	69.68
SINGRAULI STPS	1	200	1687.27	0.00	6.53	93.47	0.52	1.28	96.00
SINGRAULI STPS	2	200	1468.29	13.51	4.73	81.75	0.42	1.34	83.60
SINGRAULI STPS	3	200	1592.35	0.00	10.00	90.00	0.82	1.77	90.60
SINGRAULI STPS	4	200	1623.68	7.80	0.68	91.52	0.81	1.79	92.40
SINGRAULI STPS	5	200	1404.33	5.57	5.12	89.30	1.62	3.98	79.90
SINGRAULI STPS	6	500	3995.90	0.00	6.00	94.00	0.98	3.96	91.00
SINGRAULI STPS	7	500	3812.89	8.54	1.97	89.49	1.03	3.77	86.80
SINGRAULI STPS		2000	15585.00	4.82	4.70	90.48	0.92	2.95	88.71
RIHAND STPS	1	500	4028.13	0.00	1.18	98.82	1.52	7.50	91.70
RIHAND STPS	2	500	4213.14	0.00	2.63	97.37	0.90	2.62	95.90
RIHAND STPS	3	500	3941.82	8.93	1.96	89.11	0.17	0.74	89.80
RIHAND STPS	4	500	4000.30	7.99	2.00	90.01	0.02	0.56	91.10
RIHAND STPS		2000	16183.00	4.23	1.94	93.83	0.65	2.85	92.12
UNCHAHAH TPS	1	210	1673.32	4.03	0.88	95.08	1.51	4.57	90.70
UNCHAHAH TPS	2	210	1619.41	7.13	1.62	91.24	1.26	4.20	87.80
UNCHAHAH TPS	3	210	1677.72	2.58	1.80	95.61	1.48	4.92	91.00
UNCHAHAH TPS	4	210	1543.58	10.58	2.28	87.14	1.31	3.88	83.70
UNCHAHAH TPS	5	210	1765.34	0.00	0.12	99.88	1.63	4.61	95.70
UNCHAHAH TPS		1050	8279.40	4.87	1.34	93.79	1.44	4.44	89.77
DADRI (NCTPP)	1	210	1709.54	0.00	0.78	99.22	2.28	6.75	92.70
DADRI (NCTPP)	2	210	1671.98	0.00	1.58	98.42	2.42	7.54	90.60
DADRI (NCTPP)	3	210	1480.85	4.78	7.49	87.73	1.71	7.17	80.30
DADRI (NCTPP)	4	210	1529.36	9.19	2.04	88.77	3.22	6.24	82.90
DADRI (NCTPP)	5	490	3847.07	0.00	4.31	95.69	2.74	6.34	89.40
DADRI (NCTPP)	6	490	3985.42	0.00	1.49	98.51	2.55	5.95	92.60
DADRI (NCTPP)		1820	14224.00	1.61	2.93	95.46	2.54	6.50	88.97
TANDA TPS	1	110	616.47	36.49	0.06	63.44	0.00	0.60	63.80
TANDA TPS	2	110	899.26	0.00	2.47	97.53	1.37	4.46	93.10
TANDA TPS	3	110	936.31	0.00	3.88	96.12	0.00	0.52	96.90
TANDA TPS	4	110	952.80	0.00	2.69	97.31	0.18	0.60	98.60
TANDA TPS		440	3404.80	9.12	2.28	88.60	0.39	1.54	88.10
RAJGHAT TPS	1	67.5	348.51	0.00	27.36	72.64	0.00	13.99	58.80
RAJGHAT TPS	2	67.5	469.97	0.00	12.10	87.90	0.00	8.70	79.30
RAJGHAT TPS		135	818.48	0.00	19.73	80.27	0.00	11.34	69.02
PANIPAT TPS	1	110	820.29	0.00	6.10	93.90	1.63	8.78	84.90
PANIPAT TPS	2	110	542.29	0.00	32.98	67.02	2.18	10.91	56.10
PANIPAT TPS	3	110	627.51	0.00	14.04	85.96	3.84	20.79	64.90
PANIPAT TPS	4	110	516.57	3.10	16.93	79.96	3.65	26.35	53.50
PANIPAT TPS	5	210	1573.67	0.00	13.03	86.97	2.11	1.96	85.30
PANIPAT TPS	6	210	1457.75	10.50	4.96	84.53	3.94	5.51	79.00
PANIPAT TPS	7	250	2110.04	3.96	2.92	93.13	0.02	0.00	96.10

UNIT WISE AND STATION WISE PERFORMANCE INDICES FOR 2011-12

NAME OF UNIT/ SYSTEM	UNI T NO.	CAP (MW)	GEN (MU)	Planned Mainten ance (%)	Forced outage (%)	Operating Availability (%)	Reserve Shutdo wn + Low system demand (%)	Partial Unavaila- bility including Low system demand (%)	PLF (%)
PANIPAT TPS	8	250	2088.76	0.00	7.33	92.67	5.21	0.10	95.10
PANIPAT TPS		1360	9736.90	2.60	10.33	87.07	2.81	6.58	81.51
YAMUNA NAGAR TPS	1	300	2424.08	0.00	5.52	94.48	0.95	2.42	92.00
YAMUNA NAGAR TPS	2	300	814.62	0.00	61.64	38.36	0.62	7.40	30.90
YAMUNA NAGAR TPS		600	3238.70	0.00	33.58	66.42	0.78	4.91	61.45
RAJIV GANDHI TPS	1	600	2785.97	0.00	12.01	87.99	0.00	8.21	82.10
RAJIV GANDHI TPS	2	600	2629.90	32.60	3.68	63.72	0.00	3.80	57.20
RAJIV GANDHI TPS		1200	5415.90	21.85	6.43	71.72	0.00	5.25	65.44
GND TPS(BHATINDA)	1	110	763.58	0.00	14.76	85.24	7.59	6.21	79.00
GND TPS(BHATINDA)	2	110	825.22	0.00	11.40	88.60	1.66	3.28	85.40
GND TPS(BHATINDA)	3	110	0.00	100.00	0.00	0.00	0.00	0.00	0.00
GND TPS(BHATINDA)	4	110	294.21	40.24	13.46	46.29	10.31	15.97	30.40
GND TPS(BHATINDA)		440	1883.00	35.06	9.91	55.03	4.89	6.37	48.72
GH TPS (LEH.MOH.)	1	210	1824.30	0.00	2.14	97.86	1.16	0.40	98.90
GH TPS (LEH.MOH.)	2	210	1737.81	0.00	7.55	92.45	5.46	0.21	94.20
GH TPS (LEH.MOH.)	3	250	2123.79	0.00	4.46	95.54	2.62	0.56	96.70
GH TPS (LEH.MOH.)	4	250	1935.40	7.01	5.67	87.32	3.95	1.45	88.10
GH TPS (LEH.MOH.)		920	7621.30	1.90	4.96	93.13	3.30	0.69	94.31
ROPAR TPS	1	210	1597.83	0.00	10.11	89.89	2.18	3.82	86.60
ROPAR TPS	2	210	1572.50	6.44	6.54	87.03	3.04	2.47	85.20
ROPAR TPS	3	210	1437.13	10.57	11.32	78.11	5.41	0.93	77.90
ROPAR TPS	4	210	1564.66	8.98	6.43	84.59	4.70	0.92	84.80
ROPAR TPS	5	210	1755.57	0.00	4.62	95.38	4.07	1.08	95.20
ROPAR TPS	6	210	1636.43	5.66	5.18	89.15	3.97	1.55	88.70
ROPAR TPS		1260	9564.10	5.27	7.37	87.36	3.90	1.79	86.41
KOTA TPS	1	110	871.17	6.00	1.25	92.74	0.81	2.61	90.20
KOTA TPS	2	110	861.37	6.00	2.75	91.26	0.69	2.12	89.10
KOTA TPS	3	210	1666.62	7.32	1.87	90.82	0.19	0.96	90.30
KOTA TPS	4	210	1664.28	6.51	2.89	90.60	0.04	1.06	90.20
KOTA TPS	5	210	1669.28	5.35	2.70	91.95	0.35	1.57	90.50
KOTA TPS	6	195	1687.72	5.49	1.01	93.50	0.00	0.00	98.50
KOTA TPS	7	195	1664.34	5.63	3.21	91.16	0.00	0.03	97.20
KOTA TPS		1240	10085.00	6.06	2.28	91.66	0.23	1.03	92.59
SURATGARH TPS	1	250	1764.87	5.64	13.70	80.66	0.00	0.59	80.40
SURATGARH TPS	2	250	2043.90	0.00	4.39	95.61	0.45	2.64	93.10
SURATGARH TPS	3	250	1978.41	4.51	3.05	92.44	0.41	2.41	90.10
SURATGARH TPS	4	250	1896.97	9.73	1.30	88.97	0.00	2.58	86.40
SURATGARH TPS	5	250	1907.77	6.40	2.53	91.08	0.87	4.15	86.90
SURATGARH TPS	6	250	1082.45	0.00	49.49	50.51	0.35	1.24	49.30
SURATGARH TPS		1500	10674.00	4.38	12.41	83.21	0.35	2.27	81.01
GIRAL TPS	1	125	196.89	19.55	44.34	36.11	0.00	18.57	17.90
GIRAL TPS	2	125	291.58	0.00	50.62	49.38	0.00	23.25	26.60
GIRAL TPS		250	488.47	9.78	47.48	42.75	0.00	20.91	22.24
CHHABRA TPP	1	250	1675.56	0.00	13.62	86.38	9.40	10.59	76.30

UNIT WISE AND STATION WISE PERFORMANCE INDICES FOR 2011-12

NAME OF UNIT/ SYSTEM	UNI T NO.	CAP (MW)	GEN (MU)	Planned Mainten ance (%)	Forced outage (%)	Operating Availability (%)	Reserve Shutdo wn + Low system demand (%)	Partial Unavaila- bility including Low system demand (%)	PLF (%)
CHHABRA TPP		250	1675.60	0.00	13.62	86.38	9.40	10.59	76.30
OBRA TPS	1	40	266.26	0.56	17.47	81.97	0.72	6.87	75.80
OBRA TPS	2	50	317.81	0.00	12.44	87.56	1.89	15.25	72.40
OBRA TPS	7	94	0.00	100.00	0.00	0.00	0.00	0.00	0.00
OBRA TPS	8	94	54.78	0.00	85.61	14.39	1.09	7.75	6.60
OBRA TPS	9	200	924.06	23.73	13.35	62.92	1.65	10.06	52.60
OBRA TPS	10	200	731.74	2.62	15.28	82.10	0.58	40.25	41.70
OBRA TPS	11	200	256.33	72.44	3.39	24.17	0.00	9.58	14.60
OBRA TPS	12	200	862.14	0.00	28.08	71.92	0.59	22.87	49.10
OBRA TPS	13	200	1052.94	8.70	8.17	83.13	0.70	23.28	59.90
OBRA TPS		1278	4466.10	24.19	18.01	57.79	0.73	17.98	39.78
PANKI TPS	3	105	451.03	20.50	16.21	63.29	0.00	14.43	48.90
PANKI TPS	4	105	529.80	0.00	20.12	79.88	0.00	22.31	57.40
PANKI TPS		210	980.83	10.25	18.17	71.58	0.00	18.37	53.17
HARDUAGANJ TPS	5	60	175.96	36.41	13.63	49.97	0.00	16.36	33.40
HARDUAGANJ TPS	7	105	0.00	100.00	0.00	0.00	0.00	0.00	0.00
HARDUAGANJ TPS	8	250	402.42	0.00	77.84	22.16	0.00	9.40	19.80
HARDUAGANJ TPS		415	578.38	68.13	13.24	18.62	0.00	6.34	13.01
PARICHHA TPS	1	110	509.03	0.00	11.74	88.26	0.00	35.60	52.70
PARICHHA TPS	2	110	0.00	100.00	0.00	0.00	0.00	0.00	0.00
PARICHHA TPS	3	210	1374.74	1.92	4.78	93.30	0.00	18.77	74.50
PARICHHA TPS	4	210	1052.50	0.00	26.59	73.41	0.00	16.35	57.10
PARICHHA TPS		640	2936.30	17.82	12.31	69.87	0.00	17.64	52.23
ANPARA TPS	1	210	1480.36	0.00	4.66	95.34	1.48	15.44	80.30
ANPARA TPS	2	210	1412.36	0.00	3.85	96.15	1.54	19.58	76.60
ANPARA TPS	3	210	1447.76	0.00	4.80	95.20	1.46	16.71	78.50
ANPARA TPS	4	500	3569.10	11.58	2.68	85.73	1.12	4.53	81.30
ANPARA TPS									
ANPARA TPS		1630	11666.00	3.55	4.47	91.98	1.01	10.57	81.47
JALIPA KAPURDI TPP	1	135	473.73	0.00	58.25	41.75	0.00	1.81	39.90
JALIPA KAPURDI TPP	2	135	504.47	1.17	53.43	45.40	0.00	2.86	42.50
JALIPA KAPURDI TPP	3	135	406.43	0.00	13.96	86.04	0.00	11.81	83.30
JALIPA KAPURDI TPP	4	135	299.71	0.00	41.48	58.52	0.00	15.26	72.00
JALIPA KAPURDI TPP		540	1684.30	0.45	49.05	50.50	0.00	4.80	49.64
ROSA TPP Ph-I	1	300	2159.13	0.00	11.69	88.31	8.76	7.22	81.90
ROSA TPP Ph-I	2	300	2074.08	11.45	5.52	83.02	2.38	5.04	78.70
ROSA TPP Ph-I	3	300	56.32	0.00	84.01	15.99	1.44	5.77	13.00
ROSA TPP Ph-I		900	4289.50	5.29	14.32	80.39	5.26	6.10	75.22
KHAMBARKHERA TPS	2	45	94.30	0.00	17.60	82.40	0.00	13.00	69.40
KHAMBARKHER A TPS		45	94.30	0.00	17.60	82.40	0.00	13.00	69.42
WESTERN									
KORBA STPS	1	200	1248.46	26.02	4.18	69.79	0.92	0.96	71.10
KORBA STPS	2	200	1524.71	7.54	4.46	88.00	1.51	3.06	86.80
KORBA STPS	3	200	1380.67	6.76	13.99	79.26	0.88	2.33	78.60
KORBA STPS	4	500	3529.34	11.01	2.71	86.28	2.26	6.50	80.40
KORBA STPS	5	500	3356.75	6.91	9.15	83.95	2.55	7.98	76.40
KORBA STPS	6	500	3642.14	0.00	10.04	89.96	2.17	8.08	82.90
KORBA STPS	7	500	3348.28	3.74	15.08	81.18	1.22	5.04	76.20
KORBA STPS		2600	18030.00	7.27	8.85	83.88	1.83	5.80	78.95
SIPAT STPS	1	660	2441.63	0.00	27.56	72.44	3.15	8.03	71.50
SIPAT STPS	4	500	4445.96	0.00	1.71	98.29	0.00	0.00	101.20
SIPAT STPS	5	500	4238.88	5.75	1.08	93.17	0.00	0.00	96.50
SIPAT STPS		1660	11126.00	2.36	6.11	91.53	0.57	1.45	93.94

UNIT WISE AND STATION WISE PERFORMANCE INDICES FOR 2011-12

NAME OF UNIT/ SYSTEM	UNI T NO.	CAP (MW)	GEN (MU)	Planned Mainten ance (%)	Forced outage (%)	Operating Availability (%)	Reserve Shutdo wn + Low system demand (%)	Partial Unavaila- bility including Low system demand (%)	PLF (%)
VINDHYACHAL STPS	1	210	1538.03	9.37	6.52	84.11	1.06	2.19	83.40
VINDHYACHAL STPS	2	210	1697.15	2.15	5.81	92.04	0.73	1.99	92.00
VINDHYACHAL STPS	3	210	1696.56	0.00	8.02	91.98	0.67	1.85	92.00
VINDHYACHAL STPS	4	210	1611.21	4.99	7.13	87.89	0.56	2.15	87.30
VINDHYACHAL STPS	5	210	1681.90	5.23	3.02	91.74	0.55	2.22	91.20
VINDHYACHAL STPS	6	210	1791.80	1.95	0.43	97.63	0.95	2.52	97.10
VINDHYACHAL STPS	7	500	3666.98	6.90	6.74	86.36	1.19	3.58	83.50
VINDHYACHAL STPS	8	500	4039.39	0.00	3.34	96.66	1.34	5.24	92.00
VINDHYACHAL STPS	9	500	4227.82	0.00	2.97	97.03	1.01	2.33	96.30
VINDHYACHAL STPS	10	500	3934.74	7.06	2.44	90.50	0.84	2.59	89.60
VINDHYACHAL STPS		3260	25886.00	3.67	4.37	91.97	0.96	2.94	90.40
BHILAI TPS	1	250	2000.11	0.00	4.22	95.78	0.78	6.28	91.10
BHILAI TPS	2	250	1977.84	0.00	4.67	95.33	0.19	6.50	90.10
BHILAI TPS		500	3978.00	0.00	4.45	95.55	0.49	6.39	90.57
UKAI TPS	1	120	628.37	0.00	22.87	77.13	15.66	19.34	59.60
UKAI TPS	2	120	739.07	10.73	7.25	82.03	0.28	12.19	70.10
UKAI TPS	3	200	1438.40	4.92	4.76	90.32	1.27	8.36	81.90
UKAI TPS	4	200	1414.08	5.76	6.49	87.75	4.48	7.71	80.50
UKAI TPS	5	210	1398.91	7.05	10.45	82.49	1.02	6.87	75.80
UKAI TPS		850	5618.80	5.77	9.48	84.75	3.85	9.93	75.25
GANDHI NAGAR TPS	1	120	411.98	15.69	24.27	60.04	18.70	20.68	39.10
GANDHI NAGAR TPS	2	120	553.44	6.89	19.11	74.00	12.24	21.32	52.50
GANDHI NAGAR TPS	3	210	1511.25	0.00	11.06	88.94	10.01	7.49	81.90
GANDHI NAGAR TPS	4	210	1399.30	5.62	12.19	82.19	11.03	6.53	75.90
GANDHI NAGAR TPS	5	210	1611.32	6.42	3.67	89.91	0.00	2.66	87.40
GANDHI NAGAR TPS		870	5487.30	6.02	12.48	81.50	9.34	9.82	71.80
WANAKBORI TPS	1	210	1080.78	15.15	19.80	65.06	3.32	6.43	58.60
WANAKBORI TPS	2	210	1533.12	0.00	8.88	91.12	7.74	8.15	83.10
WANAKBORI TPS	3	210	1494.30	6.20	5.67	88.13	5.62	7.15	81.00
WANAKBORI TPS	4	210	1445.64	6.94	10.79	82.27	6.22	3.89	78.40
WANAKBORI TPS	5	210	1560.29	5.19	5.26	89.55	6.81	5.28	84.60
WANAKBORI TPS	6	210	1603.58	0.00	6.92	93.08	8.81	6.29	86.90
WANAKBORI TPS	7	210	1562.74	9.99	1.58	88.43	3.66	3.71	84.70
WANAKBORI TPS		1470	10280.00	6.21	8.42	85.38	6.03	5.84	79.62
SIKKA REP. TPS	1	120	433.95	5.59	37.75	56.66	28.12	16.03	41.20
SIKKA REP. TPS	2	120	542.65	7.49	25.82	66.70	24.85	15.70	51.50
SIKKA REP. TPS		240	976.60	6.54	31.78	61.68	26.49	15.87	46.32
KUTCH LIG. TPS	1	70	376.63	8.79	18.46	72.75	1.52	12.00	61.30
KUTCH LIG. TPS	2	70	452.48	10.28	9.72	79.99	0.00	6.44	73.60
KUTCH LIG. TPS	3	75	338.31	0.00	23.70	76.30	0.57	24.88	51.40
KUTCH LIG. TPS	4	75	358.41	0.00	25.35	74.65	0.49	20.25	54.40
KUTCH LIG. TPS		290	1525.80	4.60	19.49	75.91	0.64	16.12	59.90
AKRIMOTA LIG TPS	1	125	434.42	13.26	22.59	64.14	0.00	24.59	39.60

UNIT WISE AND STATION WISE PERFORMANCE INDICES FOR 2011-12

NAME OF UNIT/ SYSTEM	UNI T NO.	CAP (MW)	GEN (MU)	Planned Mainten ance (%)	Forced outage (%)	Operating Availability (%)	Reserve Shutdo wn + Low system demand (%)	Partial Unavaila- bility including Low system demand (%)	PLF (%)
AKRIMOTA LIG TPS	2	125	436.50	13.06	27.52	59.42	0.00	19.44	39.80
AKRIMOTA LIG TPS		250	870.92	13.16	25.06	61.78	0.00	22.02	39.66
SATPURA TPS	1	62.5	358.23	0.00	6.77	93.23	0.00	28.06	65.30
SATPURA TPS	2	62.5	324.41	0.00	13.98	86.02	3.15	26.91	59.10
SATPURA TPS	3	62.5	319.51	8.32	9.96	81.72	2.45	23.44	58.20
SATPURA TPS	4	62.5	335.72	6.94	9.64	83.42	0.00	22.26	61.20
SATPURA TPS	5	62.5	317.79	6.35	10.96	82.68	1.79	24.86	57.90
SATPURA TPS	6	200	985.76	16.41	10.86	72.73	0.00	16.83	56.10
SATPURA TPS	7	210	994.96	9.98	13.19	76.83	0.12	23.23	53.90
SATPURA TPS	8	210	847.63	24.69	10.37	64.94	1.68	18.83	46.00
SATPURA TPS	9	210	902.78	14.18	9.95	75.86	0.91	26.82	48.90
SATPURA TPS		1143	5386.80	13.04	10.87	76.10	0.90	22.48	53.68
KORBA-II	1	50	342.28	7.69	7.94	84.37	0.65	6.18	77.90
KORBA-II	2	50	391.45	4.85	4.17	90.98	0.77	2.33	89.10
KORBA-II	3	50	315.32	0.00	7.13	92.87	4.32	21.22	71.80
KORBA-II	4	50	381.06	4.18	3.87	91.95	0.89	5.38	86.80
KORBA-II		200	1430.10	4.18	5.78	90.04	1.66	8.78	81.40
KORBA-III	1	120	831.14	0.00	8.14	91.86	0.07	13.01	78.80
KORBA-III	2	120	797.38	5.58	3.62	90.79	0.28	15.15	75.60
KORBA-III		240	1628.50	2.79	5.88	91.33	0.18	14.08	77.25
DSPM TPS	1	250	1854.18	13.25	1.41	85.35	0.62	1.45	84.40
DSPM TPS	2	250	1291.02	0.00	32.24	67.76	4.20	9.32	58.80
DSPM TPS		500	3145.20	6.62	16.82	76.55	2.41	5.39	71.61
KORBA-WEST TPS	1	210	1821.91	0.00	1.47	98.53	0.00	0.57	98.80
KORBA-WEST TPS	2	210	1577.50	8.35	4.19	87.46	0.00	2.07	85.50
KORBA-WEST TPS	3	210	1480.49	12.71	3.71	83.58	0.00	3.40	80.30
KORBA-WEST TPS	4	210	1552.91	5.46	5.20	89.34	0.00	5.33	84.20
KORBA-WEST TPS		840	6432.80	6.63	3.64	89.73	0.00	2.84	87.18
AMARKANTAK EXT TPS	1	120	41.55	0.00	93.97	6.03	0.00	2.09	3.90
AMARKANTAK EXT TPS	2	120	384.88	45.34	9.45	45.21	0.01	8.66	36.50
AMARKANTAK EXT TPS	3	210	1734.33	0.00	3.10	96.90	0.08	3.06	94.00
AMARKANTAK EXT TPS		450	2160.80	12.09	29.02	58.89	0.04	4.29	54.66
SANJAY GANDHI TPS	1	210	1046.33	8.09	13.51	78.39	0.76	21.77	56.70
SANJAY GANDHI TPS	2	210	991.37	15.22	9.34	75.44	0.14	21.80	53.70
SANJAY GANDHI TPS	3	210	1144.80	11.93	7.79	80.28	0.17	18.31	62.10
SANJAY GANDHI TPS	4	210	1354.23	6.54	2.60	90.86	0.16	17.35	73.40
SANJAY GANDHI TPS	5	500	3726.46	0.00	7.46	92.54	2.65	7.69	84.80
SANJAY GANDHI TPS		1340	8263.20	6.55	7.99	85.46	1.18	15.29	70.20
NASIK TPS	1	125	142.84	0.00	13.43	86.57	0.00	26.71	52.30
NASIK TPS	2	125	145.69	0.00	17.57	82.43	0.00	29.29	53.40
NASIK TPS	3	210	1394.44	8.20	2.67	89.13	0.07	13.67	75.60
NASIK TPS	4	210	1305.94	0.00	13.02	86.98	0.30	16.18	70.80
NASIK TPS	5	210	1252.44	0.00	11.86	88.14	0.15	20.26	67.90
NASIK TPS		880	4241.40	2.49	9.75	87.76	0.16	17.72	69.76
KORADI TPS	1	105	0.00	0.00	100.00	0.00	0.00	0.00	0.00
KORADI TPS	2	105	0.00	0.00	100.00	0.00	0.00	0.00	0.00
KORADI TPS	3	105	0.00	0.00	100.00	0.00	0.00	0.00	0.00
KORADI TPS	4	105	0.00	0.00	100.00	0.00	0.00	0.00	0.00

UNIT WISE AND STATION WISE PERFORMANCE INDICES FOR 2011-12

NAME OF UNIT/ SYSTEM	UNI T NO.	CAP (MW)	GEN (MU)	Planned Mainten ance (%)	Forced outage (%)	Operating Availability (%)	Reserve Shutdo wn + Low system demand (%)	Partial Unavaila- bility including Low system demand (%)	PLF (%)
KORADI TPS	5	200	983.21	0.00	21.19	78.81	2.55	22.29	56.00
KORADI TPS	6	210	1183.22	0.00	9.35	90.65	3.92	26.52	64.10
KORADI TPS	7	210	1193.60	9.63	3.73	86.64	0.03	22.25	64.70
KORADI TPS		1040	3360.00	1.94	47.10	50.96	1.29	14.13	36.78
KHAPARKHEDA TPS	1	210	1394.48	7.47	3.47	89.06	0.03	13.71	75.60
KHAPARKHEDA TPS	2	210	1385.48	0.00	8.54	91.46	0.04	16.93	75.10
KHAPARKHEDA TPS	3	210	1437.73	7.97	3.66	88.37	0.00	10.59	77.90
KHAPARKHEDA TPS	4	210	1685.60	0.00	1.43	98.57	0.03	8.09	91.40
KHAPARKHEDA TPS		840	5903.30	3.86	4.28	91.86	0.03	12.33	80.01
PARAS TPS	2	55	0.00	0.00	80.33	19.67	0.00	0.00	0.00
PARAS TPS	3	250	1390.83	10.22	3.11	86.67	0.06	23.11	63.30
PARAS TPS	4	250	1461.81	3.29	3.59	93.12	0.05	26.55	66.60
PARAS TPS		555	2852.60	6.63	4.74	88.63	0.05	24.38	63.78
BHUSAWAL TPS	1	50	0.00	0.00	80.33	19.67	0.00	0.00	0.00
BHUSAWAL TPS	2	210	1029.71	15.14	10.84	74.02	0.02	18.56	55.80
BHUSAWAL TPS	3	210	1289.62	0.00	10.20	89.80	0.02	19.86	69.90
BHUSAWAL TPS		470	2319.30	7.42	11.88	80.70	0.02	18.83	61.64
PARLI TPS	3	210	589.24	31.22	20.41	48.37	0.00	16.42	31.90
PARLI TPS	4	210	1072.98	12.84	6.57	80.58	0.00	22.56	58.20
PARLI TPS	5	210	1053.31	0.00	10.70	89.30	0.00	32.06	57.10
PARLI TPS	6	250	1197.61	10.06	13.05	76.90	1.39	22.50	54.50
PARLI TPS	7	250	1204.75	0.00	19.35	80.65	0.00	25.64	54.90
PARLI TPS		1130	5117.90	10.41	14.17	75.42	0.31	23.85	51.26
CHANDRAPUR(MA HARASHTRA) STPS	1	210	1133.20	6.21	4.77	89.02	0.00	28.07	61.40
CHANDRAPUR(MA HARASHTRA) STPS	2	210	1065.84	7.92	5.09	86.98	0.02	29.30	57.80
CHANDRAPUR(MA HARASHTRA) STPS	3	210	1336.83	0.00	7.84	92.16	0.04	19.62	72.50
CHANDRAPUR(MA HARASHTRA) STPS	4	210	1297.57	15.68	3.04	81.28	0.01	10.94	70.30
CHANDRAPUR(MA HARASHTRA) STPS	5	500	3144.53	0.00	7.74	92.26	0.10	20.71	71.60
CHANDRAPUR(MA HARASHTRA) STPS	6	500	2943.61	6.88	4.66	88.46	0.06	21.56	67.00
CHANDRAPUR(MA HARASHTRA) STPS	7	500	2594.68	16.27	7.78	75.95	0.07	17.14	59.10
CHANDRAPUR(M AHARASHTRA) STPS		2340	13516.00	7.62	6.17	86.20	0.05	20.58	65.76
SABARMATI (C STATION)	15	30	189.42	9.60	5.58	84.82	8.02	12.73	71.90
SABARMATI (C STATION)	16	30	213.93	0.00	6.96	93.04	12.32	12.77	81.20
SABARMATI (C STATION)		60	403.35	4.80	6.27	88.93	10.17	12.75	76.53
SABARMATI (D-F STATIONS)	1	120	895.59	5.22	1.11	93.68	4.47	8.71	85.00
SABARMATI (D-F STATIONS)	2	110	820.77	5.23	0.48	94.29	3.67	9.34	84.90

UNIT WISE AND STATION WISE PERFORMANCE INDICES FOR 2011-12

NAME OF UNIT/ SYSTEM	UNI T NO.	CAP (MW)	GEN (MU)	Planned Mainten ance (%)	Forced outage (%)	Operating Availability (%)	Reserve Shutdo wn + Low system demand (%)	Partial Unavaila- bility including Low system demand (%)	PLF (%)
SABARMATI (D-F STATIONS)	3	110	839.68	0.00	3.24	96.76	3.85	9.86	86.90
SABARMATI (D-F STATIONS)		340	2556.00	3.53	1.59	94.87	4.01	9.29	85.58
SURAT LIG. TPS	1	125	660.36	7.02	29.44	63.54	1.54	3.58	60.10
SURAT LIG. TPS	2	125	815.55	0.00	18.36	81.64	2.74	7.36	74.30
SURAT LIG. TPS	3	125	782.06	7.48	14.59	77.93	0.26	7.02	71.20
SURAT LIG. TPS	4	125	670.75	21.70	14.13	64.17	0.41	6.50	58.00
SURAT LIG. TPS		500	2928.70	8.79	19.24	71.98	1.26	6.11	66.07
MUNDRA TPS	1	330	1894.35	0.00	23.22	76.78	0.00	11.89	65.40
MUNDRA TPS	2	330	2126.63	4.35	11.67	83.98	0.00	11.81	73.40
MUNDRA TPS	3	330	2290.12	0.00	14.96	85.04	0.00	7.70	79.00
MUNDRA TPS	4	330	2406.71	3.82	6.69	89.49	0.00	13.30	83.00
MUNDRA TPS	5	660	3247.21	0.00	32.06	67.94	0.74	26.42	52.40
MUNDRA TPS	6	660	331.12	0.00	55.27	44.73	0.00	2.72	8.60
MUNDRA TPS	7	660	1612.26	0.00	11.21	88.79	0.00	30.12	68.20
MUNDRA TPS		3300	13908.00	1.07	24.93	74.00	0.16	14.67	58.05
OP JINDAL TPS	1	250	2045.00	4.31	4.78	90.91	0.00	0.05	93.10
OP JINDAL TPS	2	250	2223.29	0.00	0.74	99.26	0.10	0.02	101.20
OP JINDAL TPS	3	250	2120.74	4.19	1.46	94.35	0.00	0.05	96.60
OP JINDAL TPS	4	250	2199.89	0.00	2.02	97.98	0.00	0.00	100.20
OP JINDAL TPS		1000	8588.90	2.12	2.25	95.63	0.03	0.03	97.78
PATHADI TPP	1	300	2195.49	0.00	7.59	92.41	1.46	9.11	83.30
PATHADI TPP	2	300	1816.90	0.00	7.36	92.64	7.17	23.58	68.90
PATHADI TPP		600	4012.40	0.00	7.48	92.52	4.31	16.34	76.13
KATGHORA TPP	1	35	19.45	0.00	0.00	100.00	0.00	0.00	51.20
KATGHORA TPP		35	19.45	0.00	0.00	100.00	0.00	0.00	51.19
TROMBAY TPS	4	150	1.57	0.00	98.98	1.02	98.98	0.92	0.10
TROMBAY TPS	5	500	3542.71	9.12	1.87	89.01	1.03	8.35	80.70
TROMBAY TPS	6	500	2399.90	0.00	1.14	98.86	30.73	44.45	54.60
TROMBAY TPS	8	250	1699.42	8.70	3.37	87.93	0.00	10.86	77.40
TROMBAY TPS		1400	7643.60	4.81	12.28	82.91	21.95	20.90	62.16
DAHANU TPS	1	250	2226.97	0.00	2.74	97.26	0.00	0.02	101.40
DAHANU TPS	2	250	2223.66	0.55	1.62	97.82	0.00	0.03	101.30
DAHANU TPS		500	4450.60	0.28	2.18	97.54	0.00	0.02	101.33
JSW RATNAGIRI TPP	1	300	2096.31	0.00	12.56	87.44	2.82	8.17	79.60
JSW RATNAGIRI TPP	2	300	2086.96	4.41	8.02	87.58	3.55	9.47	79.20
JSW RATNAGIRI TPP	3	300	1417.19	0.00	7.68	92.32	4.46	14.54	61.50
JSW RATNAGIRI TPP	4	300	983.40	0.00	6.99	93.01	4.93	29.24	80.60
JSW RATNAGIRI TPP		1200	6583.90	1.43	9.28	89.29	3.70	12.81	75.69
WARDHA WARORA TPP	1	135	842.88	0.00	15.91	84.09	6.23	13.02	71.10
WARDHA WARORA TPP	2	135	806.22	0.00	19.77	80.23	1.99	12.52	68.00
WARDHA WARORA TPP	3	135	839.66	4.78	9.09	86.12	5.07	19.36	70.60
WARDHA WARORA TPP		405	2488.80	1.41	15.27	83.33	4.39	14.71	69.85
SOUTHERN									
RAMAGUNDEM STPS	1	200	1578.89	6.23	0.51	93.27	1.22	3.39	89.90
RAMAGUNDEM STPS	2	200	1592.98	5.48	1.49	93.03	0.69	2.37	90.70
RAMAGUNDEM STPS	3	200	1616.59	0.00	2.09	97.91	1.46	5.89	92.00

UNIT WISE AND STATION WISE PERFORMANCE INDICES FOR 2011-12

NAME OF UNIT/ SYSTEM	UNI T NO.	CAP (MW)	GEN (MU)	Planned Mainten ance (%)	Forced outage (%)	Operating Availability (%)	Reserve Shutdo wn + Low system demand (%)	Partial Unavaila- bility including Low system demand (%)	PLF (%)
RAMAGUNDEM STPS	4	500	3877.12	9.52	0.19	90.29	0.95	2.98	88.30
RAMAGUNDEM STPS	5	500	4159.04	0.00	3.72	96.28	1.00	2.42	94.70
RAMAGUNDEM STPS	6	500	4331.30	0.00	1.00	99.00	0.76	2.14	98.60
RAMAGUNDEM STPS	7	500	4099.47	0.00	5.05	94.95	1.10	2.96	93.30
RAMAGUNDEM STPS		2600	21255.00	2.73	2.23	95.04	0.99	2.92	93.07
SIMHADRI	1	500	4260.16	0.00	0.64	99.36	1.03	3.76	97.00
SIMHADRI	2	500	3903.82	7.61	0.71	91.68	1.22	3.94	88.90
SIMHADRI	3	500	2240.48	0.00	1.85	98.15	4.86	14.50	92.10
SIMHADRI		1500	10404.00	3.05	0.91	96.05	1.87	5.98	92.78
NEYVELI TPS- I	1	50	349.67	4.08	2.68	93.24	0.00	13.73	79.60
NEYVELI TPS- I	2	50	293.96	17.40	6.72	75.88	0.00	8.95	66.90
NEYVELI TPS- I	3	50	365.71	5.40	3.59	91.02	0.00	7.75	83.30
NEYVELI TPS- I	4	50	363.13	4.25	4.52	91.23	0.00	8.58	82.70
NEYVELI TPS- I	5	50	360.47	2.93	3.68	93.39	0.00	11.56	82.10
NEYVELI TPS- I	6	50	361.38	0.00	9.04	90.96	0.00	8.72	82.30
NEYVELI TPS- I	7	100	634.42	4.53	4.77	90.71	0.28	18.73	72.20
NEYVELI TPS- I	8	100	625.90	13.45	4.42	82.13	0.00	11.01	71.30
NEYVELI TPS- I	9	100	632.35	5.77	7.55	86.68	0.40	14.78	72.00
NEYVELI TPS- I		600	3987.00	6.79	5.31	87.90	0.11	12.36	75.65
NEYVELI TPS-II	1	210	1637.97	6.01	2.59	91.40	0.03	2.60	88.80
NEYVELI TPS-II	2	210	1429.34	11.25	9.74	79.01	0.02	1.56	77.50
NEYVELI TPS-II	3	210	1665.59	5.68	2.13	92.19	0.03	1.92	90.30
NEYVELI TPS-II	4	210	1593.63	8.05	3.74	88.22	0.02	1.84	86.40
NEYVELI TPS-II	5	210	1571.77	0.00	12.60	87.40	0.04	2.27	85.20
NEYVELI TPS-II	6	210	1623.74	5.66	3.63	90.71	0.03	2.67	88.00
NEYVELI TPS-II	7	210	1565.38	9.06	2.37	88.57	0.08	3.73	84.90
NEYVELI TPS-II		1470	11087.00	6.53	5.26	88.21	0.03	2.37	85.87
NEYVELI (EXT) TPS	1	210	1565.58	6.89	2.89	90.22	0.10	5.28	84.90
NEYVELI (EXT) TPS	2	210	1477.15	12.37	6.93	80.71	0.04	1.24	80.10
NEYVELI (EXT) TPS		420	3042.70	9.63	4.91	85.46	0.07	3.26	82.47
KOTHAGUNDEM TPS	1	60	447.76	4.13	0.70	95.17	0.00	10.21	85.00
KOTHAGUNDEM TPS	2	60	449.70	0.00	1.13	98.87	0.00	13.54	85.30
KOTHAGUNDEM TPS	3	60	445.33	5.58	1.04	93.38	0.17	8.88	84.50
KOTHAGUNDEM TPS	4	60	415.87	4.07	2.33	93.61	0.00	14.83	78.90
KOTHAGUNDEM TPS	5	120	841.18	4.83	2.46	92.71	0.00	12.90	79.80
KOTHAGUNDEM TPS	6	120	824.51	0.00	3.62	96.38	0.00	18.10	78.20
KOTHAGUNDEM TPS	7	120	817.80	8.89	3.92	87.19	0.00	9.61	77.60
KOTHAGUNDEM TPS	8	120	755.50	5.17	4.28	90.55	0.00	18.98	71.70
KOTHAGUNDEM TPS		720	4997.70	4.30	2.81	92.89	0.01	13.89	79.02
KOTHAGUNDEM TPS (NEW)	1	250	1510.43	16.06	11.75	72.19	0.10	3.41	68.80
KOTHAGUNDEM TPS (NEW)	2	250	2033.22	0.00	2.90	97.10	0.29	4.51	92.60
KOTHAGUNDEM TPS (NEW)	3	500	2257.94	0.00	7.00	93.00	0.00	16.06	90.50

UNIT WISE AND STATION WISE PERFORMANCE INDICES FOR 2011-12

NAME OF UNIT/ SYSTEM	UNI T NO.	CAP (MW)	GEN (MU)	Planned Mainten ance (%)	Forced outage (%)	Operating Availability (%)	Reserve Shutdo wn + Low system demand (%)	Partial Unavaila- bility including Low system demand (%)	PLF (%)
KOTHAGUDEM TPS (NEW)		1000	5801.60	5.67	7.23	87.10	0.14	7.51	83.55
Dr. N.TATA RAO TPS	1	210	1641.23	3.67	1.66	94.67	0.00	5.70	89.00
Dr. N.TATA RAO TPS	2	210	1645.07	4.04	2.24	93.71	0.00	4.56	89.20
Dr. N.TATA RAO TPS	3	210	1715.05	4.31	1.89	93.80	0.00	1.02	93.00
Dr. N.TATA RAO TPS	4	210	1722.17	4.13	0.89	94.99	0.00	1.66	93.40
Dr. N.TATA RAO TPS	5	210	1564.97	12.74	0.84	86.42	0.00	1.63	84.80
Dr. N.TATA RAO TPS	6	210	1746.35	0.00	2.20	97.80	0.00	3.08	94.70
Dr. N.TATA RAO TPS	7	500	4120.53	0.00	1.39	98.61	0.00	4.80	93.80
Dr. N.TATA RAO TPS		1760	14155.00	3.45	1.55	95.00	0.00	3.47	91.56
RAMAGUNDEM - B TPS	1	62.5	452.70	7.62	6.25	86.13	0.00	4.18	82.50
RAMAGUNDEM - B TPS		62.5	452.70	7.62	6.25	86.13	0.00	4.18	82.46
KAKATIYA TPS	1	500	2440.79	23.40	11.59	65.02	0.00	9.87	55.60
KAKATIYA TPS		500	2440.80	23.40	11.59	65.02	0.00	9.87	55.57
RAYALASEEMA TPS	1	210	1628.47	4.13	0.54	95.33	0.00	7.07	88.30
RAYALASEEMA TPS	2	210	1625.78	0.00	5.25	94.75	0.00	6.62	88.10
RAYALASEEMA TPS	3	210	1645.97	0.00	4.93	95.07	0.00	5.87	89.20
RAYALASEEMA TPS	4	210	1669.04	4.27	0.57	95.16	0.00	4.68	90.50
RAYALASEEMA TPS	5	210	1506.97	0.00	8.25	91.75	0.00	11.57	82.70
RAYALASEEMA TPS		1050	8076.20	1.74	3.76	94.51	0.00	7.01	87.94
RAICHUR TPS	1	210	1353.46	7.64	7.45	84.91	0.23	11.02	73.40
RAICHUR TPS	2	210	1165.95	5.62	17.23	77.15	0.13	13.96	63.20
RAICHUR TPS	3	210	1305.44	19.09	4.52	76.40	0.22	5.69	70.80
RAICHUR TPS	4	210	1495.65	5.34	6.54	88.13	0.81	7.17	81.10
RAICHUR TPS	5	210	1402.19	0.00	14.53	85.47	0.07	9.53	76.00
RAICHUR TPS	6	210	1486.35	6.30	5.38	88.32	0.11	7.75	80.60
RAICHUR TPS	7	210	1373.57	8.23	6.19	85.58	1.11	11.06	74.50
RAICHUR TPS	8	250	951.31	13.09	28.47	58.43	0.71	15.13	43.30
RAICHUR TPS		1720	10534.00	8.28	11.69	80.03	0.43	10.28	69.72
BELLARY TPS	1	500	3090.60	8.42	6.78	84.80	0.87	15.00	70.40
BELLARY TPS		500	3090.60	8.42	6.78	84.80	0.87	15.00	70.37
ENNORE TPS	1	60	185.71	0.00	38.80	61.20	0.01	26.14	35.20
ENNORE TPS	2	60	245.11	7.29	13.69	79.02	0.02	32.62	46.50
ENNORE TPS	3	110	0.05	0.00	99.96	0.04	0.00	0.03	0.00
ENNORE TPS	4	110	221.03	0.00	58.62	41.38	0.60	18.76	22.90
ENNORE TPS	5	110	241.78	0.00	49.05	50.95	0.15	26.08	25.00
ENNORE TPS		450	893.68	0.97	57.75	41.27	0.19	18.8	22.61
TUTICORIN TPS	1	210	1714.75	0.00	3.74	96.26	0.09	3.31	93.00
TUTICORIN TPS	2	210	1609.94	4.07	3.34	92.59	0.13	5.31	87.30
TUTICORIN TPS	3	210	1220.97	16.92	5.50	77.58	0.46	11.48	66.20
TUTICORIN TPS	4	210	1644.55	5.36	2.79	91.86	0.13	2.82	89.20
TUTICORIN TPS	5	210	1701.73	0.00	6.16	93.84	0.17	1.81	92.30
TUTICORIN TPS		1050	7891.90	5.27	4.31	90.43	0.20	4.95	85.57
METTUR TPS	1	210	1714.67	3.73	2.30	93.97	0.00	1.03	93.00
METTUR TPS	2	210	1699.40	3.88	3.06	93.06	0.00	1.09	92.10
METTUR TPS	3	210	1715.51	3.85	1.43	94.72	0.00	1.75	93.00

UNIT WISE AND STATION WISE PERFORMANCE INDICES FOR 2011-12

NAME OF UNIT/ SYSTEM	UNI T NO.	CAP (MW)	GEN (MU)	Planned Mainten ance (%)	Forced outage (%)	Operating Availability (%)	Reserve Shutdo wn + Low system demand (%)	Partial Unavaila- bility including Low system demand (%)	PLF (%)
METTUR TPS	4	210	1715.27	3.80	1.69	94.51	0.00	1.59	93.00
METTUR TPS		840	6844.90	3.82	2.12	94.07	0.00	1.37	92.77
NORTH CHENNAI TPS	1	210	1400.73	4.36	18.23	77.41	0.03	1.48	75.90
NORTH CHENNAI TPS	2	210	1575.31	4.73	7.72	87.55	0.00	2.14	85.40
NORTH CHENNAI TPS	3	210	1717.28	4.67	0.80	94.54	0.04	1.52	93.10
NORTH CHENNAI TPS		630	4693.30	4.58	8.92	86.50	0.02	1.71	84.81
TORANGALLU TPS(SBU-I)	1	130	1128.38	1.62	0.12	98.25	0.00	0.00	98.80
TORANGALLU TPS(SBU-I)	2	130	1065.32	3.86	0.00	96.14	0.00	3.35	93.30
TORANGALLU TPS(SBU-I)		260	2193.70	2.74	0.06	97.20	0.00	1.68	96.05
TORANGALLU TPS(SBU-II)	3	300	2101.07	0.00	14.07	85.93	0.33	7.72	79.70
TORANGALLU TPS(SBU-II)	4	300	2103.73	16.33	3.22	80.45	0.08	2.45	79.80
TORANGALLU TPS(SBU-II)		600	4204.80	8.16	8.64	83.19	0.21	5.08	79.78
UDUPI TPP	1	600	3161.47	12.28	18.13	69.59	0.10	10.14	60.00
UDUPI TPP		600	3161.50	12.28	18.13	69.59	0.10	10.14	59.99
NEYVELI TPS(Z)	1	250	1835.17	5.18	8.74	86.08	0.06	2.60	83.60
NEYVELI TPS(Z)		250	1835.20	5.18	8.74	86.08	0.06	2.60	83.57
EASTERN									
MUZAFFARPUR TPS	1	110	0.00	100.00	0.00	0.00	0.00	0.00	0.00
MUZAFFARPUR TPS	2	110	207.38	0.68	68.70	30.62	0.00	8.31	21.50
MUZAFFARPUR TPS		220	207.38	50.34	34.35	15.31	0.00	4.16	10.73
KAHALGAON TPS	1	210	1333.80	5.29	8.16	86.54	3.90	14.23	72.30
KAHALGAON TPS	2	210	1514.27	0.00	2.33	97.67	4.00	15.74	82.10
KAHALGAON TPS	3	210	1354.57	0.00	13.07	86.93	2.50	13.22	73.40
KAHALGAON TPS	5	500	2805.24	0.00	18.34	81.66	4.54	17.79	63.90
KAHALGAON TPS	6	500	2483.75	9.19	19.24	71.57	3.80	14.89	56.60
KAHALGAON TPS	7	500	2580.99	10.68	14.10	75.22	3.51	16.45	58.80
KAHALGAON TPS		2340	13438.00	5.20	13.83	80.97	3.75	15.56	65.38
CHANDRAPURA(D VC) TPS	1	130	654.92	0.00	17.74	82.26	0.12	25.25	57.40
CHANDRAPURA(D VC) TPS	2	130	604.19	0.00	13.47	86.53	0.09	33.62	52.90
CHANDRAPURA(D VC) TPS	3	130	909.56	3.36	5.18	91.46	0.26	11.80	79.70
CHANDRAPURA(D VC) TPS	7	250	956.82	0.00	6.23	93.77	0.37	0.37	86.30
CHANDRAPURA(D VC) TPS	8	250	864.14	0.00	51.28	48.72	0.02	11.73	41.20
CHANDRAPURA(DVC) TPS		890	3989.60	0.68	21.56	77.76	0.15	17.46	60.53
DURGAPUR TPS	3	130	622.65	24.52	6.32	69.16	0.41	15.01	54.50
DURGAPUR TPS	4	210	1333.12	2.06	9.77	88.17	0.68	16.07	72.30
DURGAPUR TPS		340	1955.80	10.64	8.45	80.90	0.57	15.66	65.49
BOKARO `B` TPS	1	210	1266.62	0.00	12.87	87.13	0.58	18.54	68.70
BOKARO `B` TPS	2	210	1053.94	0.00	19.10	80.90	0.59	24.03	57.10
BOKARO `B` TPS	3	210	1035.96	0.00	11.42	88.58	1.76	32.52	56.20
BOKARO `B` TPS		630	3356.50	0.00	14.46	85.54	0.97	25.03	60.65

UNIT WISE AND STATION WISE PERFORMANCE INDICES FOR 2011-12

NAME OF UNIT/ SYSTEM	UNI T NO.	CAP (MW)	GEN (MU)	Planned Mainten ance (%)	Forced outage (%)	Operating Availability (%)	Reserve Shutdo wn + Low system demand (%)	Partial Unavaila- bility including Low system demand (%)	PLF (%)
MEJIA TPS	1	210	1304.75	0.00	18.92	81.08	0.95	9.97	70.70
MEJIA TPS	2	210	1279.40	0.00	22.80	77.20	0.35	7.88	69.40
MEJIA TPS	3	210	1237.52	12.29	7.54	80.17	3.31	13.24	67.10
MEJIA TPS	4	210	1333.02	0.00	17.98	82.02	0.85	10.16	72.30
MEJIA TPS	5	250	1777.21	7.32	0.97	91.71	0.58	10.79	80.90
MEJIA TPS	6	250	1856.64	0.00	6.99	93.01	0.81	8.53	84.50
MEJIA TPS	7	500	1385.75	0.00	42.21	57.79	1.30	16.53	46.00
MEJIA TPS		1840	10174.00	2.70	17.41	79.89	1.15	11.22	69.56
TALCHER (OLD) TPS	1	62.5	532.77	0.00	2.60	97.40	0.37	0.57	97.00
TALCHER (OLD) TPS	2	62.5	524.70	3.69	1.24	95.08	0.00	0.27	95.60
TALCHER (OLD) TPS	3	62.5	510.98	4.19	0.81	95.00	0.25	1.92	93.10
TALCHER (OLD) TPS	4	62.5	527.46	0.00	4.27	95.73	0.08	0.17	96.10
TALCHER (OLD) TPS	5	110	788.09	14.74	2.06	83.21	0.00	2.01	81.60
TALCHER (OLD) TPS	6	110	856.07	11.27	2.04	86.69	0.01	0.01	88.60
TALCHER (OLD) TPS		470	3740.10	7.13	2.14	90.72	0.10	0.86	90.59
TALCHER STPS	1	500	3391.66	13.39	4.63	81.97	1.44	5.16	77.20
TALCHER STPS	2	500	3533.18	11.01	3.71	85.28	1.53	5.16	80.40
TALCHER STPS	3	500	3366.28	12.99	6.75	80.26	1.23	4.25	76.60
TALCHER STPS	4	500	3609.95	8.41	2.75	88.85	1.92	6.95	82.20
TALCHER STPS	5	500	3905.68	0.00	6.44	93.56	1.79	5.12	88.90
TALCHER STPS	6	500	4050.36	0.00	1.43	98.57	2.10	7.15	92.20
TALCHER STPS		3000	21857.00	7.63	4.29	88.08	1.67	5.63	82.94
FARAKKA STPS	1	200	1490.76	0.00	4.38	95.62	2.64	10.76	84.90
FARAKKA STPS	2	200	1233.81	8.41	10.40	81.19	2.88	10.87	70.20
FARAKKA STPS	3	200	1422.21	0.00	6.36	93.64	3.59	12.69	81.00
FARAKKA STPS	4	500	2673.26	19.88	6.05	74.07	2.81	13.20	60.90
FARAKKA STPS	5	500	3158.13	10.55	2.81	86.64	3.64	14.78	71.90
FARAKKA STPS		1600	9978.20	10.56	5.41	84.03	3.15	13.03	71.00
PATRATU TPS	1	40	0.00	0.00	100.00	0.00	0.00	0.00	0.00
PATRATU TPS	2	40	0.00	0.00	100.00	0.00	0.00	0.00	0.00
PATRATU TPS	3	40	0.00	0.00	100.00	0.00	0.00	0.00	0.00
PATRATU TPS	4	40	241.48	0.00	29.54	70.46	0.00	2.91	68.70
PATRATU TPS	5	90	0.00	0.00	100.00	0.00	0.00	0.00	0.00
PATRATU TPS	6	90	192.09	0.00	36.09	63.91	0.00	39.77	24.30
PATRATU TPS	7	105	0.00	0.00	100.00	0.00	0.00	0.00	0.00
PATRATU TPS	8	105	0.00	0.00	100.00	0.00	0.00	0.00	0.00
PATRATU TPS	9	110	0.00	100.00	0.00	0.00	0.00	0.00	0.00
PATRATU TPS	10	110	0.00	100.00	0.00	0.00	0.00	0.00	0.00
PATRATU TPS		770	433.57	28.57	60.30	11.13	0.00	4.80	6.41
BARAUNI TPS	4	50	0.00	0.00	94.81	5.19	0.00	0.00	0.00
BARAUNI TPS	5	50	0.00	0.00	94.81	5.19	0.00	0.00	0.00
BARAUNI TPS	6	105	166.74	3.95	53.67	42.39	0.27	25.05	18.10
BARAUNI TPS	7	105	0.00	100.00	0.00	0.00	0.00	0.00	0.00
BARAUNI TPS		310	166.74	35.21	48.76	16.03	0.09	8.48	6.12
TENUGHAT TPS	1	210	1152.98	0.00	35.55	64.45	0.48	2.34	62.50
TENUGHAT TPS	2	210	1124.39	0.00	36.85	63.15	0.82	2.41	61.00
TENUGHAT TPS		420	2277.40	0.00	36.20	63.80	0.65	2.38	61.73
IB VALLEY TPS	1	210	1466.87	8.26	6.08	85.66	0.00	7.21	79.50
IB VALLEY TPS	2	210	1483.27	6.75	4.20	89.06	0.00	8.66	80.40
IB VALLEY TPS		420	2950.10	7.51	5.14	87.36	0.00	7.94	79.97
BANDEL TPS	1	60	232.50	0.00	33.79	66.21	1.30	22.47	44.10
BANDEL TPS	2	60	111.44	5.03	66.20	28.77	0.32	7.70	21.10
BANDEL TPS	3	60	174.18	0.00	45.40	54.60	7.63	21.86	33.00
BANDEL TPS	4	60	277.39	0.00	20.57	79.43	1.93	24.08	52.60

UNIT WISE AND STATION WISE PERFORMANCE INDICES FOR 2011-12

NAME OF UNIT/ SYSTEM	UNI T NO.	CAP (MW)	GEN (MU)	Planned Mainten ance (%)	Forced outage (%)	Operating Availability (%)	Reserve Shutdo wn + Low system demand (%)	Partial Unavaila- bility including Low system demand (%)	PLF (%)
BANDEL TPS	5	210	1066.62	6.24	5.17	88.60	1.86	30.92	57.80
BANDEL TPS		450	1862.10	3.58	24.54	71.88	2.36	24.58	47.11
SANTALDIH TPS	1	120	0.00	0.00	100.00	0.00	0.00	0.00	0.00
SANTALDIH TPS	2	120	0.00	0.00	100.00	0.00	0.00	0.00	0.00
SANTALDIH TPS	3	120	0.00	0.00	100.00	0.00	0.00	0.00	0.00
SANTALDIH TPS	4	120	0.00	0.00	100.00	0.00	0.00	0.00	0.00
SANTALDIH TPS	5	250	1839.79	0.00	9.02	90.98	0.29	7.15	83.80
SANTALDIH TPS	6	250	786.05	0.00	48.16	51.84	1.42	7.78	67.10
SANTALDIH TPS		980	2625.80	0.00	65.82	34.18	0.29	3.23	34.30
KOLAGHAT TPS	1	210	1001.27	0.00	22.65	77.35	0.78	23.07	54.30
KOLAGHAT TPS	2	210	1209.13	0.00	4.68	95.32	1.22	29.84	65.50
KOLAGHAT TPS	3	210	989.55	14.04	7.45	78.51	1.15	25.10	53.60
KOLAGHAT TPS	4	210	1272.31	5.33	6.38	88.29	1.74	19.35	69.00
KOLAGHAT TPS	5	210	1529.75	4.41	3.74	91.85	1.90	8.92	82.90
KOLAGHAT TPS	6	210	1558.98	0.00	5.41	94.59	3.72	10.08	84.50
KOLAGHAT TPS		1260	7561.00	3.96	8.38	87.65	1.75	19.39	68.31
BAKRESWAR TPS	1	210	1369.36	9.63	4.49	85.88	2.19	11.67	74.20
BAKRESWAR TPS	2	210	1639.46	0.00	0.43	99.57	2.56	10.63	88.90
BAKRESWAR TPS	3	210	1608.18	0.00	2.01	97.99	3.24	10.87	87.20
BAKRESWAR TPS	4	210	1563.75	7.33	0.94	91.74	1.25	7.06	84.80
BAKRESWAR TPS	5	210	1544.69	5.76	4.61	89.63	1.30	5.95	83.70
BAKRESWAR TPS		1050	7725.40	4.54	2.50	92.96	2.11	9.23	83.76
SAGARDIGHI TPS	1	300	2119.50	0.00	4.46	95.54	0.57	15.20	80.40
SAGARDIGHI TPS	2	300	1958.53	5.71	7.23	87.06	0.00	12.47	74.30
SAGARDIGHI TPS		600	4078.00	2.86	5.85	91.30	0.29	13.83	77.38
D.P.L. TPS	1	30	0.00	0.00	100.00	0.00	0.00	0.00	0.00
D.P.L. TPS	2	30	0.00	0.00	100.00	0.00	0.00	0.00	0.00
D.P.L. TPS	3	70	162.01	0	56.74	43.26	1.09	16.71	26.3
D.P.L. TPS	4	75	253.00	15.07	20.09	64.83	2.74	26.09	38.40
D.P.L. TPS	5	75	280.41	0.00	21.51	78.49	4.29	35.80	42.60
D.P.L. TPS	6	110	259.62	40.05	19.21	40.74	1.80	13.88	26.90
D.P.L. TPS	7	300	817.75	0.00	55.23	44.77	0.00	13.75	31.00
D.P.L. TPS		690	1772.80	8.02	46.05	45.93	1.16	16.61	29.25
JOJOBERA TPS	1	120	798.54	6.69	0.01	93.30	8.60	17.54	75.80
JOJOBERA TPS	2	120	824.69	0.00	1.28	98.72	11.34	20.82	78.20
JOJOBERA TPS	3	120	781.46	0.00	0.98	99.02	14.20	25.00	74.10
JOJOBERA TPS		360	2404.70	2.23	0.76	97.01	11.38	21.12	76.04
MAITHON RB TPP	1	525	1269.51	0.00	30.96	69.04	0.00	32.38	45.60
MAITHON RB TPP		525	1269.50	0.00	30.96	69.04	0.00	32.38	45.64
STERLITE TPP	1	600	3197.67	0.00	20.50	79.50	0.04	26.62	60.60
STERLITE TPP	2	600	2066.88	0.00	25.89	74.11	0.00	29.54	39.20
STERLITE TPP	3	600	1101.89	0.00	39.05	60.95	0.00	16.64	34.50
STERLITE TPP		1800	6366.40	0.00	27.70	72.30	0.01	25.34	44.34
NEW COSSIPORE TPS	1	30	28.43	8.20	45.19	46.61	43.18	25.31	10.80
NEW COSSIPORE TPS	2	30	18.63	0.01	41.87	58.12	74.72	50.49	7.10
NEW COSSIPORE TPS	3	50	55.33	0.00	51.02	48.98	43.30	36.89	12.60
NEW COSSIPORE TPS	4	50	143.90	0.00	20.12	79.88	34.20	46.93	32.80
NEW COSSIPORE TPS		160	246.29	1.54	38.55	59.91	46.33	40.41	17.52
TITAGARH TPS	1	60	454.73	0.00	3.82	96.18	8.29	10.05	86.30
TITAGARH TPS	2	60	421.30	3.95	3.20	92.84	8.19	12.71	79.90
TITAGARH TPS	3	60	403.89	5.61	3.47	90.92	8.61	14.20	76.60
TITAGARH TPS	4	60	435.73	0.00	6.20	93.80	5.15	10.98	82.70
TITAGARH TPS		240	1715.70	2.39	4.17	93.44	7.56	11.98	81.38

UNIT WISE AND STATION WISE PERFORMANCE INDICES FOR 2011-12

NAME OF UNIT/ SYSTEM	UNI T NO.	CAP (MW)	GEN (MU)	Planned Mainten ance (%)	Forced outage (%)	Operating Availability (%)	Reserve Shutdo wn + Low system demand (%)	Partial Unavaila- bility including Low system demand (%)	PLF (%)
SOUTHERN REPL. TPS	1	67.5	507.51	3.98	3.25	92.77	4.35	7.17	85.60
SOUTHERN REPL. TPS	2	67.5	529.00	0.00	4.26	95.74	4.95	6.38	89.20
SOUTHERN REPL. TPS		135	1036.50	1.99	3.75	94.25	4.65	6.78	87.41
BUDGE BUDGE TPS	1	250	1906.14	4.96	1.50	93.54	3.42	6.74	86.80
BUDGE BUDGE TPS	2	250	1879.97	2.89	4.10	93.00	3.84	7.06	85.60
BUDGE BUDGE TPS	3	250	2153.64	0.00	0.93	99.07	0.77	1.48	98.10
BUDGE BUDGE TPS		750	5939.80	2.62	2.18	95.21	2.67	5.10	90.16
North Eastern Region									
CHANDRAPUR(AS SAM) TPS	1	30	0.00	0.00	100.00	0.00	0.00	0.00	0.00
CHANDRAPUR(AS SAM) TPS	2	30	0.00	0.00	100.00	0.00	0.00	0.00	0.00
CHANDRAPUR(A SSAM) TPS		60	0.00	0.00	100.00	0.00	0.00	0.00	0.00
Grand Total		97768	606684	5.93	11.46	82.61	1.90	9.56	73.32

SECTION-3

PLANNED MAINTENANCE

- 3.1** Govt. of India/ CEA has been constantly monitoring the outages of various power generating units in the country and taking necessary steps to improve their performance. In order to reduce the period of planned maintenance outages of Coal / Lignite based thermal power stations and make/ review the norms of planned maintenance procedures to be adopted by thermal power stations, Ministry of Power had constituted various committees from time to time. Last such committee was set up in 2000-01 under the chairmanship of Shri P.K. Kukde, the then Technical Director (Generation & OM), Maharashtra State Electricity Board (MSEB). The committee recommended five/six year rolling plan for Coal/Lignite based stations with an average annual outage of 28 days for units of 200/210/500 MW capacity. Beside reduction of Planned Maintenance duration, the committee also drawn out several other recommendations like reliability based maintenance, on-line condition monitoring practices, monitoring on availability basis, safety and environment norms at the work place etc. The highlights of the recommendations of the Kukde Committee regarding Planned Maintenance norms for thermal power stations are given at **Annexure- 3.1**.
- 3.2** During 2011-12, a total of 257875 hours were utilized for carrying out various types of planned maintenance works to facilitate healthy running of generating units. During the year, the All India energy loss on account of planned maintenance was 5.93% (of the maximum possible generation) against a program of 5.6%. During the year, out of total 454 units analysed, capital maintenance was carried out on 18 generating units whereas annual maintenance was carried out on 191 generating units. The details of Planned Maintenance of thermal stations for the year 2011-12 are shown below :

Work	No. of Units	Capacity of the units involved (MW)	Average duration (Days)	Energy Loss (MU)	Energy loss as % of max possible gen.
1. Annual Maintenance					
i) Programme	227	53762.5	28	35442.6	4.37
ii) Actual	191	40887.5	30	29865.23	3.68
2. Capital Maintenance					
i) Programme	12	2297.5	44	2417.4	0.3
ii) Actual	18	4350	58	5811.44	0.72
3. Total Annual and Capital Maintenance					
i) Programme	239	56060	28	37860	4.67
ii) Actual	210	45297.5	32	35676.67	4.4
4. R&M Works					
i) Programme	9	1063	210	6577.78	0.81
ii) Actual	15	1889	240	10055.95	1.24
5. BOILER INSPECTION/ RE-CERTIFICATION					
i) Programme	11	1947.5	20	1004.46	0.12
ii) Actual	19	4020	12	1356.8	0.17
6. Other Planned Maintenance including PG Test of new units & RLA studies					
ii) Actual	11	2350	29	956.66	0.12
7. Grand Total					
i) Programme	259	59070.5	34	45442.24	5.6
ii) Actual	255	53621.5	42	48046.08	5.93

The average duration of capital maintenance was achieved 58 days which was more than the schedule duration of 44 days as capital maintenance of some of the units got

extended or unscheduled capital maintenance of some units started. The list of such units which deviated from their scheduled plan are listed below:

Station Name	Unit	Capacity	Actual Start days	Actual end Date	Duration	Remarks
ROPAR TPS	3	210	15-Nov-11	23-Dec-11	40	Unscheduled
SATPURA TPS	6	200	31-Jul-11	29-Sep-11	61	Unscheduled
AMARKANTAK EXT TPS	2	120	01-Jun-11	14-Nov-11	167	Unscheduled
SANJAY GANDHI TPS	3	210	26-Jul-11	08-Sep-11	45	Unscheduled
DURGAPUR TPS	4	210	07-Nov-10	08-Apr-11	153	Extended
BAKRESWAR TPS	1	210	04-Jul-11	08-Aug-11	36	Unscheduled

The average duration of R&M was achieved as 240 days which was more than the schedule duration of 210 days as R&M of some of the units got extended or unscheduled R&M of some units started. The list of such units which deviated from their scheduled plan are listed below:

Station Name	Unit	Cap.	Act_Start Date	Act_End Date	Remarks
OBRA TPS	9	200	2-Nov-08	26-Jun-11	Extended R&M the unit was to resynchronize in April 2011
PATRATU TPS	9	110	10-Aug-06	Contd	Extended R&M the unit was to resynchronize in Dec. 2011
BARAUNI TPS	6	105	17-Mar-12	Contd	Unit #7 Barauni was target to Synchronize in Nov 2011 and R&M activity of Unit #6 was to begin after wards.
BARAUNI TPS	7	105	23-Aug-06	Contd	
MUZAFFARPUR TPS	1	110	6-Oct-03	Contd	Unit #1Muzaffarpur was target to Synchronize in Sept 2011 and R&M activity of Unit #2 was to begin after wards.
MUZAFFARPUR TPS	2	110	29-Mar-12	Contd	

- 3.3** It was observed that boiler overhaul of only 84.14% of the thermal units scheduled for Boiler overhaul (191 units out of schedule of 227 units) could be carried out during 2011-12. However, it was observed that some of the units were taken for unscheduled Boiler Overhaul for more than 40 days. List of such units are enclosed at Annexure-3.2. The capital overhaul of 150 % of the scheduled thermal units (18 units out of schedule of 12 units) was carried out during the year. Actual planned maintenance figures include all such units, which first went under forced outage, & subsequently their boiler/capital overhaul was taken though it was not scheduled during that duration. Similarly, annual maintenance of boilers and capital maintenance of turbines carried out by some stations authorities during the long duration forced outage of the units could not be included in the above table mainly because such information was not made available. The total number of boilers and turbines programmed to be taken out for overhaul and the numbers actually taken out during 2008-09 onwards are given below :-

Particulars	Boiler				Turbine			
	2008-09	2009-10	2010-11	2011-12	2008-09	2009-10	2010-11	2011-12
1. Nos. Programmed for overhaul	216	251	254	227	65	76	67	12
2. Nos. actually taken out including those taken unscheduled	177	177	202	191	35	32	25	18
3. Percentage of Program	81.94%	70.52%	79.53%	84.14%	53.85%	42.11%	37.31%	150%

The Unit wise details of Boiler Overhaul and Capital Maintenance of turbo-generators during 2010-11 are given in **Annexure 3.3**.

3.4 CAPACITY GROUPWISE MAINTENANCE (NUMBER OF UNITS)

3.4.1 The All India capacity group wise, equipment-wise Planned Maintenance details in terms of number of units actually taken out for Planned Maintenance during the year 2011-12 is given below:

Particulars	660-800 MW	490-600 MW	300-330 MW	250 MW	210 MW	195-200 MW	100-150 MW	25-99 MW	Total
A. Boiler									
1 No. Programmed for Overhaul	1	42	5	17	79	17	34	32	227
2 No. Actually taken out	0	22	6	16	73	16	31	27	191
B. Turbine									
3 No. Programmed for Overhaul	0	1	0	0	6	0	4	1	12
4 No. Actually taken out	0	3	0	1	9	1	2	2	18

The details of units are given in Annexure 3.2 under heading Capital Maintenance

3.4.2 Annual overhaul of more number of thermal units were carried out than the program during 2011-12 in all the regions. Region-wise details of number of units programmed/ actually taken out for Planned Maintenance during 2011-12 is indicated below:

No. of Units taken for Maintenance in the Region											
Capacity Group (MW)	AM/CM	Northern		Western		Southern		Eastern		All India	
		Program	Actual	Program	Actual	Program	Actual	Program	Actual	Program	Actual
660-800	A.M.	0	0	1	0	0	0	0	0	1	0
	C.M.	0	0	0	0	0	0	0	0	0	0
490-600	A.M.	10	6	12	5	9	5	11	6	42	22
	C.M.	0	0	1	2	0	0	0	1	1	3
300-330	A.M.	1	1	4	3	0	1	0	1	5	6
250	A.M.	10	5	6	7	1	2	0	2	17	16
	C.M.	0	0	0	0	0	1	0	0	0	1
210	A.M.	20	12	26	29	24	25	9	7	79	73
	C.M.	1	3	2	2	3	2	0	2	6	9
195-200	A.M.	7	7	4	6	3	2	3	1	17	16
	C.M.	0	0	0	1	0	0	0	0	0	1
100-150	A.M.	13	6	8	12	9	8	4	5	34	31
	C.M.	1	0	3	2	0	0	0	0	4	2
25-99	A.M.	5	3	10	9	11	10	6	5	32	27
	C.M.	0	1	0	0	1	0	0	1	1	2
All Capacity	A.M.	66	40	71	71	57	53	33	27	227	191
	C.M.	2	4	6	7	4	3	0	5	12	18

A.M. – Annual Maintenance (Boiler Overhaul)

C.M. – Capital Maintenance (Turbo-Generator)

3.5 DURATION OF BOILER/ TURBO-GENERATOR OVERHAUL

3.5.1 Capacity group wise maintenance duration

During 2011-12 , the actual average duration (112 days) of capital Maintenance of Turbo –Generator of capacity 100-150 MW group was much greater than that of its program (38 days). Capacity Group wise average duration of Boiler Overhaul and Capital Maintenance of TG sets with respect to program for the years 2011-12 at national level are given below.:-

Average Duration (in days) during 2011-12				
Capacity Group (MW)	Annual Maintenance (Boiler Overhaul)		Capital Maintenance of Turbo-Generator	
	Program (days)	Actual (days)	Program (days)	Actual (days)
660-800	10	0	0	0
490-600	29	34	41	58
300-330	15	28	0	0
250	25	26	0	59
210	27	29	47	44
195-200	27	27	0	60
100-150	32	36	38	112
25-99	25	24	46	76
ALL CAPACITY	27	30	44	58

In the capacity group wise 100-150 MW, the average duration of capacity maintenance was high due to extended C.M. of Amarkantak Ext U# 2 (120MW).

3.5.2 Region-wise actual duration of boiler overhaul & capital maintenance against programmed duration for the year 2011-12 is indicated in the following tables. In Eastern Region there was no program for any capital Maintenance of units, however in actual 5 no of units were taken for Capital Maintenance with average duration of 32 days.:

Average Duration of Boiler overhaul (in days) in the Region during 2011-12								
Capacity in MW	Northern Region		Western Region		Southern Region		Eastern Region	
	Program	Actual	Program	Actual	Program	Actual	Program	Actual
660-800	0	0	10	0	0	0	0	0
490-600	34	29	26	25	27	45	31	38
300-330	15	42	15	15	0	60	0	21
250	24	24	26	27	30	33	0	22
210	29	25	25	35	26	24	30	30
195-200	27	24	28	31	28	21	25	31
100-150	16	56	17	32	22	22	55	44
25-99	18	19	28	26	23	23	21	23
ALL CAPACITY	22	30	23	31	25	26	31	32

Average Duration of Capital Maintenance (in days) in the Region during 2010-11								
Capacity in MW	Northern Region		Western Region		Southern Region		Eastern Region	
	Program	Actual	Program	Actual	Program	Actual	Program	Actual
490-600	0	0	41	50	0	0	0	73
250	0	0	0	0	0	59	0	0
210	45	37	36	79	55	54	0	22
195-200	0	0	0	60	0	0	0	0
100-150	50	0	34	112	0	0	0	0
25-99	0	133	0	0	46	0	0	18
ALL CAPACITY	48	61	36	77	53	56	0	32

Note: In the North Eastern Region, both the units of Chandrapur (Assam) TPS were under forced outage throughout the year. Thus no thermal unit considered in the review in the North-eastern Region was operational and hence is not included.

3.5.3 SECTOR WISE MAINTENANCE DURATION

During 2011-12 average duration of boiler overhaul was minimum (21 days) for the units under private utilities. It was maximum (30 days) for State Sector units. Average duration of capital maintenance for the State Sector units was 62 days while that of Central Sector units was 40 days. The average duration of boiler overhaul and capital maintenance of turbo-generators during last four years in different sectors in the country are shown below:

Sector	Average Duration (Days)				
	AM/CM	08-09	09-10	10-11	11-12
		Actual	Actual	Actual	Actual
CENTRAL	A.M.	26	29	26	31
	C.M.	51	68	52	40
PVT IPP	A.M.	0	26	15	28
	C.M.	0	0	0	0
PVT UTILITY	A.M.	18	19	28	21
	C.M.	0	0	0	0
STATE	A.M.	24	27	28	30
	C.M.	55	58	71	62

3.5.4 REGION WISE MAINTENANCE DURATION

Region wise details of the number of units, aggregate capacity and planned maintenance of thermal generating units carried out during the year 2011-12 is given below:

REGION	Units considered in the review		Planned maintenance carried out on units				
	No.	Capacity (MW)	No	Capacity (MW)	Duration (Hrs.)	Energy Loss (MU)	Energy Loss as % of Max. Poss. gen
NORTHERN	109	23578	57	12169	83006.6	13339.5	6.97
WESTERN	146	33297.5	90	19072.5	67935.5	14158.1	5.12
SOUTHERN	85	18582.5	60	12032.5	39026.4	8830.54	5.58
EASTERN	112	22250	48	10347.5	67907.2	11717.9	6.35
NORTH EASTERN*	2	60					
ALL INDIA	454	97768	255	53622	257876	48046	5.93

* In the North Eastern Region, both the units of Chandrapur (Assam) TPS were under forced outage throughout the year.

The average duration of boiler overhaul and capital maintenance of turbo-generators during the last four years in different Regions in the country are shown below:

Region	Average Region wise maintenance duration (Days)				
	AM/CM	08-09	09-10	10-11	11-12
Northern Region	A.M.	22	27	28	30
	C.M.	57	57	85	61
Western Region	A.M.	24	27	28	31
	C.M.	47	49	55	77
Southern Region	A.M.	24	27	24	26
	C.M.	56	86	68	56
Eastern Region	A.M.	27	30	26	32

Region	Average Region wise maintenance duration (Days)				
	AM/CM	08-09	09-10	10-11	11-12
All India	C.M.	57	67	57	32
	A.M.	24	28	27	30
	C.M.	53	62	64	58

3.5.5 UTILITY / ORGANISATION WISE MAINTENANCE DURATION

Sector wise / Utility / Organization-wise planned maintenance duration of thermal generating units and energy loss due to it during the year 2011-12 is shown below:

Sl. No.	Organisation /Utility	No. of Units	Capacity (MW)	Planned Maintenance				
				No. of Units	Capacity (MW)	Duration (Hrs.)	Energy Loss (MU)	Energy Loss as % of Max. Poss. gen.
CENTRAL SECTOR								
1	NTPC Ltd.	85	27045	55	16580	38795.68	11845.40	5.12
2	DVC	17	3700	5	930	4352.10	743.76	2.61
3	NLC	20	2740	16	2230	10783.08	1556.51	7.12
4	APCPL*	1	500	0	0	0.00	0.00	0.00
5	NSPCL	2	500	0	0	0.00	0.00	0.00
6	K.B.U.N.L	2	220	2	220	8844.03	972.84	50.34
CENTRAL SECTOR		127	34705	78	19960	62774.89	15118.52	5.16
STATE SECTOR								
NORTHERN REGION								
1	HPGCL	12	3160	4	1170	2497.07	883.27	4.45
2	IPGCL	2	135	0	0	0.00	0.00	0.00
3	PSPCL	14	2620	7	1310	15714.44	2092.78	9.09
4	RRVUNL	16	3240	12	2365	7740.85	1451.93	5.10
5	UPRVUNL	23	4173	12	2024	42028.01	5529.70	15.96
WESTERN REGION								
6	CSPGCL	12	1780	9	1400	5452.58	912.51	5.84
7	GMDCL	2	250	2	250	2312.20	289.02	13.16
8	GSECL	23	3720	18	2940	12182.56	1947.74	5.96
9	MAHAGENCO	34	7255	18	4395	14845.34	3789.98	6.18
10	MPPGCL	17	2932.5	12	1977.5	15285.04	2556.90	9.93
SOUTHERN REGION								
11	APGENCO	25	5092.5	16	2822.5	10281.06	2381.84	5.69
12	KPCL	9	2220	8	2010	6476.10	1620.47	8.31
13	TNGDCL	17	2970	11	2160	5503.19	1059.58	4.06
EASTERN REGION								
14	BSEB	4	310	2	210	9130.75	958.73	35.21
15	DPL	7	690	2	185	4842.19	486.30	8.02
16	JSEB	10	770	2	220	17568.00	1932.48	28.57
17	OPGC	2	420	2	420	1318.48	276.88	7.51
18	TVNL	2	420	0	0	0.00	0.00	0.00
19	WBPDCL	24	4340	9	1830	5575.47	1149.68	3.11
NORTH -EASTERN REGION								
20	APGPCL#	2	60	0	0	0.00	0.00	0.00
STATE SECTOR		257	46558	146	27689	178753.33	29319.79	7.47
PVT UTILITIES								
WESTERN REGION								
1	RIL (DAHANU)	2	500	1	250	48.75	12.19	0.28
2	TATA PCL	4	1400	2	750	1565.88	591.82	4.81
3	TOR. POW. (AECO)	5	400	4	290	1761.70	130.88	3.72
EASTERN REGION								
4	CESC	13	1285	7	747.5	2600.75	268.07	2.37
PVT UTILITY		24	3585	14	2037.5	5977.08	1002.95	3.18
IPPS								

Sl. No.	Organisation /Utility	No. of Units	Capacity (MW)	Planned Maintenance				Energy Loss as % of Max. Poss. gen.
				No. of Units	Capacity (MW)	Duration (Hrs.)	Energy Loss (MU)	
NORTHERN REGION								
1	BEPL*	1	45	0	0	0.00	0.00	0.00
2	RPSCL	3	900	1	300	1006.05	301.82	5.29
3	RWPL (JSW)	4	540	1	135	102.40	13.82	0.45
WESTERN REGION								
4	APL	7	3300	2	660	717.43	236.75	1.07
5	GIPCL	4	500	3	375	3023.90	377.99	8.79
6	JPL	4	1000	2	500	746.38	186.60	2.12
7	JSWEL	4	1200	1	300	387.08	116.12	1.43
8	LANCO*	2	600	0	0	0.00	0.00	0.00
9	VESPL*	1	35	0	0	0.00	0.00	0.00
10	WPCL	3	405	1	135	350.03	47.25	1.41
SOUTHERN REGION								
10	JSWEL	4	860	3	560	1915.90	492.92	6.53
11	ST-CMSECP	1	250	1	250	454.62	113.66	5.18
12	UPCL	1	600	1	600	1078.85	647.31	12.28
EASTERN REGION								
13	MPL*	1	525	0	0	0.00	0.00	0.00
14	SEL*	3	1800	0	0	0.00	0.00	0.00
15	TATA PCL	3	360	1	120	587.70	70.52	2.23
PVT IPP		46	12920	17	3935	10370.34	2604.76	2.78
ALL INDIA		454	97768	255	53622	257875.64	48046.01	5.93

*New Utility, #Units 1&2 for Chandrapur (Assam) TPS were forced shutdown during 2011-12

Annexure-3.1
SHEET 1 OF 3

HIGH LIGHT OF RECOMMENDATIONS OF SHRINIVASAN COMMITTEE / KUKDE WORKING GROUP			
ITEM I: DURATION OF PLANNED MAINTENANCE			
	Srinivasan Committee	Present Recommendation by Kukde Working Group	Remarks
A) COAL BASED			
Unit Size / Capacity	No. of days (5 years Rolling Plan)	No. of days (5 / 6 years Rolling Plan)	
a) <210 MW	a)4x30+1x45=33(Av./yr)	a) Same as before	a) Most of the units need R&M/RLA etc.
b) 210 Mw	b)4x45+1x75=51(Av./yr)	*b)2x15+2x30+1x50=28 (Av./yr) (For Russian Design)	b) Reduction of 23 days/year/unit c) Reduction of 35 days/year/unit
c) 500 MW	c)4x60+1x75=63(Av./yr)	**c)3x15+2x40+1x45=28 (Av./yr) (For KWU Design with any fuel firing)	* Indicative Rolling Plans are given in Foot Note.
B) LIGNITE BASED			
200/210 MW	Not covered	3x15+2x30+1x50=26(Av./yr)	
C) GAS BASED			
	Not covered	-OEM's Recommendations are as follows: I. M/s ABB ▶ `A' type inspection after 4000 and 12,000 valuated operating hours (VOH) (5 days) ▶ `B' type inspection after 8000 VOH (11 days) ▶ `C' type inspection after 16,000 VOH (42 days) II. M/s GEC ▶ `Minor' inspection after 8000 equivalent operating hours (EOH) (13 days) ▶ `Hot gas path' inspection at 24000 EOH (30 days) ▶ `Major' inspection after 48000 EOH (50 days) III. M/s Siemens ▶ `Minor' inspection after 4000 EOH (5 days) ▶ Hot section Maintenance after every 25,000 EOH ▶ Major overhaul after 50000 EOH (50 days)	Same as per OEM's recommendations - do - - do -

Annexure-3.1
SHEET 2 OF 3

ITEM II. SCOPE OF WORK FOR PLANNED MAINTENANCE			
	Srinivasan Committee	Present Recommendation by Kukde Working Group	Remarks
	Only capital Maintenance of 200 MW is defined through a model Pert Chart	i) Scope of work for Boiler Overhaul and Capital Overhaul of Turbine is clearly defined in Section IV of the report. ii) Necessary Pert/Bar Charts for coal/lignite/gas based units are exhibited separately.	Scope of work for Capital Maintenance for large capacity sized units which were to be executed in 75 days as per Srinivasan Committee Report are fully covered in present recommendation to be executed in 50 days.
ITEM III. CHANGE OVER TO AVAILABILITY BASED MONITORING			
	Not applicable	Working Group has recommended availability based monitoring system be introduced as per NERC's model. (Section-7, Paper-3)	As per this, the outages/ partial outages (De-rating) are reported under three head namely; planned, scheduled & forced against the two heads viz. planned & forced presently being followed.
ITEM IV. ON LINE MONITORING SYSTEM			
	Not applicable	Working Group has recommended On Line Condition Monitoring techniques to be introduced in Indian Power Sector by assimilating similar technology successfully working abroad (Para 6.6.1)	This is to optimize cost & time of planned maintenance
ITEM V. New T&P			
		i) Cup lock scaffolding ii) Boroscope iii) Modern tube cutting & edge preparation Machine. iv) Rotor purge test kit and ELCID test kits for stator core healthiness v) Ultrasonic thickness meter with data logger. vi) Film thickness meters	These are in addition to the T&P items earlier covered in Srinivasan Committee Report.

<i>*Five years Rolling Plan for Russian Design TGs</i>	<i>PA-Boiler Overhaul (30 days)</i>	→	<i>Alternate year</i>
	<i>Mini Shut down – Shutdown for Statutory inspection of Boiler (15 days)</i>	→	<i>-do -</i>
	<i>PC – Capital Maintenance of Boiler + TG (50 days)</i>	→	<i>Every five years</i>
<i>** Six years Rolling Plan for KWU Design</i>	<i>PA-Boiler Overhaul with one turbine cylinder (40 days)</i>	→	<i>Alternate year</i>
	<i>Mini Shut down – Shutdown for Statutory inspection of Boiler (15 days)</i>	→	<i>- do -</i>
	<i>PC – Capital Maintenance of Boiler + one TG + Generator (45 days)</i>		<i>Every six years</i>

HIGH LIGHTS OF PLANNED MAINTENANCE CYCLE RECOMMENDED BY KUKDE WORKING GROUP

COAL BASED THERMAL POWER STATIONS FIVE YEAR ROLLING PLAN FOR RUSSIAN DESIGN UNITS					
I YEAR	II YEAR	III YEAR	IV YEAR	V YEAR	
Mini Shut Down 15 DAYS STATUTORY & EFFICIENCY RELATED JOB	Planned Annual 30 DAYS BOILER OVERHAUL	Mini Shut Down 15 DAYS STATUTORY & EFFICIENCY RELATED JOB	Planned Annual 30 DAYS BOILER OVERHAUL	Planned Capital 50 DAYS CAPITAL MAINTENANCE OF TURBINE & GENERATOR	
Total number of days in five years : 140 Days Average number of days per year : 28 Days					
COAL BASED THERMAL POWER STATIONS SIX YEAR ROLLING PLAN FOR KWU UNITS					
I YEAR	II YEAR	III YEAR	IV YEAR	V YEAR	VI YEAR
Mini Shut Down 15 DAYS STATUTORY & EFFICIENCY RELATED JOB	Planned Annual 40 DAYS BOILER OVERHAUL WITH ONE TURBINE	Mini Shut Down 15 DAYS STATUTORY & EFFICIENCY RELATED JOB	Planned Annual 40 DAYS BOILER OVERHAUL WITH ONE TURBINE MODULE	Mini Shut Down 15 DAYS STATUTORY & EFFICIENCY RELATED JOB	Planned Capital 50 DAYS BOILER OVERHAUL WITH ONE TURBINE & GENERATOR
Total number of days in six years : 170 Days Average number of days per year : 28 Days					
LIGNITE BASED THERMAL POWER STATIONS SIX YEAR ROLLING PLAN					
I YEAR	II YEAR	III YEAR	IV YEAR	V YEAR	VI YEAR
Mini Shut Down 15 DAYS STATUTORY & EFFICIENCY RELATED JOB	Planned Annual 30 DAYS BOILER OVERHAUL	Mini Shut Down 15 DAYS STATUTORY & EFFICIENCY RELATED JOB	Planned Capital 50 DAYS BOILER OVERHAUL, HP/IP/LP TURBINE, GENERATOR & ABG REPLACEMENT	Mini Shut Down 15 DAYS STATUTORY & EFFICIENCY RELATED JOB	Planned Annual 30 DAYS BOILER OVERHAUL
Total number of days in six years : 155 Days Average number of days per year : 26 Days					

Annexure-3.2**Unscheduled and Extended Annual Maintenance**

State Name	Station Name	Unit	Cap.	Act_Start Date	Act_End Date	Act_Mtc. Days	Act_Reason
HARYANA	RAJIV GANDHI TPS	1	600	01-Dec-11	13-Jan-12	44	Unsch. and Extended
UTTAR PRADESH	OBRA TPS	13	200	06-Jan-11	02-May-11	117	A M
UTTAR PRADESH	ROSA TPP Ph-I	2	300	25-Sep-11	06-Nov-11	43	A M
GUJARAT	AKRIMOTA LIG TPS	1	125	26-Nov-11	13-Jan-12	50	A M
GUJARAT	AKRIMOTA LIG TPS	2	125	02-Nov-11	19-Dec-11	49	A M
MADHYA PRADESH	SATPURA TPS	8	210	09-Sep-11	08-Dec-11	91	A M
MADHYA PRADESH	SATPURA TPS	9	210	20-Jan-12	12-Mar-12	53	A M
CHHATTISGARH	KORBA-WEST TPS	3	210	30-Aug-11	15-Oct-11	48	A M
MADHYA PRADESH	SANJAY GANDHI TPS	2	210	06-Sep-11	31-Oct-11	57	A M
KARNATAKA	RAICHUR TPS	8	250	07-May-11	24-Jun-11	49	A M
KARNATAKA	TORANGALLU TPS(SBU-II)	4	300	01-Jun-11	30-Jul-11	61	A M
KARNATAKA	UDUPI TPP	1	600	08-Oct-11	22-Nov-11	46	A M
WEST BENGAL	KOLAGHAT TPS	3	210	26-Nov-11	16-Jan-12	52	A M

Annexure-3.3
SHEET _ OF 5

UNIT-WISE PLANNED MAINTENANCE DURING THE YEAR 2010-11

Name Of Station	Unit No.	Cap (in MW)	Date Of Outage	Date Of Return	Outage hours	Outage days	MU Loss	Energy loss as % of Pos. Gen.
ANNUAL MAINTENANCE (BOILER OVERHAUL)								
NORTHERN REGION								
BADARPUR TPS	1	95	01-SEP-2011	22-SEP-2011	500.13	21	47.51	5.69
BADARPUR TPS	2	95	03-APR-2011	20-APR-2011	428.75	18	40.73	4.88
BADARPUR TPS	3	95	07-JUL-2011	26-JUL-2011	469.8	20	44.63	5.35
BADARPUR TPS	4	210	27-OCT-2011	22-DEC-2011	1351.22	56	283.76	15.38
PANIPAT TPS	4	110	20-MAR-2012	31-MAR-2012	272.7	11	30	3.1
RAJIV GANDHI TPS	2	600	21-FEB-2012	31-MAR-2012	954.5	40	572.7	32.6
GH TPS (LEH.MOH.)	4	250	01-MAY-2011	27-MAY-2011	615.78	26	153.94	7.01
ROPAR TPS	2	210	21-OCT-2011	13-NOV-2011	565.33	24	118.72	6.44
ROPAR TPS	6	210	31-JAN-2012	20-FEB-2012	497.5	21	104.48	5.66
KOTA TPS	1	110	17-SEP-2011	09-OCT-2011	527.27	22	58	6
KOTA TPS	2	110	03-SEP-2011	25-SEP-2011	526.68	22	57.93	6
KOTA TPS	3	210	13-AUG-2011	09-SEP-2011	642.72	27	134.97	7.32
KOTA TPS	4	210	23-JUN-2011	17-JUL-2011	571.78	24	120.07	6.51
KOTA TPS	5	210	17-JUL-2011	06-AUG-2011	470.05	20	98.71	5.35
KOTA TPS	6	195	07-SEP-2011	28-SEP-2011	482	20	93.99	5.49
KOTA TPS	7	195	30-JUN-2011	20-JUL-2011	494.18	21	96.37	5.63
SURATGARH TPS	1	250	16-AUG-2011	06-SEP-2011	495.78	21	123.94	5.64
SURATGARH TPS	3	250	15-MAY-2011	31-MAY-2011	396.17	17	99.04	4.51
SURATGARH TPS	4	250	17-MAY-2011	22-JUN-2011	855.07	36	213.77	9.73
SURATGARH TPS	5	250	17-JUL-2011	09-AUG-2011	561.87	23	140.47	6.4
GIRAL TPS	1	125	12-APR-2011	22-JUN-2011	1717.28	72	214.66	19.55
OBRA TPS	13	200	Cont from last year	02-MAY-2011	764.07	32	152.81	8.7
PANKI TPS	3	105	14-JUL-2011	27-SEP-2011	1800.85	75	189.09	20.5
PARICHHHA TPS	3	210	Cont from last year	08-APR-2011	168.75	7	35.44	1.92
ANPARA TPS	4	500	28-JUL-2011	08-SEP-2011	1017.37	42	508.68	11.58
SINGRAULI STPS	2	200	06-JUN-2011	25-JUL-2011	1187.05	49	237.41	13.51
SINGRAULI STPS	4	200	14-SEP-2011	28-SEP-2011	357.67	15	71.53	4.07
SINGRAULI STPS	4	200	12-APR-2011	26-APR-2011	327.33	14	65.47	3.73
SINGRAULI STPS	5	200	11-JAN-2012	31-JAN-2012	489.6	20	97.92	5.57
SINGRAULI STPS	7	500	11-APR-2011	12-MAY-2011	750.02	31	375.01	8.54
RIHAND STPS	3	500	16-AUG-2011	17-SEP-2011	784.32	33	392.16	8.93
RIHAND STPS	4	500	17-SEP-2011	17-OCT-2011	701.78	29	350.89	7.99
UNCHAHAH TPS	1	210	Cont from last year	15-APR-2011	354.25	15	74.39	4.03
UNCHAHAH TPS	2	210	18-APR-2011	14-MAY-2011	626.68	26	131.6	7.13
UNCHAHAH TPS	4	210	18-SEP-2011	24-OCT-2011	845.1	35	177.47	9.62
DADRI (NCTPP)	3	210	01-DEC-2011	18-DEC-2011	419.88	17	88.17	4.78
DADRI (NCTPP)	4	210	06-AUG-2011	09-SEP-2011	807	34	169.47	9.19
DADRI (NCTPP)	5	490	31-MAR-2012	31-MAR-2012	0.02	0	0.01	0
TANDA TPS	1	110	26-MAY-2011	06-OCT-2011	3205.72	134	352.63	36.49
ROSA TPP Ph-I	2	300	25-SEP-2011	06-NOV-2011	1006.05	42	301.82	11.45
WESTERN REGION								
UKAI TPS	2	120	04-JUL-2011	31-JUL-2011	634	26	76.08	7.22
UKAI TPS	3	200	12-SEP-2011	30-SEP-2011	432	18	86.4	4.92
UKAI TPS	4	200	01-JAN-2012	22-JAN-2012	506.38	21	101.28	5.76
UKAI TPS	5	210	16-MAY-2011	10-JUN-2011	619.37	26	130.07	7.05
GANDHI NAGAR TPS	2	120	20-JUN-2011	16-JUL-2011	605.25	25	72.63	6.89
GANDHI NAGAR TPS	4	210	10-APR-2011	30-APR-2011	493.67	21	103.67	5.62
GANDHI NAGAR TPS	5	210	10-JUL-2011	02-AUG-2011	564	24	118.44	6.42
WANAKBORI TPS	1	210	09-JUL-2011	02-SEP-2011	1330.55	55	279.42	15.15
WANAKBORI TPS	3	210	02-SEP-2011	24-SEP-2011	544.52	23	114.35	6.2
WANAKBORI TPS	4	210	02-JUN-2011	27-JUN-2011	609.35	25	127.96	6.94
WANAKBORI TPS	5	210	31-JUL-2011	19-AUG-2011	455.73	19	95.7	5.19
WANAKBORI TPS	7	210	02-NOV-2011	08-DEC-2011	877.33	37	184.24	9.99
SIKKA REP. TPS	1	120	20-JUL-2011	09-AUG-2011	490.92	20	58.91	5.59
SIKKA REP. TPS	2	120	22-JUN-2011	19-JUL-2011	657.67	27	78.92	7.49
KUTCH LIG. TPS	1	70	08-JUL-2011	09-AUG-2011	771.75	32	54.02	8.79
KUTCH LIG. TPS	2	70	21-JUL-2011	27-AUG-2011	903.2	38	63.22	10.28

Annexure-3.3
SHEET _ OF 5
UNIT-WISE PLANNED MAINTENANCE DURING THE YEAR 2010-11

Name Of Station	Unit No.	Cap (in MW)	Date Of Outage	Date Of Return	Outage hours	Outage days	MU Loss	Energy loss as % of Pos. Gen.
AKRIMOTA LIG TPS	1	125	26-NOV-2011	13-JAN-2012	1165.1	49	145.64	13.26
AKRIMOTA LIG TPS	2	125	02-NOV-2011	19-DEC-2011	1147.1	48	143.39	13.06
SABARMATI (C STATION)	15	30	Cont from last year	28-APR-2011	665.3	28	19.96	7.57
SABARMATI (D-F STATIONS)	1	120	11-FEB-2012	01-MAR-2012	458.33	19	55	5.22
SABARMATI (D-F STATIONS)	2	110	14-DEC-2011	03-JAN-2012	459.75	19	50.57	5.23
SURAT LIG. TPS	1	125	17-JUL-2011	11-AUG-2011	616.58	26	77.07	7.02
SURAT LIG. TPS	3	125	17-AUG-2011	13-SEP-2011	657.25	27	82.16	7.48
SURAT LIG. TPS	4	125	08-SEP-2011	20-NOV-2011	1750.07	73	218.76	21.7
MUNDRA TPS	2	330	16-JUL-2011	01-AUG-2011	382.18	16	126.12	4.35
MUNDRA TPS	4	330	29-AUG-2011	12-SEP-2011	335.25	14	110.63	3.82
SATPURA TPS	3	62.5	30-APR-2011	31-MAY-2011	730.87	30	45.68	8.32
SATPURA TPS	4	62.5	23-JUL-2011	17-AUG-2011	609.83	25	38.11	6.94
SATPURA TPS	5	62.5	30-MAY-2011	22-JUN-2011	558.05	23	34.88	6.35
SATPURA TPS	7	210	25-JUN-2011	01-AUG-2011	876.58	37	184.08	9.98
SATPURA TPS	8	210	09-SEP-2011	08-DEC-2011	2168.72	90	455.43	24.69
SATPURA TPS	9	210	20-JAN-2012	12-MAR-2012	1245.95	52	261.65	14.18
KORBA-II	1	50	29-NOV-2011	27-DEC-2011	675.42	28	33.77	7.69
KORBA-II	2	50	16-AUG-2011	02-SEP-2011	425.77	18	21.29	4.85
KORBA-II	4	50	08-NOV-2011	23-NOV-2011	367.08	15	18.35	4.18
KORBA-III	2	120	04-SEP-2011	25-SEP-2011	490.5	20	58.86	5.58
DSPM TPS	1	250	01-JUL-2011	25-JUL-2011	598.83	25	149.71	6.82
DSPM TPS	1	250	07-JUN-2011	30-JUN-2011	564.65	24	141.16	6.43
KORBA-WEST TPS	2	210	02-NOV-2011	02-DEC-2011	733.83	31	154.1	8.35
KORBA-WEST TPS	3	210	30-AUG-2011	15-OCT-2011	1116.85	47	234.54	12.71
KORBA-WEST TPS	4	210	04-DEC-2011	24-DEC-2011	479.65	20	100.73	5.46
SANJAY GANDHI TPS	1	210	24-SEP-2011	23-OCT-2011	710.87	30	149.28	8.09
SANJAY GANDHI TPS	2	210	06-SEP-2011	31-OCT-2011	1337.08	56	280.79	15.22
SANJAY GANDHI TPS	4	210	06-MAY-2011	30-MAY-2011	574.68	24	120.68	6.54
KORBA STPS	1	200	20-DEC-2011	24-MAR-2012	2285.92	95	457.18	26.02
KORBA STPS	2	200	01-JAN-2012	19-JAN-2012	424.03	18	84.81	4.83
KORBA STPS	2	200	21-DEC-2011	31-DEC-2011	238.2	10	47.64	2.71
KORBA STPS	3	200	Cont from last year	25-APR-2011	593.52	25	118.7	6.76
KORBA STPS	5	500	10-MAY-2011	04-JUN-2011	606.57	25	303.28	6.91
SIPAT STPS	5	500	01-APR-2011	22-APR-2011	505.5	21	252.75	5.75
VINDHYACHAL STPS	1	210	07-MAY-2011	10-JUN-2011	822.77	34	172.78	9.37
VINDHYACHAL STPS	4	210	10-APR-2011	28-APR-2011	438.17	18	92.02	4.99
VINDHYACHAL STPS	5	210	14-SEP-2011	03-OCT-2011	459.63	19	96.52	5.23
VINDHYACHAL STPS	7	500	19-JUL-2011	13-AUG-2011	606.17	25	303.08	6.9
VINDHYACHAL STPS	10	500	15-JUN-2011	10-JUL-2011	620.45	26	310.22	7.06
OP JINDAL TPS	1	250	01-AUG-2011	16-AUG-2011	378.45	16	94.61	4.31
OP JINDAL TPS	3	250	02-SEP-2011	17-SEP-2011	367.93	15	91.98	4.19
NASIK TPS	3	210	23-JUL-2011	22-AUG-2011	720.58	30	151.32	8.2
KORADI TPS	7	210	08-OCT-2011	11-NOV-2011	800.2	33	168.04	9.11
KHAPARKHEDA TPS	1	210	31-DEC-2011	27-JAN-2012	656.07	27	137.77	7.47
KHAPARKHEDA TPS	3	210	25-APR-2011	24-MAY-2011	700.17	29	147.04	7.97
PARAS TPS	3	250	19-AUG-2011	26-SEP-2011	897.87	37	224.47	10.22
BHUSAWAL TPS	2	210	22-AUG-2011	17-OCT-2011	1329.92	55	279.28	15.14
PARLI TPS	4	210	31-AUG-2011	17-OCT-2011	1128.02	47	236.88	12.84
PARLI TPS	6	250	16-JUN-2011	23-JUL-2011	883.3	37	220.82	10.06
CHANDRAPUR(MAHAR ASHTRA) STPS	1	210	11-MAR-2012	31-MAR-2012	495.2	21	103.99	5.64
CHANDRAPUR(MAHAR ASHTRA) STPS	2	210	05-NOV-2011	04-DEC-2011	696.12	29	146.19	7.92
CHANDRAPUR(MAHAR ASHTRA) STPS	4	210	16-AUG-2011	12-OCT-2011	1377.27	57	289.23	15.68
CHANDRAPUR(MAHAR ASHTRA) STPS	6	500	12-JUL-2011	06-AUG-2011	604.13	25	302.06	6.88
TROMBAY TPS	8	250	15-JUL-2011	15-AUG-2011	764.5	32	191.12	8.7

Annexure-3.3

SHEET _ OF 5

UNIT-WISE PLANNED MAINTENANCE DURING THE YEAR 2010-11

Name Of Station	Unit No.	Cap (in MW)	Date Of Outage	Date Of Return	Outage hours	Outage days	MU Loss	Energy loss as % of Pos. Gen.
JSW RATNAGIRI TPP	2	300	10-DEC-2011	27-DEC-2011	387.08	16	116.12	4.41
SOUTHERN REGION								
KOTHAGUDEM TPS	1	60	28-JUL-2011	12-AUG-2011	362.63	15	21.76	4.13
KOTHAGUDEM TPS	3	60	15-SEP-2011	06-OCT-2011	490.5	20	29.43	5.58
KOTHAGUDEM TPS	4	60	31-AUG-2011	15-SEP-2011	357.22	15	21.43	4.07
KOTHAGUDEM TPS	5	120	19-AUG-2011	06-SEP-2011	423.95	18	50.87	4.83
KOTHAGUDEM TPS	7	120	03-SEP-2011	05-OCT-2011	781.17	33	93.74	8.89
KOTHAGUDEM TPS	8	120	15-JUL-2011	02-AUG-2011	454.03	19	54.48	5.17
Dr. N.TATA RAO TPS	1	210	20-JUL-2011	02-AUG-2011	322.3	13	67.68	3.67
Dr. N.TATA RAO TPS	3	210	17-JUN-2011	02-JUL-2011	378.67	16	79.52	4.31
RAMAGUNDEM - B TPS	1	62.5	23-AUG-2011	19-SEP-2011	669.5	28	41.84	7.62
KAKATIYA TPS	1	500	07-OCT-2011	31-DEC-2011	2055.22	86	1027.61	23.4
RAYALASEEMA TPS	4	210	02-SEP-2011	17-SEP-2011	375.17	16	78.79	4.27
RAMAGUNDEM STPS	1	200	25-NOV-2011	18-DEC-2011	547.15	23	109.43	6.23
RAMAGUNDEM STPS	2	200	01-NOV-2011	21-NOV-2011	481.32	20	96.26	5.48
RAMAGUNDEM STPS	4	500	01-APR-2011	05-MAY-2011	836.27	35	418.14	9.52
SIMHADRI	2	500	20-NOV-2011	17-DEC-2011	668.87	28	334.44	7.61
RAICHUR TPS	1	210	10-OCT-2011	07-NOV-2011	671.05	28	140.92	7.64
RAICHUR TPS	2	210	24-JUL-2011	14-AUG-2011	493.83	21	103.7	5.62
RAICHUR TPS	3	210	18-AUG-2011	27-OCT-2011	1676.57	70	352.08	19.09
RAICHUR TPS	4	210	26-JUN-2011	15-JUL-2011	468.93	20	98.48	5.34
RAICHUR TPS	6	210	02-JUL-2011	25-JUL-2011	553.12	23	116.16	6.3
RAICHUR TPS	7	210	08-AUG-2011	07-SEP-2011	722.88	30	151.8	8.23
RAICHUR TPS	8	250	07-MAY-2011	24-JUN-2011	1150.1	48	287.52	13.09
TORANGALLU TPS(SBU-I)	1	130	21-OCT-2011	26-OCT-2011	142.73	6	18.55	1.62
TORANGALLU TPS(SBU-I)	2	130	06-OCT-2011	20-OCT-2011	338.77	14	44.04	3.86
TORANGALLU TPS(SBU-II)	4	300	01-JUN-2011	30-JUL-2011	1434.4	60	430.32	16.33
BELLARY TPS	1	500	02-SEP-2011	03-OCT-2011	739.62	31	369.81	8.42
UDUPI TPP	1	600	08-OCT-2011	22-NOV-2011	1078.85	45	647.31	12.28
ENNORE TPS	2	60	25-JUL-2011	21-AUG-2011	640.63	27	38.44	7.29
TUTICORIN TPS	4	210	13-AUG-2011	01-SEP-2011	470.5	20	98.8	5.36
METTUR TPS	1	210	22-JAN-2012	05-FEB-2012	327.55	14	68.79	3.73
METTUR TPS	2	210	02-JUL-2011	16-JUL-2011	340.72	14	71.55	3.88
METTUR TPS	3	210	04-SEP-2011	18-SEP-2011	338.1	14	71	3.85
METTUR TPS	4	210	05-AUG-2011	19-AUG-2011	334.2	14	70.18	3.8
NORTH CHENNAI TPS	1	210	14-JUN-2011	30-JUN-2011	382.57	16	80.34	4.36
NORTH CHENNAI TPS	2	210	19-NOV-2011	06-DEC-2011	415.57	17	87.27	4.73
NORTH CHENNAI TPS	3	210	24-AUG-2011	10-SEP-2011	409.97	17	86.09	4.67
NEYVELI TPS- I	1	50	22-NOV-2011	07-DEC-2011	358.43	15	17.92	4.08
NEYVELI TPS- I	2	50	21-MAY-2011	24-JUL-2011	1528.22	64	76.41	17.4
NEYVELI TPS- I	3	50	28-APR-2011	17-MAY-2011	474.08	20	23.7	5.4
NEYVELI TPS- I	4	50	11-SEP-2011	26-SEP-2011	372.92	16	18.65	4.25
NEYVELI TPS- I	5	50	05-OCT-2011	16-OCT-2011	257.28	11	12.86	2.93
NEYVELI TPS- I	7	100	20-AUG-2011	06-SEP-2011	397.58	17	39.76	4.53
NEYVELI TPS- I	8	100	24-OCT-2011	12-DEC-2011	1181.18	49	118.12	13.45
NEYVELI TPS- I	9	100	27-JUL-2011	17-AUG-2011	506.6	21	50.66	5.77
NEYVELI TPS-II	1	210	01-JUL-2011	23-JUL-2011	528.2	22	110.92	6.01
NEYVELI TPS-II	2	210	15-OCT-2011	25-NOV-2011	987.83	41	207.44	11.25
NEYVELI TPS-II	3	210	19-NOV-2011	10-DEC-2011	498.88	21	104.76	5.68
NEYVELI TPS-II	4	210	18-SEP-2011	18-OCT-2011	706.98	29	148.47	8.05
NEYVELI TPS-II	6	210	11-DEC-2011	31-DEC-2011	497.43	21	104.46	5.66
NEYVELI TPS-II	7	210	25-AUG-2011	27-SEP-2011	796.03	33	167.17	9.06
NEYVELI (EXT) TPS	1	210	06-OCT-2011	31-OCT-2011	605.22	25	127.1	6.89
NEYVELI (EXT) TPS	2	210	06-NOV-2011	21-DEC-2011	1086.22	45	228.11	12.37
NEYVELI TPS(Z)	1	250	09-NOV-2011	27-NOV-2011	454.62	19	113.66	5.18
EASTERN REGION								
KAHALGAON TPS	1	210	04-JUL-2011	23-JUL-2011	464.98	19	97.65	5.29
KAHALGAON TPS	4	210	10-APR-2011	29-APR-2011	466.47	19	97.96	5.31
KAHALGAON TPS	6	500	01-SEP-2011	05-OCT-2011	807.23	34	403.62	9.19

Annexure-3.3
SHEET _ OF 5
UNIT-WISE PLANNED MAINTENANCE DURING THE YEAR 2010-11

Name Of Station	Unit No.	Cap (in MW)	Date Of Outage	Date Of Return	Outage hours	Outage days	MU Loss	Energy loss as % of Pos. Gen.
JOJOBERA TPS	1	120	01-APR-2011	25-APR-2011	587.7	24	70.52	6.69
CHANDRAPURA(DVC) TPS	3	130	26-NOV-2011	08-DEC-2011	295.25	12	38.38	3.36
DURGAPUR TPS	3	130	01-APR-2011	29-JUN-2011	2153.5	90	279.96	24.52
MEJIA TPS	3	210	10-JUL-2011	24-AUG-2011	1079.67	45	226.73	12.29
MEJIA TPS	5	250	09-FEB-2012	06-MAR-2012	643.1	27	160.78	7.32
TALCHER (OLD) TPS	2	62.5	16-JAN-2012	29-JAN-2012	323.7	13	20.23	3.69
TALCHER (OLD) TPS	3	62.5	07-NOV-2011	23-NOV-2011	368.17	15	23.01	4.19
TALCHER (OLD) TPS	5	110	29-AUG-2011	22-OCT-2011	1294.5	54	142.4	14.74
TALCHER (OLD) TPS	6	110	06-JUL-2011	16-AUG-2011	989.92	41	108.89	11.27
IB VALLEY TPS	1	210	05-APR-2011	05-MAY-2011	725.7	30	152.4	8.26
TALCHER STPS	1	500	10-NOV-2011	18-DEC-2011	916.27	38	458.14	10.43
TALCHER STPS	2	500	17-JUN-2011	27-JUL-2011	967.13	40	483.56	11.01
TALCHER STPS	3	500	07-AUG-2011	23-SEP-2011	1140.92	48	570.46	12.99
TALCHER STPS	4	500	27-SEP-2011	27-OCT-2011	738.45	31	369.22	8.41
KOLAGHAT TPS	3	210	26-NOV-2011	16-JAN-2012	1233.48	51	259.03	14.04
BAKRESWAR TPS	4	210	08-NOV-2011	04-DEC-2011	643.47	27	135.13	7.33
BAKRESWAR TPS	5	210	06-JAN-2012	27-JAN-2012	505.57	21	106.17	5.76
SAGARDIGHI TPS	2	300	10-AUG-2011	31-AUG-2011	501.62	21	150.49	5.71
D.P.L. TPS	4	75	19-OCT-2011	13-DEC-2011	1323.97	55	99.3	15.07
TITAGARH TPS	2	60	08-DEC-2011	22-DEC-2011	347.4	14	20.84	3.95
SOUTHERN REPL. TPS	1	67.5	30-JAN-2012	13-FEB-2012	349.75	15	23.61	3.98
BUDGE BUDGE TPS	1	250	10-JAN-2012	28-JAN-2012	435.4	18	108.85	4.96
FARAKKA STPS	2	200	11-MAY-2011	11-JUN-2011	738.43	31	147.69	8.41
FARAKKA STPS	5	500	01-APR-2011	09-MAY-2011	926.75	39	463.38	10.55
Sub Total	191	40887.5			135736.45	5660	29865.16	8.4
BOILER INSPECTION/RE-CERTIFICATION								
NORTHERN								
OBRA TPS	1	40	10-MAY-2011	12-MAY-2011	49.27	2	1.97	0.56
UNCHAHAH TPS	3	210	24-MAY-2011	03-JUN-2011	226.92	9	47.65	2.58
UNCHAHAH TPS	4	210	24-MAY-2011	27-MAY-2011	84.53	4	17.75	0.96
WESTERN								
UKAI TPS	2	120	01-AUG-2011	13-AUG-2011	308.35	13	37	3.51
SABARMATI (C STATION)	15	30	07-DEC-2011	14-DEC-2011	178.32	7	5.35	2.03
VINDHYACHAL STPS	6	210	03-SEP-2011	10-SEP-2011	171.12	7	35.94	1.95
KORADI TPS	7	210	07-JUL-2011	09-JUL-2011	45.47	2	9.55	0.52
CHANDRAPUR(MAHAR ASHTRA) STPS	1	210	30-MAY-2011	01-JUN-2011	50.62	2	10.63	0.58
TROMBAY TPS	5	500	11-JAN-2012	13-FEB-2012	801.38	33	400.69	9.12
SOUTHERN								
Dr. N.TATA RAO TPS	2	210	20-AUG-2011	03-SEP-2011	355.07	15	74.56	4.04
Dr. N.TATA RAO TPS	4	210	04-AUG-2011	19-AUG-2011	362.37	15	76.1	4.13
RAYALASEEMA TPS	1	210	20-SEP-2011	06-OCT-2011	363.08	15	76.25	4.13
TUTICORIN TPS	2	210	28-MAY-2011	12-JUN-2011	357.25	15	75.02	4.07
EASTERN								
TALCHER STPS	1	500	29-JUL-2011	09-AUG-2011	260.28	11	130.14	2.96
BANDEL TPS	5	210	11-DEC-2011	02-JAN-2012	547.73	23	115.02	6.24
BANDEL TPS	2	60	01-FEB-2012	19-FEB-2012	442.08	18	26.52	5.03
KOLAGHAT TPS	4	210	10-SEP-2011	29-SEP-2011	467.77	19	98.23	5.33
KOLAGHAT TPS	5	210	01-FEB-2012	17-FEB-2012	387.63	16	81.4	4.41
BUDGE BUDGE TPS	2	250	27-DEC-2011	06-JAN-2012	254.2	11	63.55	2.89
Sub Total	19	4020			5271.36	219	1356.81	3.9
CAPITAL MAINTENANCE								
NORTHERN								
PANIPAT TPS	6	210	07-FEB-2012	16-MAR-2012	922.45	38	193.71	10.5
ROPAR TPS	3	210	15-NOV-2011	23-DEC-2011	928.42	39	194.97	10.57
ROPAR TPS	4	210	26-FEB-2012	29-MAR-2012	788.58	33	165.6	8.98
HARDUAGANJ TPS	5	60	01-APR-2011	12-AUG-2011	3197.83	133	191.87	36.41
WESTERN								
GANDHI NAGAR TPS	1	120	02-NOV-2011	29-DEC-2011	1378.52	57	165.42	15.69
SATPURA TPS	6	200	31-JUL-2011	29-SEP-2011	1441.83	60	288.37	16.41
AMARKANTAK EXT TPS	2	120	01-JUN-2011	14-NOV-2011	3983	166	477.96	45.34

Annexure-3.3
SHEET _ OF 5

UNIT-WISE PLANNED MAINTENANCE DURING THE YEAR 2010-11

Name Of Station	Unit No.	Cap (in MW)	Date Of Outage	Date Of Return	Outage hours	Outage days	MU Loss	Energy loss as % of Pos. Gen.
SANJAY GANDHI TPS	3	210	26-JUL-2011	08-SEP-2011	1047.58	44	219.99	11.93
KORBA STPS	4	500	15-SEP-2011	25-OCT-2011	966.75	40	483.38	11.01
PARLI TPS	3	210	12-NOV-2011	06-MAR-2012	2742.58	114	575.94	31.22
CHANDRAPUR(MAHARASHTRA) STPS	7	500	29-JUN-2011	28-AUG-2011	1429.22	60	714.61	16.27
SOUTHERN								
KOTHAGUDEM TPS (NEW)	1	250	23-JUN-2011	21-AUG-2011	1410.75	59	352.69	16.06
Dr. N.TATA RAO TPS	5	210	03-SEP-2011	19-OCT-2011	1119.43	47	235.08	12.74
TUTICORIN TPS	3	210	20-NOV-2011	21-JAN-2012	1486.13	62	312.09	16.92
EASTERN								
DURGAPUR TPS	4	210	Cont from last year	08-APR-2011	180.58	8	37.92	2.06
IB VALLEY TPS	2	210	19-FEB-2012	15-MAR-2012	592.78	25	124.48	6.75
BAKRESWAR TPS	1	210	04-JUL-2011	08-AUG-2011	846.12	35	177.69	9.63
FARAKKA STPS	4	500	08-AUG-2011	19-OCT-2011	1746.3	73	873.15	19.88
Sub Total	18	4350			26650.93	1111	5811.44	15
OTHER PLANNED MAINTENANCE INCLUDING PG TEST OF NEW UNITS AND RLA STUDIES ETC.								
NORTHERN								
JALIPA KAPURDI TPP	2	135	19-DEC-2011	23-DEC-2011	102.4	4	13.82	1.17
WESTERN								
KORBA STPS	7	500	14-MAY-2011	28-MAY-2011	328.72	14	164.36	3.74
PARAS TPS	4	250	17-MAY-2011	29-MAY-2011	288.58	12	72.14	3.29
EASTERN								
KAHALGAON TPS	7	500	15-JUN-2011	24-JUL-2011	938.2	39	469.1	10.68
NEW COSSIPORE TPS	2	30	01-APR-2011	01-APR-2011	0.92	0	0.03	0.01
Sub Total	5	1415			1658.82	69	719.46	5.79
NORTHERN								
PANIPAT TPS	7	250	18-APR-2011	02-MAY-2011	347.42	14	86.86	3.96
WESTERN								
VINDHYACHAL STPS	2	210	01-APR-2011	08-APR-2011	189.08	8	39.71	2.15
DAHANU TPS	2	250	15-NOV-2011	18-NOV-2011	48.75	2	12.19	0.55
WARDHA WARORA TPP	3	135	20-JUN-2011	04-JUL-2011	350.03	15	47.25	4.78
EASTERN								
NEW COSSIPORE TPS	1	30	01-NOV-2011	30-NOV-2011	719.98	30	21.6	8.2
TITAGARH TPS	3	60	09-NOV-2011	29-NOV-2011	493.1	21	29.59	5.61
Sub Total	6	935			2148.36	90	237.19	2.96
R AND M WORKS								
NORTHERN REGION								
GND TPS(BHATINDA)	3	110	Cont from last year	31-MAR-2012	8784	366	966.24	100
GND TPS(BHATINDA)*	4	110	05-NOV-2011	31-MAR-2012	3534.83	147	388.83	40.24
OBRA TPS	7	94	Cont from last year	31-MAR-2012	8784	366	825.7	100
OBRA TPS	9	200	Cont from last year	26-JUN-2011	2084.58	87	416.92	23.73
OBRA TPS*	10	200	22-MAR-2012	31-MAR-2012	230.17	10	46.03	2.62
OBRA TPS*	11	200	10-JUL-2011	31-MAR-2012	6363.12	265	1272.62	72.44
HARDUAGANJ TPS	7	105	Cont from last year	31-MAR-2012	8784	366	922.32	100
PARICHHA TPS	2	110	Cont from last year	31-MAR-2012	8784	366	966.24	100
EASTERN								
PATRATU TPS	9	110	Cont from last year	31-MAR-2012	8784	366	966.24	100
PATRATU TPS	10	110	Cont from last year	31-MAR-2012	8784	366	966.24	100
BARAUNI TPS*	6	105	17-MAR-2012	31-MAR-2012	346.75	14	36.41	3.95
BARAUNI TPS	7	105	Cont from last year	31-MAR-2012	8784	366	922.32	100
MUZAFFARPUR TPS	1	110	Cont from last year	31-MAR-2012	8784	366	966.24	100
MUZAFFARPUR TPS*	2	110	29-MAR-2012	31-MAR-2012	60.03	3	6.6	0.68

Annexure-3.3
SHEET _ OF 5

UNIT-WISE PLANNED MAINTENANCE DURING THE YEAR 2010-11

Name Of Station	Unit No.	Cap (in MW)	Date Of Outage	Date Of Return	Outage hours	Outage days	MU Loss	Energy loss as % of Pos. Gen.
D.P.L. TPS*	6	110	06-NOV-2011	31-MAR-2012	3518.22	147	387	40.05
Sub Total	15	1889			86409.7	3601	10055.96	60.6
Total	255	53621.5			257875.64	10750	48046.01	5.93

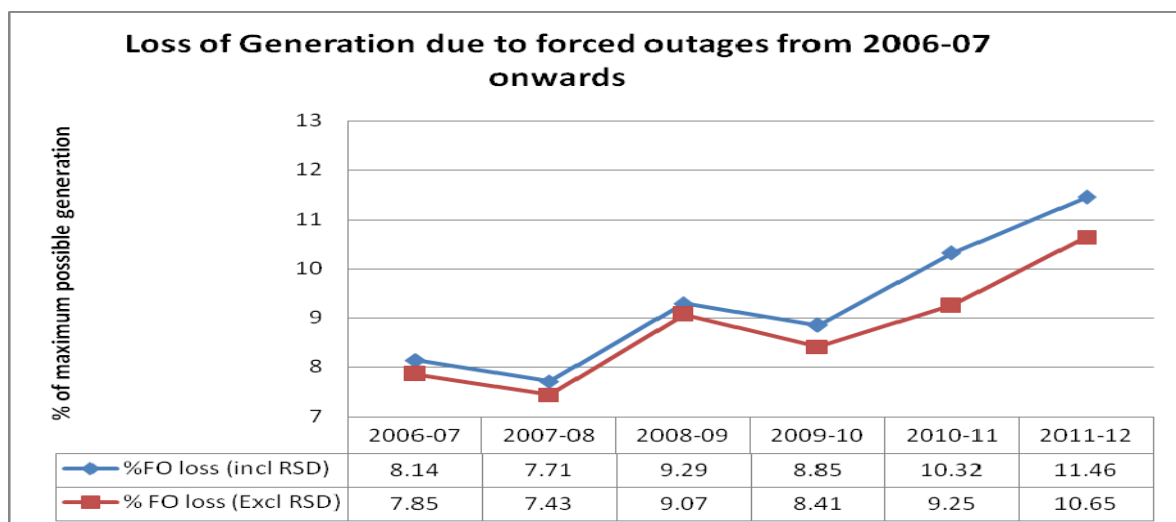
**Units taken under R&M during 2011-12*

SECTION-4

FORCED OUTAGES

4.1 Based on the analysis carried out for 454 generating units installed in 126 thermal power stations, forced outages of generating units were due to various problems in generating equipment, auxiliary system and also due to external reasons viz., shortage of fuel, system constraints, receipt of lower schedules etc.

During the financial year 2011-12, the loss of generation on account of forced outages of various units increased to 92.9BU from 75.2BU during 2010-12. Non availability of thermal units in the country due to forced outages increased to 11.46% from 10.32% during 2010-11. The All India energy loss due to forced outage of units considered in the review as the percentage of the maximum possible generation calculated on the basis of rated capacity of the units from year 2006-07 onwards are depicted below:



4.2 Main Reasons for increases Forced Outages: During the year 2011-12, the many thermal power stations were kept under forced shutdown on account of the following constraints/ developments:

4.2.1 Transmission Constraints: Some thermal power stations faced the problem of transmission constraints and were kept shutdown. Following are some units which were under long duration forced outage due to transmission constraints. The impact of these shutdown on % Forced outages are worked out as below:

Station	Unit No.	Capacity (MW)	Date Of Outage	Date of Return	Outage DAYS	MU Loss
MUNDRA TPS	6	660	1-OCT-2011	31-OCT-2011	31	491.03
MUNDRA TPS	6	660	18-FEB-2012	31-MAR-2012	43	675.39
PARICHHA TPS	4	210	19-DEC-11	29-FEB-2012	73	366.1
STERLITE TPP	2	600	01-SEP-2011	28-SEP-2011	28	399.43
ROSA TPP Ph-I	3	300	01-FEB-2012	15-MAR-2012	44	313.57
Impact on percentage All India Forced Outage						0.28%

4.2.2 Equipment Problems of some new units: Some of the following new units considered in Review were on long duration Forced outages due to equipment problems. The total MU loss and % impact on forced outages were worked out as follows. Last year(2010-11) the % impact on All India forced outages due to long duration forced outages of new units due to equipment problems were merely 0.13%.

Station	Unit No.	Capacity (MW)	Date Of Outage	Date of Return	Reason	MU Loss
INDIRA GANDHI STPP	1	500	08-MAY-2011	02-JUN-2011	ELECTRICAL MISCELLANEOUS PROBLEMS	301.52
INDIRA GANDHI STPP	1	500	19-FEB-2012	31-MAR-2012	GENERATOR MISCELLANEOUS	498.00
MEJIA TPS	7	500	09-OCT-2011	07-NOV-2011	GEN. TRANS DAMAGED	352.62
MEJIA TPS	7	500	29-DEC-2011	29-JAN-2012	GENERATOR MISCELLANEOUS	372.04
MUNDRA TPS	5	660	08-OCT-2011	07-NOV-2011	BOILER FEED PUMP/MOTOR PROBLEM	474.52
MUNDRA TPS	6	660	20-DEC-2011	03-FEB-2012	TURBINE MISC. PROBLEMS	718.79
SIPAT STPS	1	660	01-MAR-2012	31-MAR-2012	TURB. AXIAL SHIFT/ THRUST PAD	491.04
STERLITE TPP	3	600	21-JAN-2012	04-MAR-2012	ECONOMISER TUBE LEAKAGE	190.84
CHANDRAPUR A(DVC) TPS	8	250	13-SEP-2011	24-DEC-2011	VARIOUS STEAM LEAKAGES	613.82
		4955				4095.63
Impact on percentage All India Forced Outages (in terms of maximum possible gen.)						0.50%

4.2.3 Some of the vintage thermal units were kept under forced shutdown and were subsequently declared retired. Paras U#2 (50MW), Bhusawal U#1 (50MW) capacity were declared retired from 19-05-11. Koradi TPS U # 1,2,3,4 each of capacity 105 MW were closed for the whole year.

4.2.4 In the month September-October'2012, coal availability to many power stations of Southern Regions were deteriorated due to Telangana crisis. Telangana crisis hampered the production in SCCL mines which had affected coal supplies to Ramagundam STPS of NTPC, Rayalseema and Kothagudem Thermal Power Stations of APGENCO, Raichur Thermal Power Station of KPCL and Parli Thermal Power Station of MSPGCL.

4.2.5 During the month September'11 and October'11 there was maximum utilization of hydro capacities on account of increased inflows after arrival of good monsoon and also due to reduced domestic and agriculture loads due to pleasant season leading to low demand during the month.

4.2.6 Many thermal units additionally faced the problem of wet coal, as such their performance got adversely affected during this season

4.3 Forced outages due to the main equipment faults accounted for 54.37% of the total forced outages loss. Forced outages due to auxiliary system constraints increased to 8.06% during 2011-12 as compared to 5.70% during 2010-11. The all India energy loss due to Turbine & Turbine Aux. had been increased from 16.49% during 2010-11 to 18.33% during 2011-12 due to increased turbine problems at OBRA TPS, Panipat TPS, Mundra TPS, Patratu TPS. The details are given in annexure 4.3 of section 4. However, the generation loss due to Reserve shut down was decreased to 7.04% during 2011-12 as compared to 10.33% in 2010-11, as units (Dhuvaran U#5 &6, Harduaganj U# 3) which were in Reserve Shut down during 2010-11, were declared retired. The All India energy losses due to outage of equipments & auxiliaries as the percentage of the total forced outage loss during the last five years are shown below:

Sl. No.	Cause of Outage	Percentage of total forced outage losses including losses due to reserve shut down				
		07-08	08-09	09-10	10-11	11-12
I.	Main Equipment					
	a) Boiler	39.34	35.17	36.79	30.64	29.87
	b) Turbine	15.00	13.58	15.64	15.58	15.84
	c) Generator	5.69	7.35	8.55	8.03	8.65
	Sub Total	60.03	56.10	60.98	54.25	54.37
II.	Auxiliaries					
	a) Boiler Aux.	4.96	2.83	3.60	4.79	5.57
	b) Turbine Aux.	1.29	1.26	1.32	0.90	2.49
	Sub-Total	6.25	4.09	4.91	5.70	8.06
III.	Boiler & Boiler Aux.	44.30	38.00	40.39	35.44	35.44
IV.	Turbine & Turbine Aux.	16.29	14.83	16.96	16.49	18.33
V.	Generator	5.69	7.35	8.55	8.03	8.65
VI.	Others	30.20	39.81	34.10	40.05	37.58
VII.	Generation loss due to Reserve Shut Down (RSD)	3.52	2.41	4.83	10.33	7.04

4.4 EQUIPMENT OUTAGES :

A. Boiler

The % generation loss due to Boiler problems increased from 3.25% to 3.42% of the maximum possible generation. The main reason for increase in boiler related problem was that of increased water wall tube leakages (1.47%). A comparison of area/causes of outages in boiler during 2010-11 and 2011-12 is shown below:

Sl. No.	Area/ cause of outages	No. of outages		Loss (MU)		% age of Max. possible gen.	
		2010-11	2011-12	2010-11	2011-12	2010-11	2011-12
1	Water wall tube leakage	976	958	10167.25	11940.6	1.39	1.47
2	Super heater tube leakage	274	232	2798.08	2799.73	0.38	0.35
3	Re-heater tube leakage	174	187	1968.50	2446.16	0.27	0.30
4	Economizer tube leakage	346	284	2803.76	2165.24	0.38	0.27
5	Air pre-heater problems	56	43	468.83	484.75	0.06	0.06
6	Furnace trouble	35	12	331.06	272.81	0.05	0.03
7	Boiler operational problems						
	(a) Furnace fire out/flame failure	652	464	1119.35	908.62	0.15	0.11
	(b) Furnace draft abnormal	526	471	1186.91	1253.65	0.16	0.15
	(c) Drum level high/ low	317	263	664.92	672.04	0.09	0.08
	(d) Miscellaneous	2	5	0.50	2.78	0.00	0.00
8	Others boiler misc. Problem	162	158	1564.06	4813.46	0.21	0.59
	TOTAL BOILER	3520	3077	23073.22	27759.83	3.16	3.42

B. Turbine

An energy loss due to turbine problems was also increased from 1.61 % to 1.82% of the maximum possible generation. Losses due to turbine rotor failure/damage and turbine eccentricity / high vibrations (3518.69 MU and 3021.02 MU) were the main cause of increased loss of generation under this head. A comparison of area/causes of outages in turbine during 2010-11 and 2011-12 is shown below:

Sl. No.	Area/ cause of outages	No. of Outages		Loss (MU)		% age of Max. possible gen.	
		2010-11	2011-12	2010-11	2011-12	2010-11	2011-12
1	Turbine Bearing problems	19	18	703.52	73.23	0.10	0.01
2	Governing /Oil System Failures	92	61	1620.45	1462.55	0.22	0.18
3	Turbine differential expansion problem	15	2	82.35	18.9	0.01	0.00
4	Axial shift/thrust pad problem	58	32	766.59	1090.67	0.11	0.13
5	Turbine eccentricity / high vibrations	92	76	2569.33	3021.07	0.35	0.37
6	Turbine rotor failure/ damaged	4	14	2728.19	3518.69	0.37	0.43
7	Turbine control valve problem	23	30	97.25	161.47	0.01	0.02
8	Condenser tube leakage/ cleaning	81	99	738.44	1021.47	0.10	0.13
9	Main Steam line problem	56	60	499.94	533.25	0.07	0.07
10	Emergency Stop Valve (ESV) closure	7	10	7.55	18.89	0.00	0.00
11	Condenser low vacuum	169	157	253.58	1075.14	0.03	0.13
12	H.P.&L.P bypass system	22	22	133.05	199.4	0.02	0.02
13	Other Misc. Problems	146	103	1534.76	2520.03	0.21	0.31
Total Turbine		784	684	11735.01	14721.75	1.61	1.82

C. Generator

During the year 2011-12 the energy loss due to generator problems was 0.99% of maximum possible generation. Hydrogen pressure problems, stator/stator earth fault and generator tripping problem were the main causes of generator outages. A comparison of area/causes of outages in generator during 2010-11 and 2011-12 is shown below:

Sl. No.	Area/ cause of outages	No. of Outages		Loss (MU)		% age of Max. possible gen.	
		2010-11	2011-12	2010-11	2011-12	2010-11	2011-12
1.	STATOR/ STATOR EARTH FAULT	51	40	2779.60	1634.95	0.38	0.20
2.	ROTOR/ ROTOR EARTH FAULT	26	18	226.23	330.95	0.03	0.04
3	GEN. TRANSFORMER TRIPPING/ DAMAGED	-	38	-	1291.37	-	0.16
4.	EXCITATION PROBLEM	56	47	75.16	63.84	0.01	0.01
5.	GEN. COOLING SYSTEM FAILURE	8	13	8.91	101.19	0.00	0.01
6.	SEAL OIL SYSTEM PROBLEM	21	8	184.43	115.87	0.03	0.01
7.	GENERATOR BEARING PROBLEM	8	6	41.77	174.51	0.01	0.02
8.	FIRE IN TURBO GEN. BUSHING/ BUSHING FAILURE	15	13	78.52	25.69	0.01	0.00
9.	A.V.R. PROBLEM	23	26	175.68	131.56	0.02	0.02
10.	GENERATOR PROTECTION/ RELAY OPERATION PROBLEM	119	99	688.96	272.11	0.09	0.03
11.	HYDROGEN PRESSURE PROBLEM	27	18	1293.60	2196.04	0.18	0.27
12.	GENERATOR MISCELLANEOUS MAINTENANCE	75	48	492.12	1703.11	0.07	0.21
Total Generator		429	374	6044.96	8041.18	0.83	0.99

D. OTHER ELECTRICAL PROBLEMS

Details of loss of generation during 2010-11 and 2011-12 due to various electrical problems including switchyard area and other instruments etc. were as under:

Sl. No.	Area/ cause of outages	No. of Outages		Loss (MU)		% age of Max. possible gen.	
		2010-11	2011-12	2010-11	2011-12	2010-11	2011-12
1.	Unit Aux. Transformer problem / Station Transformer	109	80	311.61	203.44	0.04	0.03
2.	Generator Transformer problem	121	77	2845.18	830.88	0.39	0.10
3.	H.T./L.T. supply problem	115	47	386.72	137.87	0.05	0.02
4.	DC supply problem	62	47	87.96	67.72	0.01	0.01
5.	Switchyard/ Bus Bar problems	88	113	206.00	144.4	0.03	0.02
6.	Breaker/isolator	37	15	124.79	28.82	0.02	0.00
7	Misc. fire hazards / fire in cable gallery	39	25	1469.74	69.4	0.20	0.01
8.	Instrument fault	12	7	10.36	6.86	0.00	0.00
9.	Mal-operation of relays	47	0	49.00	0	0.01	0.00
10.	Air supply problem	35	4	116.73	9.61	0.02	0.00
11.	Other electrical problems	274	499	803.27	2504.8	0.11	0.31
	Total	939	914	6411.36	4003.8	0.88	0.41

E. FUEL SUPPLY AND OTHER MISC. PROBLEMS:

The generation loss on account of shutdown of thermal units due to Coal and Lignite shortage problem has increased from 4413 MU to 7380 MU. The MU loss due to ash handling problem increased from 370 MU to 1425 MU. This was mainly due to increased ash handling problems at Korba STPS during the year. The generation loss due to closer of operation of some vintage units also increased from 1326 MU to 4340 MU. The details of such units are at Section 2. The loss due to cooling tower problem was increased mainly due to problem at Trongaullu (SBU-II) U#3 (Cap-300 MW). Details of loss of generation during 2010-11 and 2011-12 due to fuel supplies and other miscellaneous problems were as under.

Sl. No.	Area/ cause of outages	No. of outages		Loss (MU)		% age of Max. Possible gen.	
		2010-11	2011-12	2010-11	2011-12	2010-11	2011-12
1	COAL SHORTAGE/ FEEDING PROBLEM	249	279	4413.61	7380.67	0.60	0.91
2	WET/ POOR QUALITY LIGNITE	73	41	747.85	597.44	0.10	0.07
3	FUEL OIL PROBLEM	58	45	123.54	169.56	0.02	0.02
4	COOLING TOWER PROBLEM	6	8	19.29	431.68	0.00	0.05
5	ASH HANDLING SYSTEM PROBLEM	39	55	370.87	1425.06	0.05	0.18
6	RAW WATER PROBLEM	17	10	3901.03	725.03	0.53	0.09
7	D.M. WATER PROBLEM	10	7	102.11	40.64	0.01	0.01
8	E.S.P. PROBLEM	18	18	1937.15	2548.45	0.27	0.31
9	NON-READINESS OF RESIDUAL WORK OF NEW UNIT	0	21	NA	729.93	NA	0.09
9	VINTAGE UNIT WITHDRAWN AND CLOSED FOR OPERATION	10	8	1326.55	4339.8	0.18	0.54
10	OTHER MISC. PROBLEMS	126	76	2124.62	2074.19	0.29	0.26
	TOTAL MISCELLANEOUS	606	568	15066.62	20462.46	2.06	2.52

F. GRID SYSTEM AND LOW SYSTEM DEMAND

The generation loss due to transmission constraints was increased from 901 MU to 3863MU during the year 2011-12. This was mainly due to transmission constraints at Mundra TPS, Sterlite TPS, Udupi TPS, However energy loss due to Reserve shutdown was decreased from 7777MU in 2010-11 to 6546 MU during 2011-12

A comparison of generation losses due to transmission constraints/ grid system problems and reserve shut down of during 2010-11 and 2011-12 are given below: -

Sl. No.	Area/ cause of outages	No. of Outages		Loss (MU)		% age of Max. possible gen.	
		2010-11	2011-12	2010-11	2011-12	2010-11	2011-12
1.	Transmission constraints/grid system problems	249	231	901.69	3863.96	0.12	0.48
2.	Reserve Shut Down	840	630	7777.26	6546.36	1.07	0.81
	Total	1089	861	8678.95	10410.32	1.19	1.28

4.5 OUTAGE & ENERGY LOSS DUE TO PROBLEMS IN AUXILIARY SYSTEM

4.5.4 Generation loss due to problems in boiler & turbine auxiliaries systems leading to total shutdown of the units increased to 7487 MU during 2011-12 from 4289 MU during 2010-11. The milling system/RC feeder problems increases mainly due to increased problem at Santaldhi U#2,3 (120MW each) and Bandel U#1 (60MW) Details of these losses during the years 2010-11 and 2011-12 are compared below: -

Sl. No.	Area/ cause of outages	No. of Outages		Loss (MU)		% age of Max. possible gen.	
		2010-11	2011-12	2010-11	2011-12	2010-11	2011-12
I Boiler Aux.							
	a) I.D. Fans	151	142	925.48	1213.38	0.13	0.15
	b) F.D. Fans	28	33	88.76	50.13	0.01	0.01
	c) P.A. Fans	106	107	564.75	671.89	0.08	0.08
	d) Milling System / RC feeder problems	94	54	1748.94	2478.42	0.24	0.31
	e) Pipe and valves	8	8	40.48	48.63	0.01	0.01
	f) Others	53	59	241.88	709.94	0.03	0.09
	Total Boiler Aux.	440	403	3610.30	5172.39	0.49	0.64
II Turbine Aux.							
	a) Boiler feed pump problems	100	88	260.25	733.5	0.04	0.09
	b) Condensate pump problems	18	14	42.74	34.9	0.01	0.00
	c) C.W. pump problems	40	39	281.25	754.94	0.04	0.09
	d) Regenerative System problem	8	0.00	0.91	0.0	0.00	0.0
	e) Pipe and valve	2	6	5.50	48.93	0.00	0.01
	f) De-aerator Problem	3	2	14.42	44.28	0.00	0.01
	g) Others	29	56	74.09	698.26	0.01	0.09
	Total Turbine Aux.	200	205	679.16	2314.81	0.09	0.29
	Total Boiler & Turbine Aux.	640	608	4289.46	7487.2	0.58	0.93

4.6 FREQUENCY OF OUTAGES AND ENERGY LOSS

4.6.4 Region-wise frequency of outages/ tripping of equipment and related energy loss during 2010-11 and 2011-12 are shown in the **Annexure 4.1**.

4.6.5 Year-wise break-up of Average loss per outage (in MU) due to failure of equipment and auxiliaries during the years 2007-08 to 2011-12 is shown below: -

Sl. No.	Outages	Average Loss/Outage (MU)				
		2007-08	2009-10	2009-10	2010-11	2011-12
I.	Equipment					
	1. Boiler	6.03	6.08	6.92	6.55	9.02
	2. Turbine	10.38	9.75	11.93	14.97	21.52
	3. Generator	6.55	11.86	12.33	14.09	21.5
	4. Total Equipment	6.79	7.19	8.33	8.63	12.22
II.	Auxiliaries					
	1. Boiler Aux.	4.78	4.54	5.12	8.21	12.83
	2. Turbine Aux.	2.24	2.47	3.15	3.40	11.29
	3. Total Aux.	3.88	3.61	4.39	6.70	12.31
III	Boiler & Aux.	5.86	5.68	6.48	6.74	9.46
IV.	Turbine & Aux.	8.06	7.00	8.45	12.62	19.61
V.	Generator	6.55	11.86	12.33	14.09	21.5
VI.	Other Misc. Problems	11.38	10.09	8.81	11.45	14.83
	Total (Excl. RSD)	7.71	8.32	8.46	9.42	13.36
VII.	Reserve Shut Down	15.87	2.09	4.49	9.26	10.4
	Total (Incl. RSD)	7.99	7.77	8.12	9.40	13.09

The Average loses/Outage was being increased from 7.99 during 2007-08 to 13.09 during 2010-11. This was mainly due to addition of increased size of units in the system.

4.7 DURATION PATTERN OF FORCED OUTAGES

4.7.4 There were a total of 7097 forced outages / tripping with aggregate duration of 582116 hours during the year 2011-12. The duration of individual outage varied from few hours to the maximum of full year. The duration pattern of forced outages of thermal units during the year 2010-11 in the country is given at **Annexure-4.2**. It could be seen that 59.87% of the total forced shut downs were of duration up to 24 hours, 38.67% outages were of duration varying from 1 to 25 days and only 1.45% of shut downs were for the duration more than 25 days.

4.8 LONG DURATION FORCED OUTAGES

4.8.4 Energy loss (in MUs) due to forced outages of more than 25 days during the year 2011-12 contributed to 41.75% of total forced outage losses. Details of units which were under forced outages for more than 25 days are given in **Annexure 4.3**. Eastern Region has maximum MU loss (16211) due to long forced outage and Southern Region had minimum MU loss (2907 MU). Chanderpur Assam U#1,2 (2x30MW) was kept under forced outage due to uneconomical operation for the whole year.

4.9 DURATION PATTERN OF BOILER TUBE LEAKAGE

Duration pattern of forced outages due to Boiler tube leakage category wise is given below. It was observed that Maximum Boiler Tube Leakage problem during 2011-12 were attended during 4 to 5 days.

4.9.4 WATER WALL TUBE LEAKAGE

Duration pattern of forced outages due to water wall tube leakage problems during last three years is shown below: -

Period in days	2009-10 (413 units)			2010-11 (428 units)			2011-12 (454 units)		
	No. of Units	No. of Outage	Loss (MU)	No. of Units	No. of Outage	Loss (MU)	No. of Units	No. of Outage	Loss (MU)
Upto-2 days	221	544	2971.40	230	570	3409.12	243	519	3294.61
>2 & up to 3	121	199	2048.23	122	211	2229.54	119	196	2153.87
>3 & up to 4	60	80	1247.48	66	88	1344.82	84	118	2207.43
>4 & up to 5	29	29	628.21	32	35	745.75	35	40	807.72
>5 & up to 6	13	13	309.54	20	22	506.54	16	18	657.73
>6 & up to 7	11	12	329.29	12	13	320.34	14	15	470.7
>7 & up to 14	16	19	650.42	24	26	763.29	32	40	1573.92
>14 & up to 21	3	3	129.27	8	8	584.73	6	6	308.05
>21 & up to 28	3	3	518.00	3	3	263.12	4	5	387.19
>28 & up to 30	0	0	0.00	0	0	0.00	0	0	0.00
> 30 days	1	1	68.55	0	0	0.00	1	1	79.38
Total	296	903	8900.37	302	976	10167.25	320	958	11940.6

4.9.5 SUPERHEATER TUBE LEAKAGE

Duration pattern of forced outages due to super heater tube leakage problems during last three years is shown below.

Period in days	2009-10 (413 units)			2010-11 (428 units)			2011-12 (454 units)		
	No. of Units	No. of Outage	Loss (MU)	No. of Units	No. of Outage	Loss (MU)	No. of Units	No. of Outage	Loss (MU)
Upto-2 days	93	155	877.63	93	147	833.10	76	128	775.35
>2 & up to 3	42	59	558.74	50	64	668.31	38	49	510.08
>3 & up to 4	29	36	488.98	26	34	446.02	16	18	356.86
>4 & up to 5	10	12	250.05	8	8	172.73	12	13	240.02
>5 & up to 6	6	6	118.74	2	2	16.60	5	5	101.08
>6 & up to 7	2	2	107.77	3	3	83.51	3	3	58.53
>7 & up to 14	7	8	181.64	10	10	307.67	8	8	320.47
>14 & up to 21	1	1	43.95	2	3	90.50	4	5	267.48
>21 & up to 28	0	0	0.00	1	1	60.54	3	3	169.87
>28 & up to 30	0	0	0.00	1	1	38.79	0	0	0.00
> 30 days	1	1	158.23	0	0	0.00	0	0	0.00
Total	138	281	2835.82	142	274	2798.08	131	232	2799.73

4.9.6 ECONOMISER TUBE LEAKAGE

Duration pattern of forced outages due to Economizer tube leakage problems during the last three years is shown below.

Period in days	2009-10 (413 units)			2010-11 (428 units)			2011-12 (454 units)		
	No. of Units	No. of Outage	Loss (MU)	No. of Units	No. of Outage	Loss (MU)	No. of Units	No. of Outage	Loss (MU)
Upto-2	125	242	1178.42	110	235	1184.71	94	207	921.57
2-3	45	65	621.97	49	63	655.71	35	42	415.7
3-4	14	19	214.82	20	22	326.12	9	11	91.48
4-5	12	12	245.34	12	12	168.82	9	9	150.76
5-6	4	4	68.47	3	4	41.48	2	2	41.6
6-7	3	3	95.33	2	2	47.78	3	3	56.69
7-14	2	2	40.97	6	6	208.44	8	8	237.98
14-21	0	0	0.00	2	2	170.69	0	0	0.00
21-28	0	0	0.00	0	0	0.00	1	1	58.62
28-30	0	0	0.00	0	0	0.00	0	0	0.00
>30	1	1	201.34	0	0	0.00	1	1	190.84
Total	171	349	2676.69	148	346	2803.76	125	284	2165.24

4.9.7 REHEATER TUBE LEAKAGE

Duration pattern of forced outages due to Re-heater tube leakage problems during last three years is shown below.

Period in days	2009-10 (390 units)			2010-11(413 units)			2011-12(454 units)		
	No. of Units	No. of Outage	Loss (MU)	No. of Units	No. of Outage	Loss (MU)	No. of Units	No. of Outage	Loss (MU)
Upto-2	64	98	662.56	63	106	670.29	73	116	806.51
2-3	34	50	715.18	32	41	558.27	33	43	673.38
3-4	18	26	569.14	10	14	304.36	14	16	265.43
4-5	8	8	199.71	4	4	79.23	7	7	184.41
5-6	2	2	66.49	5	5	194.39	2	2	106.53
6-7	0	0	0.00	1	1	15.40	1	1	17.6
7-14	2	2	125.46	2	2	66.05	1	1	152.21
14-21	1	1	52.00	0	0	0.00	0	0	0.00
21-28	0	0	0.00	0	0	0.00	0	0	0.00
28-30	0	0	0.00	0	0	0.00	0	0	0.00
>30	1	1	410.74	0	0	0.00	1	1	240.1
Total	100	189	2850.91	93	174	1968.50	104	187	2446.16

4.10 BOILER TUBE LEAKAGE DURATION PATTERN (CAPACITY GROUPWISE)

Capacity group-wise details of boiler tube leakage problems during the year 2011-12 are given below:-

Capacity (MW)	No. of Units Reviewed	Water Wall		Super heater		Economizer		Re-heater		Total	
		No. of Units involved	No. of Outages	No. of Units involved	No. of Outages	No. of Units involved	No. of Outages	No. of Units involved	No. of Outages	No. of Units involved	No. of Outages
660-800	4	2	2	0	0	0	0	0	0	2	2
490-600	57	48	117	21	27	9	10	21	37	55	191
300-330	20	11	23	5	6	2	2	1	1	13	32
250	40	25	77	5	6	12	14	7	7	31	104
210	143	113	327	42	71	37	82	46	97	134	577
195-200	25	21	55	9	10	7	13	11	19	24	97
100-150	90	56	189	27	66	31	100	17	25	62	380
25-99	75	44	168	22	46	27	63	1	1	53	278
Total	454	320	958	131	232	125	284	104	187	374	1661

4.11 FORCED OUTAGE – UTILITY WISE

The forced outages of thermal power stations under various Central Sector Utilities, Private Sector and State Electricity Boards / Power Generating Corporations, is given below:

Sl. No.	Organization/ Utility	No. of Units	Capacity (MW)	FORCED OUTAGE				
				No. of Units	Capacity (MW)	Duration (Hrs.)	Energy Loss (MU)	Energy Loss as % of Max. Possible generation
CENTRAL SECTOR								
1	NTPC Ltd.	85	27045	85	27045	34239.7	11538.9	4.98
2	DVC	17	3700	17	3700	20371.4	4759	16.72
3	NLC	20	2740	20	2740	9099.52	1249.5	29.46
4	APCPL	1	500	1	500	2775.84	1387.92	31.6
5	NSPCL	2	500	2	500	780.97	195.24	4.45
6	K.B.U.N.L	2	220	1	110	6034.65	663.81	34.35
	CENTRAL SECTOR	127	34705	126	34595	73302	19794	6.76
STATE SECTOR								
NORTHERN REGION								
1	HPGCL	12	3160	12	3160	14814	3172.07	15.99
2	IPGCL	2	135	2	135	3466.28	233.97	19.73
3	PSPCL	14	2620	13	2510	9104.04	1599.33	6.95
4	RRVUNL	16	3240	16	3240	17454.2	3225.13	11.33
5	UPRVUNL	23	4173	20	3864	26856.5	3906.06	11.27
WESTERN REGION								
6	CSPGCL	12	1780	12	1780	7298.71	1233.09	7.89

Sl. No.	Organization/ Utility	No. of Units	Capacity (MW)	FORCED OUTAGE				
				No. of Units	Capacity (MW)	Duration (Hrs.)	Energy Loss(MU)	Energy Loss as % of Max. Possible generatio n
7	GMDCL	2	250	2	250	4401.71	550.21	25.06
8	GSECL	23	3720	23	3720	28269.5	3914.92	11.98
9	MAHAGENCO	34	7255	34	7255	57286.2	8545.77	13.94
10	MPPGCL	17	2932.5	17	2932.5	21336.1	3178.76	12.34
SOUTHERN REGION								
11	APGENCO	25	5092.5	25	5092.5	7390.16	1745.51	4.17
12	KPCL	9	2220	9	2220	8528.48	2063.79	10.58
13	TNGDCL	17	2970	17	2970	27834.3	3329.76	12.76
EASTERN REGION								
14	BSEB	4	310	3	205	21370.1	1327.78	48.76
15	DPL	7	690	7	690	32745.1	2790.93	46.05
16	JSEB	10	770	8	550	58469.1	4078.38	60.3
17	OPGC	2	420	2	420	902.49	189.52	5.14
18	TVNL	2	420	2	420	6358.95	1335.38	36.2
19	WBPDCL	24	4340	24	4340	58606.9	7379.45	19.93
NORTH EASTERN REGION								
20	APGPCL	2	60	2	60	17568	527.04	100
	STATE SECTOR	257	46558	250	45814	430061	54327	13.84
PVT SECTOR								
WESTERN REGION								
1	RIL (DAHANU)	2	500	2	500	383.56	95.89	2.18
2	TATA PCL	4	1400	4	1400	9253.89	1510.04	12.28
3	TOR. POW. (AECO)	5	400	5	400	1524.9	80.64	2.3
EASTERN REGION								
4	CESC	13	1285	13	1285	16595.3	817.8	7.25
	PVT	24	3585	24	3585	27758	2504.4	7.95
IPPs								
NORTHERN REGION								
1	BEPL	1	45	1	45	384.3	17.29	17.6
2	RPSCL	3	900	3	900	2722.02	816.61	14.32
3	RWPL (JSW)	4	540	4	540	10655.3	1501.8	49.05
WESTERN REGION								
4	APL	7	3300	7	3300	10878.6	5540.00	24.93
5	GIPCL	4	500	4	500	6620.16	827.52	19.24
6	JPL	4	1000	4	1000	789.92	197.48	2.25
7	JSWEL	4	1200	4	1200	2451.68	753.71	9.28
8	LANCO	2	600	2	600	1313.38	394.01	7.48
9	VESPL	1	35	0	0	0	0	0
10	WPCL	3	405	3	405	3799.36	512.91	15.27
SOUTHERN REGION								
10	JSWEL	4	860	3	730	1529.53	456.99	6.05
11	ST-CMSECP	1	250	1	250	767.69	191.92	8.74
12	UPCL	1	600	1	600	1592.75	955.65	18.13
EASTERN REGION								
13	MPL	1	525	1	525	1123.89	830.99	30.96
14	SEL	3	1800	3	1800	6166.81	3282.49	27.7
15	TATA PCL	3	360	3	360	199.75	23.97	0.76
	IPP	46	12920	44	12755	50995	16304	17.41
	ALL INDIA	454	97768	444	96749	582116	92929	11.46

4.12 REGION WISE PERFORMACNE

The performance of thermal units installed in the Southern Region was best as the non-availability due to forced outages was least (7.27%). The non availability of thermal units installed in the Eastern Region was 17.57%. The region wise summary of forced outages of thermal generating units is given below:

Sl. No.	REGION	No. of Units	Capacity (MW)	FORCED OUTAGE				
				No. of Units	Capacity (MW)	Duration (Hrs.)	Energy Loss(MU)	Energy Loss as % of Max. Possible

								generation
1	NORTHERN	109	23578	105	23159	98267.7	18153.1	9.49
2	WESTERN	146	33297.5	145	33262.5	166738	31458	11.38
3	SOUTHERN	85	18582.5	84	18452.5	57295.2	10491.6	6.63
4	EASTERN	112	22250	108	21815	242247	32299.9	17.51
5	NORTH EASTERN	2	60	2	60	17568	527.04	100.00
	ALL INDIA	454	97768	444	96749	582116	92930	11.46

Annexure 4.1

**REGION-WISE FREQUENCY OF OUTAGES/ TRIPPING OF EQUIPMENT AND RELATED ENERGY LOSS
DURING 2010-11 AND 2011-12**

Particulars of outages	Northern Region		Western Region		Southern Region		Eastern Region		North- Eastern Region		All India	
	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12
I. Boiler												
1. No. of outages	1125	816	1194	1043	427	495	774	723	0.00	0.0	3520	3077
2. MU Loss	6103.64	5880.44	7389.17	8599.78	3601.84	4205.65	5978.58	9073.96	0.00	0.0	23073.22	27759.83
3. % age of total F.O	39.60	32.39	32.86	28.39	34.32	40.09	22.66	28.09	0.00	0.0	30.64	29.87
II. Turbine												
1. No. of outages	259	176	233	229	120	120	172	159	0.00	0.0	784	684
2. MU Loss	2405.91	3833.12	1758.08	4512.3	1238.87	1695.35	6332.15	4680.98	0.00	0.0	11735.01	14721.79
3. % age of total F.O	15.61	21.12	7.82	14.31	11.8	16.16	24.00	14.49	0.00	0.0	15.58	15.51
III. Generator												
1. No. of outages	141	117	100	105	74	66.0	114	86	0.00	0.0	429	374
2. MU Loss	849.99	1253.5	491.85	2536.95	1618.35	669.47	3084.77	3581.26	0.00	0.0	6044.96	8041.18
3. % age of total F.O	5.52	6.91	2.19	8.06	15.42	6.38	11.69	11.09	0.00	0.0	8.03	8.65
IV. Boiler Auxiliary												
1. No. of outages	195	128	100	115	63	54.0	82	106	0.00	0.0	440	403
2. MU Loss	1166.18	556.8	546.17	1034.22	498.88	230.13	1399.06	3351.25	0.00	0.0	3610.30	5172.39
3. % age of total F.O	7.57	3.07	2.43	3.29	4.75	2.19	5.30	10.38	0.00	0.0	4.79	5.57
V. Turbine Auxiliary												
1. No. of outages	71	71	37	44	16	25.0	76	65	0.00	0.0	200	205
2. MU Loss	138.80	275.47	121.21	1052.24	87.72	596.98	331.43	390.12	0.00	0.0	679.16	2314.81
3. % age of total F.O	0.90	1.52	0.54	3.34	0.84	5.69	1.26	1.21	0.00	0.0	0.90	2.49
VI. Miscellaneous												
1. No. of outages	638	590	616	633	276	214	1102	915	2.00	2.00	2634	2354
2. MU Loss	4747.39	6353.77	12179.71	13047.09	3449.17	3093.97	9255.05	11222.37	525.60	527.04	30156.92	34244.24
3. % age of total F.O	30.80	35	54.17	43.62	32.87	29.49	35.08	34.74	100	100	40.05	37.58
VII. Total excluding RSD												
1. No. of outages	2361	1775	2212	2048	952	970	1640	1673	2.00	2.00	7167	6468
2. MU Loss	13967.79	16199.8	17656.16	26443.23	10119.35	10454.68	25253.42	31595.4	525.6	527.04	67522.31	85220.15
3. FO Loss as % of Max. Possible Gen.	8.01	8.67	7.42	10.03	7.16	6.86	15.72	17.95	100	100	9.29	10.62
VIII. Reserve Shutdown												
1. No. of outages	68	123	68	121	24	4.00	680	381	0.00	0.0	840	629
2. MU Loss	1444.13	1953.3	4830.03	3848.35	375.48	36.87	1127.61	704.53	0.00	0.0	7777.26	6543.05
3. % age of total F.O	9.37	10.76	21.48	12.23	3.58	0.35	4.27	2.18	0.00	0.0	10.33	7.04
IX. Total including RSD												
1. No. of outages	2429	1898	2280	2169	976	974	2320	2054	2.00	2.00	8007	7097
2. MU Loss	15411.92	18153.1	22486.19	30291.58	10494.83	10491.55	26381.03	32299.93	525.60	527.04	75299.57	92929.64
3. FO Loss as % of Max. Possible Gen.	8.67	9.49	9.17	11.38	7.42	6.63	16.00	17.51	100.00	100	10.32	11.46

Annexure-4.2

Sheet 1 OF 6

DURATION PATTERN OF FORCED OUTAGES**All India:-**

Number of units considered	:	454
Number of units involved	:	444
Possible All India generation	:	810814.63 MU
All India energy loss on account of Forced outage in the equipment	:	86386.59 MU
All India energy loss on account of Reserve Shut Down (RSD)	:	6543.05 MU
All India energy loss on account of Forced Outages including RSD	:	92929.64 MU

Duration	No of units	No of outages	MU loss	% of All India F.O. Loss	% of possible All India generation
Upto 3 Hrs	335	1700	604.29	0.65	0.07
>3 & up to 6 Hrs	312	1005	1007.01	1.08	0.12
>6 & up to 12 Hrs	271	743	1260.51	1.36	0.16
>12 & up to 18 Hrs	209	394	1042.21	1.12	0.13
>18 & up to 24 Hrs	202	407	1575.06	1.69	0.19
>1 & up to 2 Days	346	1113	7785.9	8.38	0.96
>2 & up to 3 Days	261	612	6875.72	7.4	0.85
>3 & up to 4 Days	186	320	5284.72	5.69	0.65
>4 & up to 5 Days	126	168	3324.99	3.58	0.41
>5 & up to 6 Days	83	104	2790.65	3	0.34
>6 & up to 7 Days	49	54	1545.69	1.66	0.19
>7 & up to 8 Days	84	104	3522.35	3.79	0.43
>8 & up to 9 Days	43	48	1923.26	2.07	0.24
>9 & up to 10 Days	29	34	1476.8	1.59	0.18
>10 & up to 11 Days	28	30	1746.94	1.88	0.22
>11 & up to 12 Days	20	23	1365.64	1.47	0.17
>12 & up to 13 Days	18	20	1170.49	1.26	0.14
>13 & up to 14 Days	23	24	1634.62	1.76	0.2
>14 & up to 15 Days	10	11	689.24	0.74	0.09
>15 & up to 16 Days	11	11	846.71	0.91	0.1
>16 & up to 17 Days	12	12	689.16	0.74	0.08
>17 & up to 18 Days	12	13	1131.83	1.22	0.14
>18 & up to 19 Days	11	11	1147.24	1.23	0.14
>19 & up to 20 Days	6	6	414.47	0.45	0.05
>20 & up to 21 Days	4	4	673.79	0.73	0.08
>21 & up to 22 Days	5	5	494.07	0.53	0.06
>22 & up to 23 Days	4	4	285.42	0.31	0.04
>23 & up to 24 Days	9	9	960.52	1.03	0.12
>24 & up to 25 Days	5	5	853.09	0.92	0.11
Over 25 Days	85	103	38807.23	41.76	4.79
Total	444	7097	92929.64	100	11.46

Annexure-4.2

Sheet 2 OF 6

DURATION PATTERN OF FORCED OUTAGES**Northern Region**

Number of units in the Region :	:	109
Number of units involved :	:	105
Regional possible generation :	:	191254.39
Regional energy loss on account of forced	:	18153.1

Duration	No of units	No of outages	Loss (MU)	% age of Regional F.O. loss	% age of Regional possible generation	% of All India F.O. loss	% of possible All India generation
Upto 3 Hrs	88	606	173.27	0.95	0.09	0.19	0.02
3 - 6 Hrs	76	272	241.99	1.33	0.13	0.26	0.03
6 - 12 Hrs	74	157	270.81	1.49	0.14	0.29	0.03
12 - 18 Hrs	54	89	258.47	1.42	0.14	0.28	0.03
18 - 24 Hrs	54	92	370.77	2.04	0.19	0.4	0.05
1 - 2 Days	88	286	2031.4	11.19	1.06	2.19	0.25
2 - 3 Days	64	155	1676.37	9.23	0.88	1.8	0.21
3 - 4 Days	51	80	1315.04	7.24	0.69	1.42	0.16
4 - 5 Days	27	32	618.02	3.4	0.32	0.67	0.08
5 - 6 Days	21	23	534.45	2.94	0.28	0.58	0.07
6 - 7 Days	12	13	332.48	1.83	0.17	0.36	0.04
7 - 8 Days	16	23	627.33	3.46	0.33	0.68	0.08
8 - 9 Days	7	9	369.33	2.03	0.19	0.4	0.05
9 - 10 Days	1	1	44.74	0.25	0.02	0.05	0.01
10 - 11 Days	5	5	253.05	1.39	0.13	0.27	0.03
11 - 12 Days	6	8	242.38	1.34	0.13	0.26	0.03
12 - 13 Days	4	4	114.05	0.63	0.06	0.12	0.01
13 - 14 Days	4	4	163.23	0.9	0.09	0.18	0.02
14 - 15 Days	1	2	86.95	0.48	0.05	0.09	0.01
15 - 16 Days	3	3	269.33	1.48	0.14	0.29	0.03
16 - 17 Days	2	2	70.64	0.39	0.04	0.08	0.01
17 - 18 Days	6	7	576.44	3.18	0.3	0.62	0.07
18 - 19 Days	2	2	188.68	1.04	0.1	0.2	0.02
19 - 20 Days	2	2	153.29	0.84	0.08	0.16	0.02
20 - 21 Days	1	1	50.47	0.28	0.03	0.05	0.01
21 - 22 Days	1	1	126.87	0.7	0.07	0.14	0.02
22 - 23 Days	1	1	26.49	0.15	0.01	0.03	0
23 - 24 Days	1	1	142.55	0.79	0.07	0.15	0.02
24 - 25 Days	1	1	64.76	0.36	0.03	0.07	0.01
Over 25 Days	13	16	6759.42	37.24	3.53	7.27	0.83
Total	105	1898	18153.1	100	9.49	19.53	2.24

Annexure-4.2

Sheet 3 OF 6

DURATION PATTERN OF FORCED OUTAGES**Western Region**

Number of units in the Region :	:	146
Number of units involved	:	145
Regional possible generation	:	276449.76
Regional energy loss on account of forced	:	31458.02

Duration	No of units	No of outages	Loss (MU)	% age of Regional F.O. loss	% age of possible Regional generation	% of All India F.O. loss	% of Possible All India generation
Upto 3 Hrs	106	446	162.3	0.52	0.06	0.17	0.02
3 - 6 Hrs	106	306	291.76	0.93	0.11	0.31	0.04
6 - 12 Hrs	88	185	352.17	1.12	0.13	0.38	0.04
12 - 18 Hrs	68	119	357.84	1.14	0.13	0.39	0.04
18 - 24 Hrs	64	100	435.45	1.38	0.16	0.47	0.05
1 - 2 Days	113	406	2648.81	8.42	0.96	2.85	0.33
2 - 3 Days	99	222	2547.15	8.1	0.92	2.74	0.31
3 - 4 Days	66	111	1850.42	5.88	0.67	1.99	0.23
4 - 5 Days	50	64	1410.54	4.48	0.51	1.52	0.17
5 - 6 Days	31	40	1253.52	3.98	0.45	1.35	0.15
6 - 7 Days	15	17	538.56	1.71	0.19	0.58	0.07
7 - 8 Days	33	39	1410.62	4.48	0.51	1.52	0.17
8 - 9 Days	18	19	734.09	2.33	0.27	0.79	0.09
9 - 10 Days	12	14	611.94	1.95	0.22	0.66	0.08
10 - 11 Days	7	7	450.91	1.43	0.16	0.49	0.06
11 - 12 Days	4	5	292.62	0.93	0.11	0.31	0.04
12 - 13 Days	6	7	512.39	1.63	0.19	0.55	0.06
13 - 14 Days	7	8	749.45	2.38	0.27	0.81	0.09
14 - 15 Days	3	3	158.64	0.5	0.06	0.17	0.02
15 - 16 Days	0	0					
16 - 17 Days	3	3	186.3	0.59	0.07	0.2	0.02
17 - 18 Days	3	3	189.63	0.6	0.07	0.2	0.02
18 - 19 Days	6	6	606.85	1.93	0.22	0.65	0.07
19 - 20 Days	1	1	34.83	0.11	0.01	0.04	0
20 - 21 Days	0	0					
21 - 22 Days	1	1	63.05	0.2	0.02	0.07	0.01
22 - 23 Days	0	0					
23 - 24 Days	4	4	541.54	1.72	0.2	0.58	0.07
24 - 25 Days	3	3	664.99	2.11	0.24	0.72	0.08
Over 25 Days	25	30	12401.66	39.42	4.49	13.35	1.53
Total	145	2169	31458.02	100	11.38	33.85	3.88

Annexure-4.2
Sheet 4 OF 6

DURATION PATTERN OF FORCED OUTAGES

Southern Region

Number of units in the Region :	:	85
Number of units involved	:	84
Regional possible generation	:	158157.24
Regional energy loss on account of forced	:	10491.55

Duration	No of units	No of outages	Loss (MU)	% age of Regional F.O. loss	% age of possible Regional generation	% of All India F.O. loss	% of Possible All India generation
Upto 3 Hrs	61	200	85.57	0.82	0.05	0.09	0.01
3 - 6 Hrs	56	146	154.24	1.47	0.1	0.17	0.02
6 - 12 Hrs	45	87	166.61	1.59	0.11	0.18	0.02
12 - 18 Hrs	34	55	158.49	1.51	0.1	0.17	0.02
18 - 24 Hrs	40	91	379.92	3.62	0.24	0.41	0.05
1 - 2 Days	65	169	1217.52	11.6	0.77	1.31	0.15
2 - 3 Days	39	84	842.77	8.03	0.53	0.91	0.1
3 - 4 Days	24	43	812.28	7.74	0.51	0.87	0.1
4 - 5 Days	15	19	383.66	3.66	0.24	0.41	0.05
5 - 6 Days	13	17	353.73	3.37	0.22	0.38	0.04
6 - 7 Days	5	6	166.96	1.59	0.11	0.18	0.02
7 - 8 Days	11	11	478.7	4.56	0.3	0.52	0.06
8 - 9 Days	6	7	270.83	2.58	0.17	0.29	0.03
9 - 10 Days	2	3	118.56	1.13	0.07	0.13	0.01
10 - 11 Days	4	4	224.5	2.14	0.14	0.24	0.03
11 - 12 Days	2	2	129.93	1.24	0.08	0.14	0.02
12 - 13 Days	3	4	189.05	1.8	0.12	0.2	0.02
13 - 14 Days	2	2	107.24	1.02	0.07	0.12	0.01
14 - 15 Days	3	3	254.54	2.43	0.16	0.27	0.03
15 - 16 Days	3	3	193.95	1.85	0.12	0.21	0.02
16 - 17 Days	1	1	43.13	0.41	0.03	0.05	0.01
17 - 18 Days	2	2	320.56	3.06	0.2	0.34	0.04
18 - 19 Days	0	0	0.00	0.00	0.00	0.00	0.00
19 - 20 Days	0	0	0.00	0.00	0.00	0.00	0.00
20 - 21 Days	1	1	299.62	2.86	0.19	0.32	0.04
21 - 22 Days	0	0	0.00	0.00	0.00	0.00	0.00
22 - 23 Days	1	1	115.8	1.1	0.07	0.12	0.01
23 - 24 Days	1	1	116.24	1.11	0.07	0.13	0.01
24 - 25 Days	0	0	0.00	0.00	0.00	0.00	0.00
Over 25 Days	9	12	2907.18	27.71	1.84	3.13	0.36
Total	84	974	10491.55	100	6.63	11.29	1.29

DURATION PATTERN OF FORCED OUTAGES**Eastern Region**

Number of units in the Region :	:	112
Number of units involved :	:	108
Regional possible generation :	:	184426.2
Regional energy loss on account of forced	:	32299.93

Duration	No of units	No of outages	Loss (MU)	% age of Regional F.O. loss	% age of possible Regional generation	% of All India F.O. loss	% of Possible All India generation
Upto 3 Hrs	80	448	183.14	0.57	0.1	0.2	0.02
3 - 6 Hrs	74	281	319.02	0.99	0.17	0.34	0.04
6 - 12 Hrs	64	314	470.92	1.46	0.26	0.51	0.06
12 - 18 Hrs	53	131	267.4	0.83	0.14	0.29	0.03
18 - 24 Hrs	44	124	388.92	1.2	0.21	0.42	0.05
1 - 2 Days	80	252	1888.18	5.85	1.02	2.03	0.23
2 - 3 Days	59	151	1809.42	5.6	0.98	1.95	0.22
3 - 4 Days	45	86	1306.98	4.05	0.71	1.41	0.16
4 - 5 Days	34	53	912.77	2.83	0.49	0.98	0.11
5 - 6 Days	18	24	648.96	2.01	0.35	0.7	0.08
6 - 7 Days	17	18	507.69	1.57	0.28	0.55	0.06
7 - 8 Days	24	31	1005.7	3.11	0.55	1.08	0.12
8 - 9 Days	12	13	549.01	1.7	0.3	0.59	0.07
9 - 10 Days	14	16	701.56	2.17	0.38	0.75	0.09
10 - 11 Days	12	14	818.49	2.53	0.44	0.88	0.1
11 - 12 Days	8	8	700.71	2.17	0.38	0.75	0.09
12 - 13 Days	5	5	355.02	1.1	0.19	0.38	0.04
13 - 14 Days	10	10	614.69	1.9	0.33	0.66	0.08
14 - 15 Days	3	3	189.11	0.59	0.1	0.2	0.02
15 - 16 Days	5	5	383.43	1.19	0.21	0.41	0.05
16 - 17 Days	6	6	389.1	1.2	0.21	0.42	0.05
17 - 18 Days	1	1	45.2	0.14	0.02	0.05	0.01
18 - 19 Days	3	3	351.71	1.09	0.19	0.38	0.04
19 - 20 Days	3	3	226.35	0.7	0.12	0.24	0.03
20 - 21 Days	2	2	323.7	1	0.18	0.35	0.04
21 - 22 Days	3	3	304.16	0.94	0.16	0.33	0.04
22 - 23 Days	2	2	143.13	0.44	0.08	0.15	0.02
23 - 24 Days	3	3	160.19	0.5	0.09	0.17	0.02
24 - 25 Days	1	1	123.34	0.38	0.07	0.13	0.02
Over 25 Days	36	43	16211.93	50.19	8.79	17.45	2
Total	108	2054	32299.93	100	17.51	34.76	3.98

DURATION PATTERN OF FORCED OUTAGES**North Eastern Region**

Number of units in the Region	:	2
Number of units involved	:	2
Regional possible generation	:	527.04
Regional energy loss on account of forced	:	527.04

Duration	No of units	No of outages	Loss (MU)	% age of Regional F.O. loss	% age of possible Regional generation	% of All India F.O. loss	% of Possible All India generation
Over 25 Days	2	2	527.04	100	100	0.57	0.07
Total	2	2	527.04	100	100	0.57	0.07

Annexure-4.3

Sheet _ of 4

DETAILS OF LONG DURATION FORCED OUTAGES (25 DAYS & ABOVE) DURING 2010-11

Station	Unit No.	Capacity (MW)	Date Of Outage	Date of Return	Outage Days	Outage Hours	Reason	MU Loss	% of Unit Max Possible(Gen)
NORTHERN REGION									
INDIRA GANDHI STPP	1	500	08-MAY-2011	02-JUN-2011	25	603.03	ELECTRICAL MISCELLANEOUS PROBLEMS	301.52	6.87
INDIRA GANDHI STPP	1	500	19-FEB-2012	31-MAR-2012	41	996	GENERATOR MISCELLANEOUS MAINTENANCE	498	11.34
YAMUNA NAGAR TPS	2	300	25-SEP-2011	31-MAR-2012	189	4525.35	H.P. ROTOR BLADES FAILURE	1357.61	51.52
ROSA TPP Ph-I	3	300	01-FEB-2012	15-MAR-2012	44	1045.22	TRANSMISSION CONSTRAINTS	313.57	72.59
SURATGARH TPS	1	250	20-FEB-2012	31-MAR-2012	40	958.23	STATOR/ STATOR EARTH FAULT	239.56	10.91
SURATGARH TPS	6	250	01-APR-2011	07-MAY-2011	36	874.72	TURBINE VIBRATIONS HIGH	218.68	9.96
SURATGARH TPS	6	250	02-SEP-2011	17-JAN-2012	137	3297.52	TURBINE ROTOR FAILURE/DAMAGED	824.38	37.54
PARICHAH TPS	4	210	19-DEC-2011	29-FEB-2012	73	1743.32	TRANSMISSION CONSTRAINTS	366.1	19.85
OBRA TPS	12	200	05-JUN-2011	17-AUG-2011	74	1770.22	TURBINE VIBRATIONS HIGH	354.04	20.15
JALIPA KAPURDI TPP	1	135	24-APR-2011	11-OCT-2011	170	4091.73	BOILER MISC. PROBLEM	552.38	46.58
JALIPA KAPURDI TPP	2	135	21-APR-2011	11-OCT-2011	174	4168.68	FUEL SUPPLY & OTHER MISC. PROBLEMS	562.77	47.46
GIRAL TPS	1	125	11-JAN-2012	12-FEB-2012	33	780.1	P.A. FANS PROBLEM	97.51	8.88
GIRAL TPS	1	125	17-NOV-2011	13-DEC-2011	26	623.88	BOILER MISC. PROBLEM	77.99	7.1
GIRAL TPS	2	125	26-AUG-2011	22-SEP-2011	27	659.53	WET COAL	82.44	7.51
PANIPAT TPS	2	110	20-DEC-2011	31-MAR-2012	103	2468.58	TURBINE MISC. PROBLEMS	271.54	28.1
OBRA TPS	8	94	21-JUN-2011	31-MAR-2012	284	6822.75	ESP PROBLEM	641.34	77.67
SUB TOTAL	16	3609			1476	35428.86		6759.43	
WESTERN REGION									
MUNDRA TPS	5	660	08-OCT-2011	07-NOV-2011	30	718.97	BOILER FEED PUMP/MOTOR PROBLEM	474.52	9.82
MUNDRA TPS	6	660	01-OCT-2011	31-OCT-2011	31	743.98	TRANSMISSION CONSTRAINTS	491.03	12.7
MUNDRA TPS	6	660	18-FEB-2012	31-MAR-2012	43	1023.32	TRANSMISSION CONSTRAINTS	675.39	17.47
MUNDRA TPS	6	660	20-DEC-2011	03-FEB-2012	45	1089.07	TURBINE MISC. PROBLEMS	718.79	18.6
SIPAT STPS	1	660	01-MAR-2012	31-MAR-2012	30	728.8	TURB. AXIAL SHIFT/ THRUST PAD	491.04	25.41
KORBA STPS	7	500	14-SEP-2011	11-OCT-2011	26	630.98	GENERATOR MISCELLANEOUS MAINTENANCE/ASH HANDLING PROB	315.49	7.18
MUNDRA TPS	1	330	02-JAN-2012	17-FEB-2012	46	1096.87	HYDROGEN PRESSURE PROBLEM	361.97	12.49
MUNDRA TPS	1	330	14-JUN-2011	10-JUL-2011	26	623.43	BOILER MISC. PROBLEM	205.73	7.1
MUNDRA TPS	2	330	04-DEC-2011	09-JAN-2012	37	884.53	MAIN STEAM LINE PROBLEM	291.89	10.07
MUNDRA TPS	3	330	16-FEB-2012	31-MAR-2012	44	1057.33	CONDENSER LOW VACCUM	348.92	12.04
DSPM TPS	2	250	21-JUN-2011	12-OCT-2011	114	2727.33	GEN. TRANS DAMAGED	681.83	31.05
WANAKBORI TPS	1	210	25-FEB-2012	31-MAR-2012	35	851.5	TURBINE VIBRATIONS HIGH	178.82	9.69
PARLI TPS	3	210	02-AUG-2011	06-SEP-2011	35	830.58	HYDROGEN PRESSURE PROBLEM	174.42	9.46
TROMBAY TPS	4	150	01-APR-2011	10-FEB-2012	315	7566	RESERVE SHUT DOWN	1134.9	86.13
TROMBAY TPS	4	150	14-FEB-2012	31-MAR-2012	47	1128	RESERVE SHUT DOWN	169.2	12.84
SURAT LIG. TPS	1	125	01-JAN-2012	31-MAR-2012	90	2162.6	ROTOR/ ROTOR EARTH FAULT	270.33	24.62
SURAT LIG. TPS	2	125	03-DEC-2011	28-DEC-2011	26	621.15	BOILER MISC. PROBLEM	77.64	7.07
UKAI TPS	1	120	08-JUL-2011	01-SEP-2011	55	1315.27	RESERVE SHUT DOWN	157.83	14.97

DETAILS OF LONG DURATION FORCED OUTAGES (25 DAYS & ABOVE) DURING 2010-11

Station	Unit No.	Capacity (MW)	Date Of Outage	Date of Return	Outage Days	Outage Hours	Reason	MU Loss	% of Unit Max Possible(Gen)
GANDHI NAGAR TPS	1	120	14-AUG-2011	23-SEP-2011	40	964.45	RESERVE SHUT DOWN	115.73	10.98
SIKKA REP. TPS	1	120	10-AUG-2011	06-SEP-2011	27	638.25	RESERVE SHUT DOWN	76.59	7.27
SIKKA REP. TPS	1	120	25-FEB-2012	31-MAR-2012	35	845.88	RESERVE SHUT DOWN	101.51	9.63
SIKKA REP. TPS	2	120	26-FEB-2012	23-MAR-2012	26	614	RESERVE SHUT DOWN	73.68	6.99
AMARKANTAK EXT TPS	1	120	01-APR-2011	19-FEB-2012	325	7799.5	TURBINE VIBRATIONS HIGH	935.94	88.79
KORADI TPS	1	105	01-APR-2011	31-MAR-2012	366	8784	VINTAGE UNIT WITHDRAWN AND CLOSED FOR OPERATION	922.32	100
KORADI TPS	2	105	01-APR-2011	31-MAR-2012	366	8784	VINTAGE UNIT WITHDRAWN AND CLOSED FOR OPERATION	922.32	100
KORADI TPS	3	105	01-APR-2011	31-MAR-2012	366	8784	VINTAGE UNIT WITHDRAWN AND CLOSED FOR OPERATION	922.32	100
KORADI TPS	4	105	01-APR-2011	31-MAR-2012	366	8784	VINTAGE UNIT WITHDRAWN AND CLOSED FOR OPERATION	922.32	100
KUTCH LIG. TPS	3	75	10-APR-2011	17-MAY-2011	37	876.15	FURNACE FIRE OUT /FLAME FAILURE	65.71	9.97
PARAS TPS	2	55	01-APR-2011	19-MAY-2011	49	1176	VINTAGE UNIT WITHDRAWN AND CLOSED FOR OPERATION	64.68	80.33
BHUSAWAL TPS	1	50	01-APR-2011	19-MAY-2011	49	1176	VINTAGE UNIT WITHDRAWN AND CLOSED FOR OPERATION	58.8	80.33
SUB TOTAL	30	7660			3127	75025.94		12401.66	
SOUTHERN REGION									
TORANGALLU TPS(SBU-II)	3	300	01-SEP-2011	30-SEP-2011	30	719.98	COOLING TOWER PROBLEM	215.99	8.2
RAICHUR TPS	8	250	06-JAN-2012	01-FEB-2012	25	609.07	BOILER MISC. PROBLEM	152.27	6.93
RAICHUR TPS	8	250	30-AUG-2011	25-OCT-2011	56	1344.03	TURBINE MISC.	336.01	15.3
RAICHUR TPS	2	210	19-OCT-2011	14-NOV-2011	26	621.8	ASH HANDLING SYSTEM PROBLEM	130.58	7.08
NORTH CHENNAI TPS	1	210	21-JAN-2012	19-MAR-2012	59	1413.05	HYDROGEN PRESSURE PROBLEM	296.74	16.09
NEYVELI TPS-II	5	210	01-AUG-2011	26-AUG-2011	26	621.95	MAJOR REPAIRS IN BOILER	130.61	7.08
ENNORE TPS	3	110	01-APR-2011	28-JUN-2011	88	2113.38	TURBINE VIBRATIONS HIGH	232.47	24.06
ENNORE TPS	3	110	14-JUL-2011	31-MAR-2012	261	6275.47	WATER TREATMENT PLANT FAILURE	690.3	71.44
ENNORE TPS	4	110	05-OCT-2011	31-MAR-2012	178	4278.07	ELECTRICAL MISCELLANEOUS PROBLEMS	470.59	48.7
ENNORE TPS	5	110	06-MAR-2012	31-MAR-2012	26	616.83	WATER WALL TUBE LEAKAGE	67.85	7.02
ENNORE TPS	5	110	26-JAN-2012	25-FEB-2012	30	721.62	WATER WALL TUBE LEAKAGE	79.38	8.22
ENNORE TPS	1	60	20-AUG-2011	01-NOV-2011	72	1739.83	TURBINE BLADE FAILURE	104.39	19.81
SUB TOTAL	12	2040			877	21075.08		2907.18	
EASTERN REGION									
STERLITE TPP	2	600	01-SEP-2011	28-SEP-2011	28	665.72	TRANSMISSION CONSTRAINTS	399.43	7.58
STERLITE TPP	3	600	21-JAN-2012	04-MAR-2012	42	1014.07	ECONOMISER TUBE LEAKAGE	190.84	6.22
KAHALGAON TPS	5	500	21-NOV-2011	20-DEC-2011	30	709.68	COAL SHORTAGE/FEEDING PROBLEM	354.84	8.08
KAHALGAON TPS	5	500	23-SEP-2011	18-OCT-2011	25	605.48	COAL SHORTAGE/FEEDING PROBLEM	302.74	6.89
KAHALGAON TPS	6	500	04-AUG-2011	31-AUG-2011	27	642.53	COAL SHORTAGE/FEEDING PROBLEM	321.27	7.31
KAHALGAON TPS	7	500	07-OCT-2011	04-NOV-2011	28	661.9	COAL SHORTAGE/FEEDING PROBLEM	330.95	7.54
MEJIA TPS	7	500	09-OCT-2011	07-NOV-2011	29	705.23	GEN. TRANS DAMAGED	352.62	13.8

DETAILS OF LONG DURATION FORCED OUTAGES (25 DAYS & ABOVE) DURING 2010-11

Station	Unit No.	Capacity (MW)	Date Of Outage	Date of Return	Outage Days	Outage Hours	Reason	MU Loss	% of Unit Max Possible(Gen)
MEJIA TPS	7	500	29-DEC-2011	29-JAN-2012	31	744.07	GENERATOR MISCLLANEOUS MAINTENANCE	372.04	14.56
D.P.L. TPS	7	300	01-APR-2011	29-AUG-2011	150	3603.2	TURBINE ROTOR FAILURE/DAMAGED	1080.96	41.02
CHANDRAPURA(DVC) TPS	8	250	13-SEP-2011	24-DEC-2011	102	2455.27	VARIOUS STEAM LEAKAGES	613.82	41.93
TENUGHAT TPS	1	210	09-JUL-2011	25-AUG-2011	48	1143.33	REHEATER TUBE LEAKAGE	240.1	13.02
TENUGHAT TPS	1	210	18-MAY-2011	06-JUL-2011	49	1180.5	TRIPPING OF TRANSMISSION LINE	247.91	13.44
TENUGHAT TPS	2	210	24-FEB-2012	31-MAR-2012	36	865.42	TURBINE VIBRATIONS HIGH	181.74	9.85
MEJIA TPS	4	210	27-AUG-2011	21-SEP-2011	25	604.53	COAL SHORTAGE/FEEDING PROBLEM	126.95	6.88
KOLAGHAT TPS	1	210	16-MAY-2011	02-AUG-2011	78	1882.22	GENERATOR MISCLLANEOUS MAINTENANCE	395.27	21.43
SANTALDIH TPS	1	120	01-APR-2011	31-MAR-2012	366	8784	TURBINE OIL SYSTEM PROBLEM	1054.08	100
SANTALDIH TPS	2	120	01-APR-2011	31-MAR-2012	366	8784	MILLING SYSTEM /RC FEEDER PROBLEM	1054.08	100
SANTALDIH TPS	3	120	01-APR-2011	31-MAR-2012	366	8784	MILLING SYSTEM /RC FEEDER PROBLEM	1054.08	100
SANTALDIH TPS	4	120	01-APR-2011	31-MAR-2012	366	8784	HYDROGEN PRESSURE PROBLEM	1054.08	100
MUZAFFARPUR TPS	2	110	03-NOV-2011	29-MAR-2012	147	3519.53	COAL SHORTAGE/FEEDING PROBLEM	387.15	40.07
MUZAFFARPUR TPS	2	110	15-MAY-2011	10-JUN-2011	27	638.58	TURBINE BLADE FAILURE	70.24	7.27
PATRATU TPS	7	105	01-APR-2011	31-MAR-2012	366	8784	STATOR/ STATOR EARTH FAULT	922.32	100
PATRATU TPS	8	105	01-APR-2011	31-MAR-2012	366	8784	TURBINE MISC. PROBLEMS	922.32	100
BARAUNI TPS	6	105	05-SEP-2011	01-OCT-2011	26	617.33	COAL SHORTAGE/FEEDING PROBLEM	64.82	7.03
PATRATU TPS	5	90	01-APR-2011	31-MAR-2012	366	8784	POLLUTION PROBLEM	790.56	100
PATRATU TPS	6	90	09-JUL-2011	19-AUG-2011	42	997.13	HYDROGEN PRESSURE PROBLEM	89.74	11.35
D.P.L. TPS	3	70	01-DEC-2011	28-DEC-2011	27	644.57	WATER WALL TUBE LEAKAGE	45.12	7.34
D.P.L. TPS	3	70	03-OCT-2011	31-OCT-2011	28	667.63	BOILER MISC. PROBLEM	46.73	7.6
D.P.L. TPS	3	70	29-DEC-2011	31-MAR-2012	94	2252.83	BOILER MISC. PROBLEM	157.7	25.65
BANDEL TPS	1	60	14-JUL-2011	22-AUG-2011	39	938.7	MILLING SYSTEM /RC FEEDER PROBLEM	56.32	10.69
BANDEL TPS	2	60	07-MAY-2011	25-NOV-2011	203	4866.18	COAL HANDLING PROBLEM	291.97	55.4
BANDEL TPS	3	60	01-NOV-2011	20-DEC-2011	49	1184	BOILER FEED PUMP/MOTOR PROBLEM	71.04	13.48
BARAUNI TPS	4	50	01-APR-2011	12-MAR-2012	347	8328	POLLUTION PROBLEM	416.4	94.81
BARAUNI TPS	5	50	01-APR-2011	12-MAR-2012	347	8328	POLLUTION PROBLEM	416.4	94.81
NEW COSSIPORE TPS	3	50	02-JAN-2012	14-MAR-2012	72	1723.83	CONDENSER TUBE LEAKAGE/ CLEANING	86.19	19.62
PATRATU TPS	1	40	01-APR-2011	31-MAR-2012	366	8784	TURB. AXIAL SHIFT/ THRUST PAD	351.36	100
PATRATU TPS	2	40	01-APR-2011	31-MAR-2012	366	8784	BOILER AUX. MISC. PROMLEMS	351.36	100
PATRATU TPS	3	40	01-APR-2011	31-MAR-2012	366	8784	MAJOR REPAIRS IN BOILER	351.36	100
D.P.L. TPS	1	30	01-APR-2011	31-MAR-2012	366	8784	VINTAGE UNIT WITHDRAWN AND CLOSED FOR OPERATION	263.52	100
D.P.L. TPS	2	30	01-APR-2011	31-MAR-2012	366	8784	VINTAGE UNIT WITHDRAWN AND CLOSED FOR OPERATION	263.52	100
NEW COSSIPORE TPS	1	30	01-DEC-2011	31-DEC-2011	31	743.98	TURBINE MISC.	22.32	8.47
NEW COSSIPORE TPS	1	30	03-AUG-2011	08-SEP-2011	36	862.6	RESERVE SHUT DOWN	25.88	9.82

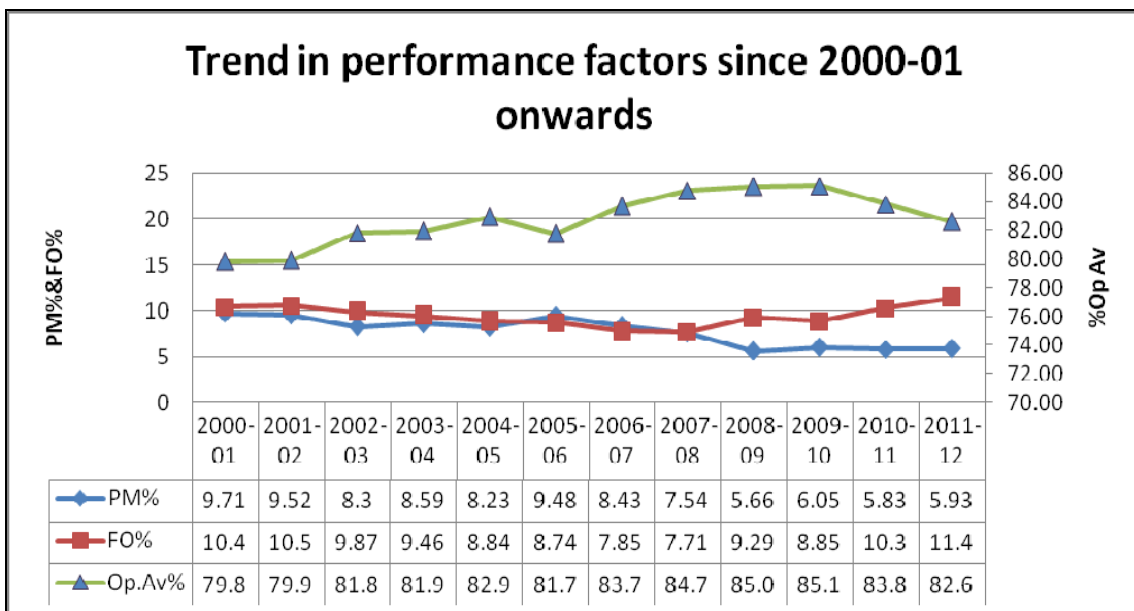
DETAILS OF LONG DURATION FORCED OUTAGES (25 DAYS & ABOVE) DURING 2010-11

Station	Unit No.	Capacity (MW)	Date Of Outage	Date of Return	Outage Days	Outage Hours	Reason	MU Loss	% of Unit Max Possible(Gen)
NEW COSSIPORE TPS	2	30	25-AUG-2011	22-SEP-2011	28	660.17	RESERVE SHUT DOWN	19.81	7.52
SUB TOTAL	43	7805			6663	159864.21		16211.95	
NORTH EASTERN REGION									
CHANDRAPUR(ASSAM) TPS	1	30	01-APR-2011	31-MAR-2012	366	8784	UNECONOMICAL OPERATION	263.52	100
CHANDRAPUR(ASSAM) TPS	2	30	01-APR-2011	31-MAR-2012	366	8784	UNECONOMICAL OPERATION	263.52	100
SUB TOTAL	2	60			732	17568		527.04	
GRAND TOTAL	103	21174			12875	308962.09		38807.26	

SECTION-5

OPERATING AVAILABILITY

5.1 On the basis of planned maintenance undertaken and forced outages occurred at 454 Thermal Generating Units aggregating to 97768 MW, the operating availability of various units and stations has been computed and given in Annexure 2.3. During the year 2011-12, the average Operating Availability of 82.61% could be achieved by the generating units under review. The unavailability due to forced and planned shutdown and corresponding operating availability of units reviewed from 2000-01 onwards are shown below:



The average Operating Availability during the year 2011-12 was lower than the Operating Availability of 83.85% achieved during last year. Main reasons for lower operating availability was increased forced shutdown of thermal units due to coal supply problem, Wet coal, Transmission constraints and Reserve shutdown of units.

5.2 UNITWISE/ STATIONWISE OPERATING AVAILABILITY

The details of some of the best performing stations / units during the year 2011-12 are given below. The list includes 10 Generating Stations from Central Sector, 13 from State sector, 6 from IPPs and 3 from Pvt Utilities.:

- During 2011-12, 32 Thermal Power stations had achieved operating availability more than 90%.
- Dahanu TPS in Maharashtra of M/s RIL(DAHANU) has achieved the highest Operating Availability of 97.54%.

- The following Thermal stations (33185 MW) achieved the Operating Availability more than 90% during 2011-12.:

Stations with Operating Availability (%) more than 90% during 2010-11					
SL. NO.	STATION NAME	ORGANISATION NAME	STATE NAME	CAPACITY	OP. AV. (%)
1	DAHANU TPS	RIL (DAHANU)	MAHARASHTRA	500	97.54
2	TORANGALLU TPS(SBU-I)	JSWEL	KARNATAKA	260	97.20
3	JOJOBERA TPS	TATA PCL	JHARKHAND	360	97.01
4	SIMHADRI	NTPC Ltd.	ANDHRA PRADESH	1500	96.04
5	OP JINDAL TPS	JPL	CHHATTISGARH	1000	95.63
6	BHILAI TPS	NSPCL	CHHATTISGARH	500	95.55
7	DADRI (NCTPP)	NTPC Ltd.	UTTAR PRADESH	1820	95.46
8	BUDGE BUDGE TPS	CESC	WEST BENGAL	750	95.2
9	RAMAGUNDEM STPS	NTPC Ltd.	ANDHRA PRADESH	2600	95.04
10	Dr. N.TATA RAO TPS	APGENCO	ANDHRA PRADESH	1760	95.00
11	SABARMATI (D-F STATIONS)	TOR. POW. (AECO)	GUJARAT	340	94.88
12	RAYALASEEMA TPS	APGENCO	ANDHRA PRADESH	1050	94.50
13	SOUTHERN REPL. TPS	CESC	WEST BENGAL	135	94.26
14	METTUR TPS	TNGDCL	TAMIL NADU	840	94.06
15	RIHAND STPS	NTPC Ltd.	UTTAR PRADESH	2000	93.83
16	UNCHAHAR TPS	NTPC Ltd.	UTTAR PRADESH	1050	93.79
17	TITAGARH TPS	CESC	WEST BENGAL	240	93.44
18	GH TPS (LEH.MOH.)	PSPCL	PUNJAB	920	93.14
19	BAKRESWAR TPS	WBPDCL	WEST BENGAL	1050	92.96
20	KOTHAGUNDEM TPS	APGENCO	ANDHRA PRADESH	720	92.89
21	PATHADI TPP	LANCO	CHHATTISGARH	600	92.52
22	ANPARA TPS	UPRVUNL	UTTAR PRADESH	1630	91.98
23	VINDHYACHAL STPS	NTPC Ltd.	MADHYA PRADESH	3260	91.96
24	KHAPARKHEDA TPS	MAHAGENCO	MAHARASHTRA	840	91.86
25	KOTA TPS	RRVUNL	RAJASTHAN	1240	91.66
26	SIPAT STPS	NTPC Ltd.	CHHATTISGARH	1660	91.53
27	KORBA-III	CSPGCL	CHHATTISGARH	240	91.33
28	SAGARDIGHI TPS	WBPDCL	WEST BENGAL	600	91.29
29	TALCHER (OLD) TPS	NTPC Ltd.	ORISSA	470	90.73
30	SINGRAULI STPS	NTPC Ltd.	UTTAR PRADESH	2000	90.48
31	TUTICORIN TPS	TNGDCL	TAMIL NADU	1050	90.42
32	KORBA-II	CSPGCL	CHHATTISGARH	200	90.04

- The following 8 thermal generating units achieved plant operating availability more than 99% during 2011-12:

Units with Operating Availability (%) more than 99% during 2010-11						
SL. No.	Station Name	Unit No.	Organisation name	State name	Capacity	OP. AV. (%)
1	UNCHAHAR TPS	5	NTPC Ltd.	UTTAR PRADESH	210	99.88
2	BAKRESWAR TPS	2	WBPDCL	WEST BENGAL	210	99.57
3	SIMHADRI	1	NTPC Ltd.	ANDHRA PRADESH	500	99.36
4	OP JINDAL TPS	2	JPL	CHHATTISGARH	250	99.26
5	DADRI (NCTPP)	1	NTPC Ltd.	UTTAR PRADESH	210	99.22
6	BUDGE BUDGE TPS	3	CESC	WEST BENGAL	250	99.07
7	JOJOBERA TPS	3	TATA PCL	JHARKHAND	120	99.02

- The following 57 thermal generating units achieved plant operating availability less than 50% during 2011-12 . the details are given in **Annexure -5.1** :

5.3 SECTORWISE OPERATING AVAILABILITY

5.3.1 Among different Sectors, the overall operating availability achieved by the generating stations under Central Sector during 2011-12 was the highest (88.08%). The operating availability of Private sector was reduced to 82.09% during the year 2011-12 as compared to 89.52 % during 2010-11 due to increased forced shutdown of the units due to non availability of coal and transmission constraints. The overall operating availability of generating stations under State sector was 78.69%. The Sector wise Planned Maintenance(%), Forced outages(%) and Operating Availability (%) of generating units in different sectors for the last three years were as under :-

SECTOR	Planned Maintenance (%)			Forced Outage (%)			Operating Availability (%) (100-PM%-FO %)		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
1. Central	4.94	5.23	5.16	6.86	5.12	6.76	88.20	89.65	88.08
2. State	7.51	6.96	7.47	9.49	14.53	13.84	83.00	78.51	78.69
3. Private	2.94	2.48	2.88	6.51	8.00	15.03	90.55	89.52	82.09

5.4 CAPACITY GROUP WISE OPERATING AVAILABILITY

5.4.1 The operating availability of 660-800 MW capacity group was 64.70% due to increased forced outage at Mundra TPS specially due to transmission constraints problem. The operating availability of 100-150 MW capacity group was 59.23% due to increased forced outage of Vintage units closed for operation and due to R&M of some units. Details are given in Section 2. The capacity group wise Planned Maintenance (%), Forced Outages (%) and Operating availability (%) for 2011-12 and previous two years were as under:

Capacity Group (MW)	Planned Maintenance (%)			Forced Outage (%)			Operating Availability (%)		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
660-800	-	-	-	-	-	35.3	-	-	64.70
450-600	3.93	4.54	5.29	5.07	5.57	7.71	91.00	89.89	87.00
300-330	2.93	1.86	2.51	9.43	15.57	15.45	87.64	82.57	82.04
250	3.41	3.59	3.76	8.71	8.31	9.29	87.88	88.10	86.95
210	6.24	5.89	5.22	5.76	7.55	6.98	88.00	86.56	87.80
195-200	7.51	10.35	9.33	5.14	5.03	7.64	87.35	84.62	83.03
100-150	12.17	10.58	13.02	18.81	26.08	27.75	69.02	63.34	59.23
25-99	7.43	5.34	5.6	18.23	25.04	24.9	74.34	69.62	69.50
ALL INDIA	6.17	5.84	5.93	8.25	10.31	11.46	74.34	83.85	82.61

5.5 REGIONWISE OPERATING AVAILABILITY

The overall Operating Availability of the Generating Stations in the Southern Region was 87.79% which was the highest among different Regions. The Region-wise Planned Maintenance(%), Forced outages(%) and Operating Availability (%) of generating units for the year 2011-12 were as under : -

Region	Planned Maintenance (%)	Forced Outage (%)	Operating Availability (%)
Northern	6.97	9.49	83.54
Western	5.12	11.38	83.50
Southern	5.58	6.63	87.79
Eastern	6.35	17.51	76.14
All India	5.93	11.46	82.61

5.6 MAKEWISE OPERATING AVAILABILITY:

The Operating Availability of 84.92% achieved by BHEL/BHEL make units was the highest among the units of different makes. The Planned maintenance (%), Forced outage (%) and Operating Availability (%) of units of different make during 2011-12 and previous two years were as under:

Make of Units TG / BOILER	Planned Maintenance (%)			Forced Outage (%)			Operating Availability (%)		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
BHEL/BHEL	6.28	6.42	6.52	6.3	7.97	8.56	87.42	85.61	84.92
BHEL /ABL	6.53	4.26	6.34	28.6	30.62	24.87	64.87	65.12	68.79
CHINA/CHINA	2.87	1.9	2.93	9.36	16.49	20.85	87.77	81.61	76.22
RUSSIA/RUSSIA	8.01	4.47	3.64	5.18	10.51	13.24	86.81	85.02	83.12
OTHERS/OTHERS	5.57	5.3	5.69	11.67	13.6	15.01	82.76	81.1	79.30
ALL MAKE	6.17	5.84	5.93	8.25	10.31	11.46	85.58	83.85	82.61

5.7 OPERATING AVAILABILITY OF SYSTEMS

The Operating Availability of different systems / areas during the years 2010-11 and 2011-12 were as under. Operating Availability of Boiler and Boiler Aux and

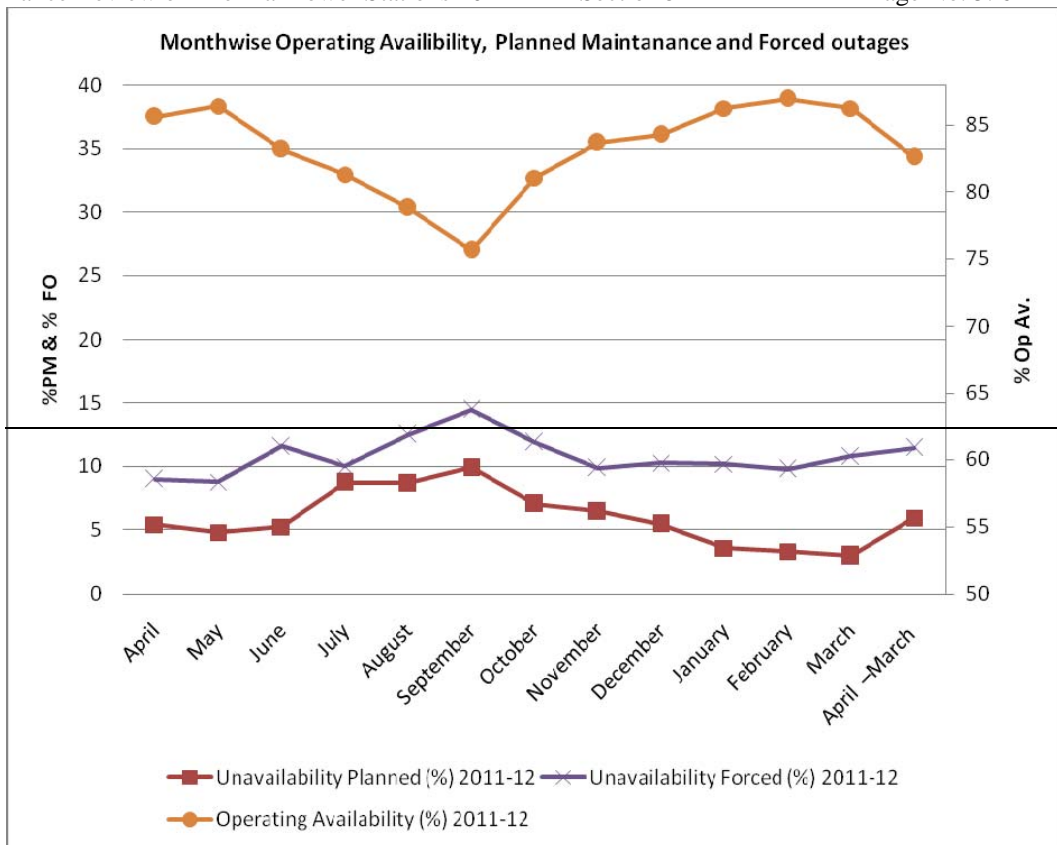
Turbine and Auxiliary system has decreased from 96.38 and 98.30% in 2010-11 to 95.94 and 97.90% respectively in 2011-12.:

Systems / Areas	OPERATING AVAILABILITY (%)	
	2010-11	2011-12
1. Boiler & Aux.	96.38	95.94
2. Turbine & Aux.	98.30	97.90
3. Generator	99.06	99.01
4. Others	90.11	89.77
Over All	83.84	82.61

5.8 MONTHWISE OPERATING AVAILABILITY

During the year 2011-12, the highest Operating Availability of 86.97% was achieved during February, 2012. Operating availability touched lowest value of 75.62% during septemeber'11 on account of increased planned and forced shutdown of thermal units. Month wise Planned Maintenance (%), Forced outage (%) and Operating Availability (%) during 2010-11 and 2011-12 are shown below:

Month	Unavailability				Operating Availability (%)	
	Planned (%)		Forced (%)		2010-11	2011-12
	2010-11	2011-12	2010-11	2011-12		
April	6.13	5.40	8.95	8.97	84.92	85.63
May	4.91	4.78	12.06	8.77	83.03	86.45
June	5.66	5.21	11.65	11.58	82.69	83.21
July	8.78	8.70	10.87	10.00	80.35	81.30
August	9.24	8.66	10.54	12.52	80.22	78.82
September	9.61	9.90	13.76	14.48	76.63	75.62
October	8.96	7.04	13.73	11.92	77.31	81.04
November	8.94	6.44	13.71	9.88	77.35	83.68
December	8.94	5.45	13.71	10.26	77.35	84.29
January	8.90	3.54	13.64	10.18	77.46	86.28
February	8.80	3.26	13.22	9.77	77.98	86.97
March	8.76	2.96	13.18	10.78	78.06	86.26
April –March	5.83	5.93	10.32	11.46	83.85	82.61



5.9 OPERATING AVAILABILITY – ORGANISATION WISE

Organisation wise operating availability in respect of Central Sector, State Sector and Pvt. Utilities during 2011-12 is given below:

Sl. No.	Organisation/Utility	No of units	Capacity (mw)	PM%	FO%	OP. Av. %
CENTRAL SECTOR						
1	NTPC Ltd.	85	27045	5.12	4.98	89.90
2	APCPL*	1	500	0.00	31.60	68.40
3	DVC	17	3700	2.61	16.72	80.67
4	K.B.U.N.L	2	220	50.34	34.35	15.31
5	NLC	20	2740	6.97	5.60	87.43
6	NSPCL	2	500	0.00	4.45	95.55
	CENTRAL SECTOR	127	34705	5.16	6.76	88.08
STATE SECTOR						
NORTHERN REGION						
1	HPGCL	12	3160	4.45	15.99	79.56
2	IPGPCL	2	135	0.00	19.73	80.27
3	PSPCL	14	2620	9.09	6.95	83.96
4	RRVUNL	16	3240	5.10	11.33	83.57
5	UPRVUNL	23	4173	15.96	11.27	72.77
WESTERN REGION						
6	CSPGCL	12	1780	5.84	7.89	86.27
7	GMDCL	2	250	13.16	25.06	61.78
8	GSECL	23	3720	5.96	11.98	82.06
9	MAHAGENCO	34	7255	6.18	13.94	79.88
10	MPPGCL	17	2932.5	9.93	12.34	77.73
SOUTHERN REGION						

Sl. No.	Organisation/ Utility	No of units	Capacity (mw)	PM%	FO%	OP.Av. %
11	APGENCO	25	5092.5	5.69	4.17	90.14
12	KPCL	9	2220	8.31	10.58	81.11
13	TNGDCL	17	2970	4.06	12.76	83.18
EASTERN REGION						
14	BSEB	4	310	35.21	48.76	16.03
15	DPL	7	690	8.02	46.05	45.93
16	JSEB	10	770	28.57	60.30	11.13
17	OPGC	2	420	7.50	5.14	87.36
18	TVNL	2	420	0.00	36.20	63.80
19	WBPDCL	24	4340	3.11	19.93	76.96
NORTH EASTERN REGION						
20	APGPCL#	2	60	0.00	100	0
	STATE SECTOR	257	46558	7.47	13.84	78.7
PRIVATE UTILITY						
WESTERN REGION						
1	RIL (DAHANU)	2	500	0.28	2.18	97.54
2	TATA PCL	4	1400	4.81	12.28	82.91
3	TOR. POW. (AECO)	5	400	3.72	2.30	93.98
EASTERN						
4	CESC	13	1285	2.37	7.25	90.38
	PRIVATE UTILITY	24	3585	3.18	7.95	88.86
PRIVATE IPPs						
NORTHERN REGION						
1	BEPL*	1	45	0.00	17.60	82.40
2	RPSCL	3	900	5.29	14.32	80.39
3	RWPL (JSW)	4	540	0.45	49.05	50.50
WESTERN REGION						
4	APL*	7	3300	1.07	24.93	74.00
5	GIPCL	4	500	8.79	19.24	71.97
6	JPL	4	1000	2.12	2.25	95.63
7	JSWEL	4	1200	1.43	9.28	89.29
8	LANCO*	2	600	0.00	7.48	92.52
9	VESPL*	1	35	0.00	0.00	100
10	WPCL	3	405	1.41	15.27	83.32
SOUTHERN REGION						
11	JSWEL	4	860	6.52	6.05	87.43
12	ST-CMSECP	1	250	5.18	8.74	86.08
13	UPCL	1	600	12.28	18.13	69.59
EASTERN REGION						
14	MPL*	1	525	0.00	30.96	69.04
15	SEL*	3	1800	0.00	27.70	72.30
16	TATA PCL	3	360	2.23	0.76	97.01
	PRIVATE IPP	46	12920	2.78	17.41	79.81
	ALL INDIA	454	97768	5.93	11.46	82.61

*New Units

Chandarpur (ASSAM), (2X30 MW) are under forced outage due to uneconomical problem

Annexure 5.1**Units achieved plant Operating Availability less than 50% during
2011 -12**

Sl. Name	Station Name	Unit Name	Capacity	%P.M	%F.O	%op Av
1	HARDUAGANJ TPS	5	60	36.41	13.63	49.97
2	GIRAL TPS	2	125	0.00	50.62	49.38
3	NEW COSSIPORE TPS	3	50	0.00	51.02	48.98
4	CHANDRAPURA(DVC) TPS	8	250	0.00	51.28	48.72
5	PARLI TPS	3	210	31.22	20.41	48.37
6	NEW COSSIPORE TPS	1	30	8.20	45.19	46.61
7	GND TPS(BHATINDA)	4	110	40.24	13.46	46.29
8	JALIPA KAPURDI TPP	2	135	1.17	53.43	45.40
9	AMARKANTAK EXT TPS	2	120	45.34	9.45	45.21
10	D.P.L. TPS	7	300	0.00	55.23	44.77
11	MUNDRA TPS	6	660	0.00	55.27	44.73
12	D.P.L. TPS	3	70	0.00	56.74	43.26
13	BARAUNI TPS	6	105	3.95	53.67	42.39
14	JALIPA KAPURDI TPP	1	135	0.00	58.25	41.75
15	ENNORE TPS	4	110	0.00	58.62	41.38
16	D.P.L. TPS	6	110	40.05	19.21	40.74
17	YAMUNA NAGAR TPS	2	300	0.00	61.64	38.36
18	GIRAL TPS	1	125	19.55	44.34	36.11
19	MUZAFFARPUR TPS	2	110	0.68	68.70	30.62
20	BANDEL TPS	2	60	5.03	66.20	28.77
21	OBRA TPS	11	200	72.44	3.39	24.17
22	HARDUAGANJ TPS	8	250	0.00	77.84	22.16
23	PARAS TPS	2	55	0.00	80.33	19.67
24	BHUSAWAL TPS	1	50	0.00	80.33	19.67
25	ROSA TPP Ph-I	3	300	0.00	84.01	15.99
26	OBRA TPS	8	94	0.00	85.61	14.39
27	AMARKANTAK EXT TPS	1	120	0.00	93.97	6.03
28	BARAUNI TPS	4	50	0.00	94.81	5.19
29	BARAUNI TPS	5	50	0.00	94.81	5.19
30	TROMBAY TPS	4	150	0.00	98.98	1.02
31	ENNORE TPS	3	110	0.00	99.96	0.04
32	GND TPS(BHATINDA)	3	110	100.00	0.00	0.00
33	OBRA TPS	7	94	100.00	0.00	0.00
34	HARDUAGANJ TPS	7	105	100.00	0.00	0.00
35	PARICHHA TPS	2	110	100.00	0.00	0.00
36	KORADI TPS	1	105	0.00	100.00	0.00
37	KORADI TPS	2	105	0.00	100.00	0.00
38	KORADI TPS	3	105	0.00	100.00	0.00
39	KORADI TPS	4	105	0.00	100.00	0.00
40	MUZAFFARPUR TPS	1	110	100.00	0.00	0.00
41	PATRATU TPS	1	40	0.00	100.00	0.00
42	PATRATU TPS	2	40	0.00	100.00	0.00
43	PATRATU TPS	3	40	0.00	100.00	0.00
44	PATRATU TPS	5	90	0.00	100.00	0.00

Sl. Name	Station Name	Unit Name	Capacity	%P.M	%F.O	%op Av
45	PATRATU TPS	7	105	0.00	100.00	0.00
46	PATRATU TPS	8	105	0.00	100.00	0.00
47	PATRATU TPS	9	110	100.00	0.00	0.00
48	PATRATU TPS	10	110	100.00	0.00	0.00
49	BARAUNI TPS	7	105	100.00	0.00	0.00
50	SANTALDIH TPS	1	120	0.00	100.00	0.00
51	SANTALDIH TPS	2	120	0.00	100.00	0.00
52	SANTALDIH TPS	3	120	0.00	100.00	0.00
53	SANTALDIH TPS	4	120	0.00	100.00	0.00
54	D.P.L. TPS	1	30	0.00	100.00	0.00
55	D.P.L. TPS	2	30	0.00	100.00	0.00
56	CHANDRAPUR(ASSAM) TPS	1	30	0.00	100.00	0.00
57	CHANDRAPUR(ASSAM) TPS	2	30	0.00	100.00	0.00

SECTION-6

CAPACITY GROUPWISE PERFORMANCE

- 6.1** This section covers the performance analysis of various capacity groups of thermal units during last three years. Out of 490 Thermal units operating on 31st March 2012, capacity group-wise disposition of 454 units considered in the review is as shown below:

Capacity Group Wise Disposition of thermal units												
Make	BHEL/BHEL		ABL/BHEL		Russia/Russia		China/China		Others/Others		All makes	
CAPACITY	NO.	CAP. (MW)	NO.	CAP. (MW)	NO.	CAP. (MW)	NO.	CAP. (MW)	NO.	CAP. (MW)	NO.	CAP. (MW)
660-800	0	0	0	0	0	0	3	1980	1	660	4	2640
490-600	43	21505	0	0	0	0	6	3600	8	4000	57	29105
300-330	0	0	0	0	0	0	20	6120	0	0	20	6120
250	37	9250	0	0	0	0	0	0	3	750	40	10000
210	110	23100	12	2520	10	2100	0	0	11	2310	143	30030
195-200	22	4390	0	0	0	0	0	0	3	600	25	4990
100-150	57	6545	8	950	3	300	7	945	15	1810	90	10550
25-99	14	1048	0	0	18	930	0	0	43	2355	75	4333
Total	283	65838	20	3470	31	3330	36	12645	84	12485	454	97768

6.2 CAPACITY GROUPWISE PERFORMANCE

Capacity group wise performance of these 454 thermal units is discussed in the subsequent paragraphs.

6.2.1 660-800 MW CAPACITY GROUP (SUPERCRITICAL UNITS)

- 6.2.1.1** During the year 2011-12, 9 Super critical units were Synchronised to the grid, however only 4 units were reckoned for PLF calculation. Details are given in Section1. Though the supercritical units of 660-800 MW group were new, the Plant load factor of the group was 44.31% because Mundra U # 6 was having transmission constraints and Mundra U #5 was having boiler feed pump problems and was on forced shutdown. Performance of 660-800 MW capacity group units during the years 2011-12 are given below: -

Sl. No.	PARTICULARS	2011-12
1	UNITS COMISSIONED BY THE END OF THE YEAR	
	(a) Number	9
	(b) Capacity (MW)	6080
2	UNITS REVIEWED	
	(a) Number	4
	(b) Capacity (MW)	2640
	(C) Generation (MU)	7632.22
3	Planned Maintenance (%)	0.00
4	Forced outage (%)	35.3
5	Operating Availability (%)	64.7
6	Plant Load Factor (%)	44.31

- 6.2.1.2** During the year 2011-12, energy losses due to forced outage in respect of 660-800 MW capacity group units have 4434 MU. The maximum energy loss of 2476 MU was due to Turbine & Turbine Aux. problem. Details of outages and energy loss of 660-800 MW capacity group units on account of outages of various equipment and auxiliaries for the previous three years are shown below.

Area/ cause of Outage of 490-500 MW capacity group	No. of Outages	MU Loss	% of Group Forced outage losses
	11-12	11-12	11-12
I. EQUIPMENT			
1. Boiler	6	338.69	7.64
2. Turbine	7	1608.82	36.28
3. Generator	1	70.05	1.58
Total	14	2017.55	45.5
II. AUXILIARIES			
1. Boiler	2	68.79	1.55
2. Turbine	2	866.97	19.55
Total	4	935.76	21.1
III. Boiler & Boiler Aux.	8	407.48	9.19
IV. Turbine & Turbine Aux.	9	2475.79	55.84
V. Generator	1	70.05	1.58
VI. Misc. (Elect./Mech.)	7	1480.79	33.4
VII. Total excluding RSD of the Group	25	4434.1	100
VIII. RSD	0	0.00	0.00
Total	25	4434.1	100

- 6.2.1.3** The details of the area/causes of forced outages and energy loss of this capacity group unit during the years 2009-10, 2010-11 and 2011-2012 are given below.

Area/ cause of outage (660-800 MW Capacity group)	No. of Outages	MU Loss	% of Group F.O. Loss
	11-12	11-12	11-12
I. EQUIPMENTS			
A. Boiler			
1. WATER WALL TUBE LEAKAGE	2	128.3	2.89
8. OTHERS	4	210.39	4.74
Total Boiler	6	338.69	7.64
B. Turbine			
1. TURBINE BEARING PROBLEM	0	0.0	0.0
2. GOVERNING / OIL SYSTEM PROBLEM	0	0.0	0.0
3. TURBINE DIFFERENTIAL EXPANSION PROBLEM	0	0.0	0.0
4. TURBINE AXIAL SHIFT/ THRUST PAD PROBLEM	1	491.04	11.07
5. TURBINE ECCENTRICITY/ HIGH VIBRATION	0	0.0	0.0
6. TURBINE ROTOR FAILURE/DAMAGED	0	0.0	0.0
7. TURBINE CONTROL VALVE PROBLEM	1	38.13	0.86
8. CONDENSER TUBE LEAKAGE/ CLEANI	3	153.38	3.46
9. MAIN STEAM LINE PROBLEM			
10. Emergency Safety Valve closure	0	0.0	0.0
11. CONDENSER LOW VACCUUM	0	0.0	0.0
12. H.P. & L.P. bypass system	0	0.0	0.0

Area/ cause of outage (660-800 MW Capacity group)	No. of Outages	MU Loss	% of Group F.O. Loss
	11-12	11-12	11-12
13. TURBINE MISC. PROBLEM	2	926.27	20.89
Total Turbine	7	1608.82	36.28
C. Generator			
1. STATOR/ STATOR EARTH FAULT	0	0.0	0.0
2. GEN. TRANSFORMER TRIPPING/ DAMAGED	1	3.85	0.09
2. ROTOR/ ROTOR EARTH FAULT	0	0.0	0.0
3. EXCITATION PROBLEM	0	0.0	0.0
4. GEN. COOLING SYSTEM FAILURE	0	0.0	0.0
5. SEAL OIL SYSTEM PROBLEM	0	0.0	0.0
6. FIRE IN TURBO GEN. BUSHING/ BUSHING FAILURE	0	0.0	0.0
6. GENERATOR BEARING PROBLEM	0	0.0	0.0
7. A.V.R. PROBLEM	0	0.0	0.0
8. GENERATOR PROTECTION/ RELAY OPERATION PROBLEM	1	70.05	1.58
9. HYDROGEN PRESSURE PROBLEM	0	0.0	0.0
10. GENERATOR MISCELLANEOUS MAINTENANCE	0	0.0	0.0
Total Generator	1	70.05	1.58
II. AUXILIARIES			
A. Boiler Auxiliaries			
1. I.D. FANS PROBLEM	0	0.0	0
2. F.D. FANS PROBLEM	0	0.0	00.0
3. P.A. FANS PROBLEM	1	20.55	0.46
4. MILLING SYSTEM /RC FEEDER PROBLEM	0	0.0	0.0
5. PIPES and VALVES BOILER SIDE	0	0.0	0.0
6. BOILER AUX. MISC. PROBLEMS	1	48.25	1.09
Total Boiler Aux.	2	68.79	1.55
B. Turbine Auxiliaries			
1. BOILER FEED PUMP/MOTOR PROBLEM	1	474.52	10.7
2. CONDENSATE PUMP PROBLEM	0	0	0
3. C.W. PUMP PROBLEM	1	392.45	8.85
4. REGENERATIVE SYSTEM PROBLEM	0	0.0	0.0
5. TURBINE PIPES & VALVES PROBLEM	0	0.0	0.0
6. DEAERATOR PROBLEM	0	0.0	0.0
7. TURBINE MISC.	0	0.0	0.0
Total Turbine Aux.	2	866.97	19.55
Total Boiler & Turbine Aux.	4	935.76	21.1
III. OTHERS MISC., MECH. & ELEC. PROBLEMS			
A. OTHER ELECTRICAL PROBLEMS			
1. UNIT AUX. TRANSFORMER/ STATION TRANSFORMER PROBLEMS	0	0.0	0.0
2. H.T./L.T. SUPPLY PROBLEM	0	0.0	0.0
3. DC SUPPLY PROBLEM	0	0.0	0.0
4. SWITCH YARD/BUS BAR PROBLEM	0	0.0	0.0
5. BREAKER/ISOLATOR PROBLEMS	0	0.0	0.0
6. MISC. FIRE HAZARDS / FIRE IN CABLE GALLERY	0	0.0	0.0
7. FUEL SUPPLY & OTHER MISC. PROBLEMS	0	0.0	0.0
8. INSTRUMENTATION PROBLEM	0	0.0	0.0
9. ELECTRICAL MISCELLANEOUS PROBLEMS	0	0.0	0.0
10. ELECTRICAL MISCELLANEOUS PROBLEMS	0	0.0	0.0
11. Air supply problem	0	0.0	0.0
12. ELECTRICAL MISCELLANEOUS PROBLEMS	0	0.0	0.0
TOTAL OTHER ELECTRICAL PROBLEMS	1	3.85	0.09

Area/ cause of outage (660-800 MW Capacity group)	No. of Outages	MU Loss	% of Group F.O. Loss
	11-12	11-12	11-12
B. FUEL SUPPLY AND OTHER MISC PROBLEMS			
13. COAL/LIGNITE SHORTAGE/ FEEDING PROBLEM	0	0.0	0.0
14. COAL SHORTAGE/ FEEDING PROBLEM	0	0.0	0.0
15. WET/ POOR QUALITY COAL	0	0.0	0.0
16. WET/ POOR QUALITY LIGNITE	0	0.0	0.0
17. FUEL OIL PROBLEM	0	0.0	0.0
18. COOLING TOWER PROBLEM	1	156.7	3.53
19. ASH HANDLING SYSTEM PROBLEM	0	0.0	0.0
20. RAW WATER PROBLEM	0	0.0	0.0
21. D.M. WATER PROBLEM	0	0.0	0.0
22. E.S.P. / POLLUTION PROBLEM	0	0.0	0.0
23. E.S.P. PROBLEM	0	0.0	0.0
24. NON-READINESS OF RESIDUAL WORK OF NEW UNIT	0	0.0	0.0
25. VINTAGE UNIT WITHDRAWN AND CLOSED FOR OPERATION			
26. OTHER MISC. PROBLEMS	0	0.0	0.0
27. FUEL SUPPLY & OTHER MISC. PROBLEMS	0	0.0	0.0
TOTAL FUEL SUPPLY AND OTHER MISC PROBLEMS	1	156.7	3.53
C. GRID SYSTEM			
28. TRANSMISSION CONSTRAINTS/ GRID DISTURBANCE	5	1320.24	29.77
29. RESERVE SHUT DOWN	0	0.0	0.0
TOTAL GRID SYSTEM	5	1320.24	29.77
Total Miscellaneous	7	1480.79	33.4

6.2.2 490-600 MW CAPACITY GROUP

6.2.2.1 Performance of 490-600 MW capacity group units during the years 2009-10, 2010-11 and 2011-12 are given below: -

Sl. No.	PARTICULARS	2009-10	2010-11	2011-12
1	UNITS COMISSIONED BY THE END OF THE YEAR			
	(a) Number	43	49	74
	(b) Capacity (MW)	21490	24480	38030
2	UNITS REVIEWED			
	(a) Number	42	45	57
	(b) Capacity (MW)	20990	22480	29105
	(C) Generation (MU)	154453.09	161637.17	190292.24
3	Planned Maintenance (%)	3.93	4.54	5.29
4	Forced outage (%)	5.11	5.57	7.71
5	Operating Availability (%)	90.97	89.89	87
6	Plant Load Factor (%)	87.21	83.58	78.38

6.2.2.2 Details of outages and energy loss of 490-600 MW capacity group units on account of outages of various equipment and auxiliaries for the previous three years are shown below.

Area/ cause of Outage of 490- 600 MW capacity group	No. of Outages			MU Loss			% of Group Forced outage losses		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
I. EQUIPMENT									
1. Boiler	205	191	278	4733.87	4093.49	6765.21	52.49	38.31	37.31
2. Turbine	31	44	55	935.27	982.05	930.26	10.37	9.19	5.13
3. Generator	15	39	46	294.87	698.88	2133.65	3.27	6.54	11.77
Total	251	274	379	5964.01	5774.42	9829.11	66.13	54.05	54.21
II. AUXILIARIES									
1. Boiler	11	21	38	36.91	98.24	371.55	0.41	0.92	2.05
2. Turbine	16	12	18	178.56	109.41	113.48	1.98	1.02	0.63
Total	27	33	56	215.47	207.65	485.03	2.39	1.94	2.68
III. Boiler & Boiler Aux.	216	212	316	4770.78	4191.73	7136.75	52.90	39.23	39.36
IV. Turbine & Turbine Aux.	47	56	73	1113.83	1091.46	1043.74	12.35	10.22	5.76
V. Generator	15	39	46	294.87	698.88	2133.65	3.27	6.54	11.77
VI. Other Misc. problems	78	97	193	2763.04	4572.69	7452.65	30.64	42.80	41.1
VII. Total excluding RSD of the Group	356	404	628	8942.52	10554.76	17766.8	99.15	98.79	97.99
VII. RSD	1	1	6	76.42	129.36	364.74	0.85	1.21	2.01
Total	357	405	634	9018.95	10684.12	18131.54	100.00	100.00	100.00

6.2.2.3 Tube leakages in the main boiler, Coal supply problem and transmission constraints were the main causes of breakdowns in 490-600 MW capacity group. The details of the area/causes of forced outages and energy loss of this capacity group unit during the years 2009-10, 2010-11 and 2011-2012 are given below. The non redness of residual work of new units was increased due to work at Sterlite TPS (U#3) (600MW). Increased ash handling problem at Korba STPS. The generation loss due to transmission constraint had been increased due to problem at Sterlite TPS (U#2) (600MW).

Area/ cause of outage (490- 600MW Capacity group)	No. of Outages			MU Loss			% of Group F.O. Loss		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
I. EQUIPMENTS									
A. Boiler									
Water wall tube leakage	71	77	117	2309.05	1841.45	3181.43	25.60	17.24	17.55
Super heater tube leakage	20	23	27	530.46	665.86	773.1	5.88	6.23	4.26
Re-heater tube leakage	44	26	37	1167.42	733.81	944.6	12.94	6.87	5.21
Economizer tube leakage	19	26	10	351.39	433.94	342.22	3.90	4.06	1.89
Air pre-heater problems	4	1	9	118.25	6.92	263.89	1.31	0.06	1.46

Area/ cause of outage (490- 600MW Capacity group)	No. of Outages			MU Loss			% of Group F.O. Loss		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
Furnace trouble	2	5	1	21.86	41.31	148.2	0.24	0.39	0.82
Boiler operational problems									
(a) Furnace fire out/flame failure	15	13	17	45.08	306.81	120.89	0.50	2.87	0.67
(b) Furnace draft abnormal	5	4	20	37.58	7.42	182.28	0.42	0.07	1.01
(c) Drum level high/ low	15	10	21	21.52	39.55	76.29	0.24	0.37	0.42
Other Misc. Problems	10	6	19	131.24	16.41	732.31	1.46	0.15	4.04
Total Boiler	205	191	278	4733.87	4093.49	6765.21	52.49	38.31	37.31
B. Turbine									
Turbine Bearing problems	1	1	5	1.24	1.94	63.94	0.01	0.02	0.35
Governing /Oil System Failures	2	4	8	0.86	136.16	30.25	0.03	1.27	0.17
Turbine differential expansion problem	1	0	1	0.55	0.00	0.94	0.01	0.00	0.01
Axial shift/thrust pad problem	1	6	0	0.00	20.35	0.00	0.01	0.19	0.00
Turbine eccentricity / high vibrations	4	4	6	536.68	370.83	79.07	5.99	3.47	0.44
Turbine rotor failure/ damaged	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00
Turbine control valve problem	2	1	2	9.66	1.10	59.23	0.11	0.01	0.33
Condenser tube leakage/ cleaning	2	2	2	293.86	50.84	161.64	3.26	0.48	0.89
Main Steam line problem	3	4	6	35.28	312.78	36.82	0.39	2.93	0.2
Emergency Stop Valve (ESV) closure	0	0	1	0.00	0.00	4.46	0.00	0.00	0.02
Condenser low vacuum	8	8	9	15.28	17.08	354.71	0.17	0.16	1.96
H.P/LP by-pass system	3	3	4	27.12	11.68	104.7	0.30	0.11	0.58
Other Misc. Problems	4	11	11	9.33	59.28	34.5	0.10	0.55	0.19
Total Turbine	31	44	55	929.84	982.05	930.26	10.37	9.19	5.13
C. Generator									
Stator/ Stator earth fault	0	2	3	0.00	19.86	28.48	0.00	0.19	0.16
Rotor/ Rotor earth fault	1	2	1	2.36	4.53	2.22	0.03	0.04	0.01
Gen. Transformer	NA.	NA.	13	NA.	NA.	863.44	NA.	NA.	4.77
Excitation problems	4	3	1	106.90	9.55	0.06	1.19	0.09	0.00
Gen. Cooling system failure	0	0	3	0.00	0.00	61.19	0.00	0.00	0.34
Seal oil system problem	0	1	1	0.00	0.80	52.86	0.00	0.01	0.29
Gen. Bearing problem	0	3	1	0.00	32.58	1	0.00	0.30	0.01
Fire in Gen. bushing/ bushing failure	1	0	2	11.18	0.00	167.2	0.12	0.00	0.92
A.V.R. problems	2	1	2	7.45	134.45	3.96	0.08	1.26	0.02

Area/ cause of outage (490- 600MW Capacity group)	No. of Outages			MU Loss			% of Group F.O. Loss		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
Generator transformer protection relay operation problem	7	15	16	166.98	126.76	83.94	1.85	1.19	0.46
Hydrogen System	0	0	2	0.00	0.00	87.18	0.00	0.00	0.48
Other Misc. Problems	0	12	11	0.00	370.34	1267.44	0.00	3.47	6.99
Total Generator	15	39	46	294.87	698.88	2133.65	3.27	6.54	11.77
II AUXILIARIES									
A. Boiler Auxiliaries									
I.D. Fans problem	4	3	10	9.56	13.25	76.58	0.11	0.12	0.42
F.D. Fans problem	2	5	1	4.17	26.76	2.78	0.05	0.25	0.02
P.A. Fans problem	5	7	15	23.18	21.28	45.1	0.26	0.20	0.25
Milling system /RC feeder problems	0	2	3	0.00	2.27	145.8	0.00	0.02	0.8
Pipes and valves	0	0	2	0.00	0.00	1.82	0.00	0.00	0.01
Other misc. Problems	0	4	7	0.00	34.69	99.48	0.00	0.32	0.55
Total Boiler Aux.	11	21	38	36.91	98.24	371.55	0.41	0.92	2.05
B. Turbine Auxiliaries									
Boiler feed pump problems	7	8	8	11.80	50.43	28.44	0.13	0.47	0.16
Condensate pump problems	1	0	0	14.70	0.00	0.00	0.16	0.00	0.00
C.W. pump problems	3	3	2	107.24	26.72	2.95	1.19	0.25	0.02
Regenerative System problem	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00
Pipes and valves (Turbine Aux.)	0	0	1	0.00	0.00	0.64	0.00	0.00	0.00
De-aerator system Problem	2	0	1	17.00	0.00	43.00	0.19	0.00	0.24
Other Misc. Problems	3	1	6	27.82	32.26	38.46	0.31	0.30	0.21
Total Turbine Aux.	16	12	18	178.56	109.41	113.48	1.98	1.02	0.63
Total Boiler & Turbine Aux.	27	33	56	215.47	207.65	485.03	2.39	1.94	2.68
III OTHERS MISC. PROBLEMS									
A. Other Electrical Problems									
1. Unit aux. Transformer/ Station Transformer problems	8	2	6	36.06	2.44	28.5	0.4	0.02	0.16
2. H.T./L.T. supply problem	4	3	2	10.98	2.89	7.55	0.12	0.03	0.04
3. DC supply problem	2	1	4	5.22	3.03	31.92	0.06	0.03	0.18
4. Switch yard/Bus Bar problem	11	6	3	56.2	21.47	14.23	0.62	0.2	0.08
5. Breaker/Isolator problems	1	2	2	4.28	27.11	13.62	0.05	0.25	0.08

Area/ cause of outage (490- 600MW Capacity group)	No. of Outages			MU Loss			% of Group F.O. Loss		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
6. Misc. fire hazards / fire in cable gallery	0	1	2	0	6.76	7.84	0	0.06	0.04
7. Instrumentation problem	0	0	0.0	0	0	0.0	0	0	0.0
8. Air supply problem	1	5	0	8.44	11.34	0.0	0.09	0.11	0.0
9. Other electrical miscellaneous	17	25	73	103.03	73.73	903.4	1.14	0.69	4.98
Subtotal	49	58	102	378.75	621.26	1492.4	4.19	5.81	8.24
B. Fuel and Other Misc. Problems									
10. Coal/Lignite Shortage/ Feeding Problem	9	17	26	2256.94	1087.72	2846.17	25.02	10.18	15.7
11. Wet/ Poor Quality Coal/ Lignite	0	1	1	0.00	1.64	90.38	0.00	0.02	0.5
12. Fuel Oil problem	0	1	5	0.00	1.12	14.7	0.00	0.01	0.08
13. Cooling Tower problem	0	1	1	0.00	2.75	2.02	0.00	0.03	0.01
14. Ash handling system problem	2	0	9	45.48	0.00	764.58	0.50	0.00	4.22
15. Raw water problem	1	3	1	1.36	2752.02	5.45	0.02	25.76	0.03
16. D.M. water problem	0	1	0	0.00	28.76	0.0	0.00	0.27	0.0
17. E.S.P. problem	0	0		0.00	0.00	0.0	0.00	0.00	0.0
18. Non-Readiness Of Residual Work Of New Unit	0	0	5	0.00	0.00	532	0.00	0.00	2.93
19. Vintage unit withdrawn and closed For Operation	0	0		0.00	0.00	0.0	0.00	0.00	0.0
20. Other misc. problems	10	3	5	26.51	7.86	326.69	0.29	0.07	1.8
Subtotal	22	27	53	2330.30	3881.86	4581.99	25.83	36.34	25.27
C. Grid System									
21. Transmission Constraints/ Grid Disturbance	7	7	28	53.98	59.28	936.17	0.60	0.55	5.16
22. Reserve Shut Down	1	1	6	76.42	129.36	364.74	0.85	1.21	2.01
Subtotal	8	8	34	130.41	188.64	1300.91	1.45	1.76	7.17
Total Miscellaneous	79	98	346	2839.47	4702.05	9775.53	31.48	44.01	43.11

6.2.3 300-330 MW CAPACITY GROUP

6.2.3.1 Plant load factor of 300-330 MW capacity group units during the financial year 2011-12 have slightly lower than the national average PLF%. The operating availability of this capacity group unit was slightly lower as compared to the previous year. Performance of 300-330 MW capacity group units during the year 2009-10, 2010-11 and 2011-2012 is given below: -

6.2.3.2

S.N.	PARTICULARS	2009-10	2010-11	2011-12
1	UNITS COMMISSIONED BY THE END OF THE YEAR			
	(a) Number	12	17	21
	(b) Capacity (MW)	3660	5220	6420
2	UNITS REVIEWED			
	(a) Number	8	17	20
	(b) Capacity (MW)	2430	5220	6120
	(c) Generation (MU)	13513.47	28622.33	35942.87
3	Planned Maintenance (%)	3.03	1.86	2.51
4	Forced outage (%)	10.08	15.57	15.45
5	Operating Availability (%)	86.89	82.57	82.04
6	Plant Load Factor (%)	72.90	73.48	72.26

6.2.3.3 Forced outage details due to failure of equipment and auxiliaries and energy loss of 300-330 MW capacity group units for the years 2009-10, 2010-11 and 2011-2012 is shown below :

Area/ cause of outage of (300-330MW Capacity group)	No. of Outages			MU Loss			% of Group F.O. Loss		
	2009-10	2010-11	2011-12	2009-10	2010-11	2011-12	2009-10	2010-11	2011-12
I. EQUIPMENT									
1. Boiler	47	97	82	757.31	910.42	1440.71	41.00	16.16	18.98
2. Turbine	16	31	29	565.21	2410.08	3615.23	30.60	42.79	47.62
3. Generator	1	15	23	2.77	88.84	544.54	0.15	1.58	7.17
Total	64	143	134	1325.29	3409.34	5600.47	71.75	60.53	73.77
II. AUXILIARIES									
1. Boiler	11	23	16	61.73	184.08	208.02	3.34	3.27	2.74
2. Turbine	0	7	6	0.00	42.30	39.6	0.00	0.75	0.52
Total	11	30	22	61.73	226.37	247.61	3.34	4.02	3.26
III. Boiler & Boiler Aux.	58	120	98	819.03	1094.50	1648.72	44.34	19.43	21.72
IV. Turbine & Turbine Aux.	16	38	35	565.21	2452.38	3654.83	30.60	43.54	48.14
V. Generator	1	15	23	2.77	88.84	544.54	0.15	1.58	7.17
VI. Misc. (Elect./Mech.)	38	109	72	460.16	1718.55	1273.06	24.91	30.51	16.77
VII. Total excluding RSD of the Group	113	282	228	1847.17	5354.26	7121.14	100.00	95.06	93.8
VIII. RSD	0	6	18	0.00	278.21	471.04	0.00	4.94	6.2
Total	113	288	246	1847.17	5632.47	7592.18	100.00	100.00	100

6.2.3.4 The break-up of the area/causes of forced outages and energy loss of 300-330 MW capacity group units during the years 2009-10, 2010-11 and 2011-2012 is given below: -

Area/ cause of outage of (300- 330MW Capacity group)	No. of Outages			MU Loss			% of Group F.O. Loss		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
I. EQUIPMENTS									
A. Boiler									
1. Water wall tube leakage	6	11	23	202.61	230.94	566.03	10.97	4.10	7.46
2. Super heater tube leakage	3	4	6	116.73	115.90	189.08	6.32	2.06	2.49
3. Re-heater tube leakage	6	3	1	135.48	116.89	10.82	7.33	2.08	0.14
4. Economizer tube leakage	4	11	2	99.70	219.45	93.05	5.40	3.90	1.23
5. Air pre-heater problems	2	4	2	7.17	32.76	32.66	0.39	0.58	0.43
6. Furnace trouble	1	0	1	64.97	0.00	75.8	3.52	0.00	1.00
7. Boiler operational problems									
(a) Furnace fire out/flame failure	7	28	9	13.04	76.59	14.58	0.71	1.36	0.19
(b) Furnace draft abnormal	4	15	16	8.58	17.70	28.95	0.46	0.31	0.38
(c) Drum level high/ low	10	14	10	37.14	14.24	11.7	2.01	0.25	0.15
8. Other Misc. Problems	4	7	12	71.88	85.94	418.04	3.89	1.53	5.51
Total Boiler	47	97	82	4733.87	910.42	1440.71	41.00	16.16	18.98
B. Turbine									
1. Turbine Bearing problems	0	0	1	0.00	0.00	0.86	0.00	0.00	0.01
2. Governing /Oil System Failures	0	5	1	0.00	6.72	104.61	0.00	0.12	1.38
3. Turbine differential expansion problem	0	0	0	0.00	0.00	0.0	0.00	0.00	0.0
4. Axial shift/thrust pad problem	4	1	1	11.83	0.36	29.9	0.64	0.01	0.39
5. Turbine eccentricity / high vibrations	3	9	6	185.75	19.34	224.41	10.06	0.34	2.96
6. Turbine rotor failure/ damaged	0	1	2	0.00	2198.90	2438.56	0.00	39.04	32.12
7. Turbine control valve problem	0	0	1	0.00	0.0	0.65	0.00	0.00	0.01
8. Condenser tube leakage/ cleaning	2	5	2	336.07	114.73	38.1	18.19	2.04	0.5
9. Main Steam line problem	3	0	3	24.54	0.00	302.48	1.33	0.00	3.98
10. Emergency Stop Valve (ESV) closure	0	0		0.00	0.00	0.00	0.00	0.00	0.00
11. Condenser low vacuum	2	4	3	1.49	12.22	362.54	0.08	0.22	4.78
12. H.P/LP by-pass system	2	3	2	5.54	4.80	7.18	0.30	0.09	0.09
13. Other Misc. Problems	0	3	7	0.00	53.01	105.93	0.00	0.94	1.4
Total Turbine	16	31	29	565.21	2410.08	3615.23	30.60	42.79	47.62
C. Generator									
1. Stator/ Stator earth fault	0	3	5	0.00	27.78	80.13	0.00	0.49	1.06
2. Rotor/ Rotor earth fault	0	0	1	0.00	0.00	2.83	0.00	0.00	0.04

Area/ cause of outage of (300- 330MW Capacity group)	No. of Outages			MU Loss			% of Group F.O. Loss		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
3. Gen. Transformer	NA.	NA.	9	NA.	NA.	164.82	NA.	NA.	2.17
4. Excitation problems	0	0	3	0.00	0.00	20.53	0.00	0.00	0.27
5. Gen. Cooling system failure	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00
6. Seal oil system problem	0	0	1	0.00	0.00	32.88	0.00	0.00	0.43
7. Gen. Bearing problem	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00
8. Fire in Gen. bushing/ bushing failure	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00
9. A.V.R. problems	0	0		0.00	0.00	0.00	0.00	0.00	0.00
10. Generator transformer protection relay operation problem	0	7	8	0.00	12.29	38.89	0.00	0.22	0.51
11. Hydrogen System	0	1	1	0.00	4.67	361.97	0.00	0.08	4.77
12. Other Misc. Problems	1	4	2	2.77	44.09	3.19	0.15	0.78	0.04
Total Generator	1	15	23	2.77	88.84	544.54	0.15	1.58	7.17
II AUXILIARIES									
A. Boiler Auxiliaries									
13. I.D. Fans problem	3	6	3	6.10	48.49	33.97	0.33	0.86	0.45
14. F.D. Fans problem	1	0	0	3.06	0.00	0.0	0.17	0.00	0.0
15. P.A. Fans problem	5	14	10	9.56	125.00	149.15	0.52	2.22	1.96
16. Milling system /RC feeder problems	0	1	1	0.00	0.60	6.07	0.00	0.01	0.08
17. Pipes and valves	0	0	0	0.00	0.00	0.0	0.00	0.00	0.0
18. Other misc. Problems	2	2	2	43.01	9.98	18.83	2.33	0.18	0.25
Total Boiler Aux.	11	23	16	61.73	184.08	208.02	3.34	3.27	2.74
B. Turbine Auxiliaries									
1. Boiler feed pump problems	0	0	1	0.00	0.00	11.47	0.00	0.00	0.15
2. Condensate pump problems	0	0	0	0.00	0.00	0.0	0.00	0.00	0.0
3. C.W. pump problems	0	3	0	0.00	17.13	0.0	0.00	0.30	0.0
4. Regenerative System problem	0	0	0	0.00	0.00	0.0	0.00	0.00	0.0
5. Pipes and valves (Turbine Aux.)	0	1	1	0.00	4.94	8.65	0.00	0.09	0.11
6. De-aerator system Problem	0	1	0	0.00	1.32	0.0	0.00	0.02	0.0
7. Other Misc. Problems	0	2	4	0.00	18.90	19.48	0.00	0.34	0.26
Total Turbine Aux.	0	7	6	0.00	42.30	39.6	0.00	0.75	0.52
Total Boiler & Turbine Aux.	11	30	22	61.73	226.37	247.61	3.34	4.02	3.26

Area/ cause of outage of (300- 330MW Capacity group)	No. of Outages			MU Loss			% of Group F.O. Loss		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
III OTHERS MISC. PROBLEMS									
A. Other Electrical Problems									
1. Unit aux. Transformer/ Station Transformer problems	2	7	8	3.42	21.42	21.84	0.19	0.38	0.29
2. H.T./L.T. supply problem	5	5	0	126.18	14.58	0.00	6.83	0.26	0.00
3. DC supply problem	1	2	0	1.12	21.02	0.00	0.06	0.37	0.00
4. Switch yard/Bus Bar problem	6	10	1	62.07	58.09	1.76	3.36	1.03	0.02
5. Breaker/Isolator problems	0	2	0	0	3.44	0.00	0.00	0.06	0.00
6. Misc. fire hazards / fire in cable gallery	1	0	2	26.83	0	11.84	1.45	0.00	0.16
7. Instrumentation problem	0	0		0	0	0.00	0.00	0.00	0.00
8. Air supply problem	2	0	0	3.94	0	0.00	0.21	0.00	0.00
9. Other electrical miscellaneous	4	6	24	83.73	12.2	263.06	4.53	0.22	3.46
Subtotal	24	40	42	403.01	186.15	459.19	21.81	3.3	6.05
B. Fuel and Other Misc. Problems									
10. Coal/Lignite Shortage/ Feeding Problem	1	15	5	1.79	838.84	184.52	0.10	14.89	2.43
11. Wet/ Poor Quality Coal/ Lignite	1	0		2.75	0.00	0.00	0.15	0.00	0.00
12. Fuel Oil problem	1	1	1	1.48	0.68	3.59	0.08	0.01	0.05
13. Cooling Tower problem	0	0	3	0.00	0.00	246	0.00	0.00	3.24
14. Ash handling system problem	0	3	0	0.00	87.67	0.00	0.00	1.56	0.00
15. Raw water problem	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00
16. D.M. water problem	0	0	1	0.00	0.00	1.72	0.00	0.00	0.02
17. E.S.P. problem	0	5	0	0.00	180.28	0.00	0.00	3.20	0.00
18. Non-Readiness Of Residual Work Of New Unit	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00
19. Vintage unit withdrawn and closed For Operation	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00
20. Other misc. problems	2	1	1	31.52	2.26	1.57	1.71	0.04	0.02
Subtotal	5	25	11	37.54	1109.72	437.4	2.04	19.70	5.76
C. Grid System									
23. Transmission Constraints/ Grid Disturbance	6	41	19	12.46	420.44	376.49	0.67	7.46	4.96
24. Reserve Shut Down	0	6	18	0.00	278.21	471.04	0.00	4.94	6.2
Subtotal	6	47	37	12.46	698.65	847.53	0.67	12.40	11.16
Total Miscellaneous	38	115	138	460.16	1996.75	2270.21	24.91	35.45	22.97

The Generation lose due to cooling tower problem was increased due to Torangallu (SBU-II) U#3 (300MW).

6.2.4 250 MW CAPACITY GROUP

6.2.4.1 The 250 MW capacity group units continued to perform well with average PLF% and operating availability above 80%. Forced outage % of this capacity group units increased from 8.31 % to 9.29%. Performance of 250 MW capacity group units during the years 2009-10, 2010-11 and 2011-2012 is given below: -

Sl.No.	PARTICULARS	09-10	10-11	11-12
UNITS COMMISSIONED BY THE END OF THE YEAR				
1.	(a) Number	36	39	42
	(b) Capacity (MW)	9000	9750	10500
UNITS REVIEWED				
2.	(a) Number	31	36	40
	(b) Capacity (MW)	7750	9000	10000
	(c) Generation (MU)	54249.93	62687.35	68477.99
3.	Planned Maintenance (%)	3.56	3.59	3.76
4.	Forced Outage (%)	8.96	8.31	9.29
5.	Operating Availability (%)	87.48	88.10	86.95
6.	Plant Load Factor (%)	83.80	82.94	81.75

6.2.4.2 The details of area/ causes of forced outage and MU losses of 250 MW capacity group 2009-10, 2010-11 and 2011-2012 are shown below:

Area/ Cause of Outage	No. of Outages			MU Loss			% of Group F.O. Loss		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
I. EQUIPMENTS									
1.Boiler	272	362	304	2161.46	2487.17	3118.46	37.43	40.60	40.68
2.Turbine	39	42	46	789.97	967.38	1243.15	13.68	15.79	16.22
3.Generator	29	32	36	435.90	1022.71	1049.82	7.55	16.69	13.69
Total	340	436	386	3387.34	4477.26	5411.43	58.66	73.08	70.59
II. AUXILIARIES									
1.Boiler	37	35	45	103.16	197.95	181.83	1.79	3.23	2.37
2.Turbine	15	13	16	43.29	37.07	579.61	0.75	0.61	7.56
Total	52	48	61	146.45	235.02	761.44	2.54	3.84	9.93
III. Boiler & Boiler Aux.	309	397	349	2264.62	2685.12	3300.29	39.21	43.83	43.05
IV. Turbine & Turbine Aux.	54	55	62	833.26	1004.45	1822.76	14.43	16.39	23.78
V. Generator	29	32	36	435.90	1022.71	1049.82	7.55	16.69	13.69
VI. Misc. (Elect./Mech.)	116	143	140	2150.45	1368.30	1067.01	37.24	22.33	13.92
VII. Total excluding RSD of the Group	508	627	587	5684.24	6080.57	7239.88	98.43	99.25	94.44
VII. Reserve Shut Down	5	6	21	90.66	46.17	426.6	1.57	0.75	5.56
Total	513	633	608	5774.90	6126.74	7666.48	100.00	100.00	100

6.2.4.3 Breakup of the forced outage and energy loss of 250 MW capacity group units due to equipment and auxiliaries during 2009-10, 2010-11 and 2011-2012 are given below:

Area/ cause of outage (250 MW Capacity group)	No. of Outages			MU Loss			% of Group F.O. Loss		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
I. EQUIPMENTS									
A. Boiler									
1. Water wall tube leakage	56	68	77	663.72	1285.38	1086.48	11.49	20.98	14.17

Area/ cause of outage (250 MW Capacity group)	No. of Outages			MU Loss			% of Group F.O. Loss		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
2. Super heater tube leakage	8	8	6	75.58	65.58	152.22	1.31	1.07	1.99
3. Re-heater tube leakage	9	12	7	476.24	73.83	58.81	8.25	1.21	0.77
4. Economizer tube leakage	19	22	14	176.43	291.03	154.65	3.06	4.75	2.02
5. Air pre-heater problems	5	8	7	20.98	56.66	51.3	0.36	0.92	0.67
6. Furnace trouble	3	2	0	3.23	16.76	0	0.06	0.27	0
7. Boiler operational problems									
(a) Furnace fire out/flame failure	77	106	75	354.70	158.95	134.47	6.14	2.59	1.75
(b) Furnace draft abnormal	36	64	62	61.60	142.51	417.36	1.07	2.33	5.44
(c) Drum level high/ low	43	46	33	73.13	59.94	156.66	1.27	0.98	2.04
8. Other Misc. Problems	16	26	23	255.84	336.54	906.52	4.43	5.49	11.82
Total Boiler	272	362	304	2161.46	2487.17	3118.46	37.43	40.60	40.68
B. Turbine									
1. Turbine Bearing problems	1	1	0	133.78	19.98	0.00	2.32	0.33	0.00
2. Governing /Oil System Failures	7	6	2	20.49	44.70	1.44	0.35	0.73	0.02
3. Turbine differential expansion problem	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4. Axial shift/thrust pad problem	1	1	3	1.76	300.58	4.9	0.03	4.91	0.06
5. Turbine eccentricity / high vibrations	2	2	7	376.70	70.08	283.56	6.52	1.14	3.7
6. Turbine rotor failure/ damaged	0	1	1	0.00	379.79	824.38	0.00	6.20	10.75
7. Turbine control valve problem	1	1	3	1.35	3.72	2.86	0.02	0.06	0.04
8. Condenser tube leakage/ cleaning	3	3	5	179.86	26.06	65.66	3.11	0.43	0.86
9. Main Steam line problem	5	4	2	9.86	95.11	24.71	0.17	1.55	0.32
10. Emergency Stop Valve (ESV) closure	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00
11. Condenser low vacuum	9	8	11	29.14	6.08	22.79	0.50	0.10	0.3
12. H.P/LP by-pass system	2	6	2	4.37	8.01	1.87	0.08	0.13	0.02
13. Other Misc. Problems	8	9	10	32.68	13.28	10.99	0.57	0.22	0.14
Total Turbine	39	42	46	789.97	967.38	1243.15	13.68	15.79	16.22
C. Generator									
1. Stator/ Stator earth fault	3	5	1	4.35	806.69	239.56	0.08	13.17	3.12
2. Rotor/ Rotor earth fault	3	0	4	46.26	0.00	37.15	0.80	0.00	0.48
3. Gen. Transformer	N A.	NA.	15	NA.	NA.	716.27	NA.	NA.	9.34
4. Excitation problems	2	7	2	9.75	14.12	2.06	0.17	0.23	0.03
5. Gen. Cooling system failure	1	0	2	0.60	0.00	31.62	0.01	0.00	0.41
6. Seal oil system problem	0	0	1	0.00	0.00	8.16	0.00	0.00	0.11
7. Gen. Bearing problem	0	1	0	0.00	1.43	0.00	0.00	0.02	0.00

Area/ cause of outage (250 MW Capacity group)	No. of Outages			MU Loss			% of Group F.O. Loss		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
8. Fire in Gen. bushing/ bushing failure	2	0	1	210.85	0.00	1.07	3.65	0.00	0.01
9. A.V.R. problems	5	4	0	24.26	2.68		0.42	0.04	
10. Generator transformer protection relay operation problem	8	8	15	8.64	81.44	17.02	0.15	1.33	0.22
11. Hydrogen System	3	2	0	129.16	113.41	0.00	2.24	1.85	0.00
12. Other Misc. Problems	2	5	3	2.05	2.93	3.14	0.04	0.05	0.04
Total Generator	29	32	36	435.90	1022.71	1049.82	7.55	16.69	13.69
II AUXILIARIES									
A. Boiler Auxiliaries									
1. I.D. Fans problem	10	10	15	17.06	11.01	67.41	0.30	0.18	0.88
2. F.D. Fans problem	5	6	5	42.57	13.53	2.95	0.74	0.22	0.04
3. P.A. Fans problem	16	14	17	29.44	103.21	56.32	0.51	1.68	0.73
4. Milling system /RC feeder problem	4	2	4	6.54	14.87	3.2	0.11	0.24	0.04
5. Pipes and valves	1	0	1	6.90	0.00	34.7	0.12	0.00	0.45
6. Other misc. Problems	1	3	3	0.65	55.33	17.24	0.01	0.90	0.22
Total Boiler Aux.	37	35	45	103.16	197.95	181.83	1.79	3.23	2.37
B. Turbine Auxiliaries									
1. Boiler feed pump problems	8	4	5	9.24	3.24	14.7	0.16	0.05	0.19
2. Condensate pump problems	0	1	0	0.00	0.58	0.00	0.00	0.01	0.00
3. C.W. pump problems	3	5	1	7.68	30.02	1.17	0.13	0.49	0.02
4. Regenerative System problem	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00
5. Pipes and valves (Turbine Aux.)	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00
6. De-aerator system Problem	1	0	0	0.40	0.00	0.00	0.01	0.00	0.00
7. Other Misc. Problems	3	3	10	25.97	3.23	563.74	0.45	0.05	7.35
Total Turbine Aux.	15	13	16	43.29	37.07	579.61	0.75	0.61	7.56
Total Boiler & Turbine Aux.	52	48	61	146.45	235.02	761.44	2.54	3.84	9.93
III. OTHERS MISC. PROBLEMS									
A. Other Electrical Problems									
1. Unit aux. Transformer/ Station Transformer problems	9	14	9	124.63	60.8	19.11	2.16	0.99	0.25
2. H.T./L.T. supply problem	1	5	4	0.46	17.22	2.26	0.01	0.28	0.03
3. DC supply problem	1	2	1	2.48	3.77	1.4	0.04	0.06	0.02
4. Switch yard/Bus Bar problem	6	4	3	10.49	13.55	21.41	0.18	0.22	0.28
5. Breaker/Isolator problems	1	1	2	0.64	0.44	1.5	0.01	0.01	0.02
6. Misc. fire hazards / fire in cable gallery	0	1	2	0.00	0.74	4.71	0.00	0.01	0.06
7. Instrumentation problem	0	1	1	0.00	1.16	0.41	0.00	0.02	0.01
8. Air supply problem	0	7	1	0.00	10.34	0.46	0.00	0.17	0.01
9. Other electrical miscellaneous	21	21	38	58.93	172.19	144.09	1.02	2.81	1.88

Area/ cause of outage (250 MW Capacity group)	No. of Outages			MU Loss			% of Group F.O. Loss		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
Subtotal	53	67	69	283.61	732.14	201.58	4.91	11.95	2.64
B. Fuel and Other Misc. problems									
10. Coal/Lignite Shortage/ Feeding Problem	17	12	19	1563.64	361.86	471.71	27.08	5.91	6.15
11. Wet/ Poor Quality Coal/ Lignite	0	4	2	0.00	19.32	35.11	0.00	0.32	0.46
12. Fuel Oil problem	3	10	10	2.98	8.38	8.99	0.05	0.14	0.12
13. Cooling Tower problem	1	0	0	1.44	0.00	0.00	0.02	0.00	0.00
14. Ash handling system problem	5	6	2	61.24	56.45	37.28	1.06	0.92	0.49
15. Raw water problem	1	0	0	8.04	0.00	0.00	0.14	0.00	0.00
16. D.M. water problem	0	1	1	0.00	0.35	10.31	0.00	0.01	0.13
17. E.S.P. problem	1	1	2	155.58	0.42	2.26	2.69	0.01	0.03
18. Non-Readiness Of Residual Work Of New Unit	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00
19. Vintage unit withdrawn and closed For Operation	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00
20. Other misc. problems	6	11	11	3.94	131.98	95.01	0.07	2.15	1.24
Subtotal	34	45	47	1796.86	578.76	660.66	31.11	9.47	8.62
C. GRID SYSTEM									
21. Transmission Constraints/ Grid Disturbance	21	31	23	66.67	57.40	202.79	1.15	0.94	2.65
22. Reserve Shut Down	5	6	21	90.66	46.17	426.6	1.57	0.75	5.56
Subtotal	26	37	44	157.32	103.58	629.39	2.72	1.69	8.21
Total Miscellaneous	121	149	245	2241.11	1414.46	1848.12	38.81	23.09	19.48

6.2.5 210 MW CAPACITY GROUP

6.2.5.1 Although the operating availability of 210 MW capacity group units reduced marginally from 76.74% in 2009-10 to 78.67% in 2010-11. Performance of 210 MW capacity group units during the years 2009-10, 2010-11 and 2011-2012 are given below: -

Particulars	210 MW		
	09-10	10-11	11-12
1. Units commissioned by the end of the year			
(a) Number	142	143	143
(b) Capacity MW	29820	30030	30030
2. Units considered in the review			
(a) Number	142	142	143
(b) Capacity MW	29820	29820	30030
(c) Generation (MU)	209483.37	200464.66	207509.66
3. Planned Maintenance (%)	6.37	5.89	5.22
4. Forced Outage (%)	5.69	7.55	6.98
5. Operating Availability (%)	87.95	86.56	87.8
6. Plant Load Factor (%)	80.24	76.74	78.67

6.2.5.2 The details of forced outage for 210 MW capacity group due to equipment and auxiliaries units during the years 2009-10, 2010-11 and 2011-2012 are given below: -

Area/ Cause of Outage of 210 MW capacity group	No. of Outages			MU Loss			% of Group F.O. Loss		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
I. EQUIPMENTS									
1. Boiler	1080	1233	1091	7464.06	8148.10	8195.79	50.34	41.30	44.57
2. Turbine	213	239	215	1814.20	2220.05	1761.2	12.23	11.25	9.58
3. Generator	146	148	115	1081.31	1395.25	1330.35	7.29	7.07	7.23
Total	1439	1620	1421	10359.57	11763.40	11287.34	69.86	59.63	61.38
II. AUXILIARIES									
1. Boiler	86	104	102	351.19	623.14	656.1	2.37	3.16	3.57
2. Turbine	60	46	56	280.02	170.44	226.23	1.89	0.86	1.23
Total Aux.	146	150	158	631.22	793.58	882.34	4.26	4.02	4.8
III. Boiler & Boiler Aux.	1166	1337	1193	7815.25	8771.24	8851.89	52.71	44.46	48.14
IV. Turbine & Turbine Aux.	273	285	271	2094.23	2390.50	1987.43	14.12	12.12	10.81
V. Generator	146	148	115	1081.31	1395.25	1330.35	7.29	7.07	7.23
VI. Misc. (Elect./Mech.)	494	479	424	3380.42	5132.20	4381.7	22.80	26.01	23.83
VII. Total excluding RSD of the Group	2079	2249	2003	14371.21	17689.19	16551.37	96.92	89.66	90.01
VIII. RSD	27	85	112	457.05	2039.29	1836.62	3.08	10.34	9.99
Total	2106	2334	2115	14828.26	19728.48	18388	100.00	100.00	100

6.2.5.3 Break-up of the area/ cause of forced outages and energy loss for 210 MW units for the years 2009-10, 2010-11 and 2011-2012 are shown below: -

Area/ cause of outage (210 MW Cap. group)	No. of Outages			MU Loss			% of Group F.O. Loss		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
I. EQUIPMENTS									
A. Boiler									
1. Water wall tube leakage	274	343	327	2894.94	3757.73	3932.5	19.52	19.05	21.39
2. Super heater tube leakage	78	80	71	973.43	843.08	629.03	6.56	4.27	3.42
3. Re-heater tube leakage	60	70	97	607.96	577.53	1116.02	4.10	2.93	6.07
4. Economizer tube leakage	126	94	82	1257.36	981.67	673.46	8.48	4.98	3.66
5. Air pre-heater problems	28	25	17	166.74	252.66	80.51	1.12	1.28	0.44
6. Furnace trouble	13	5	1	202.80	103.39	21.29	1.37	0.52	0.12
7. Boiler operational problems									
(a) Furnace fire out/flame failure	167	203	172	414.58	422.29	345	2.80	2.14	1.88
(b) Furnace draft abnormal	148	230	178	264.10	674.29	435.27	1.78	3.42	2.37

Area/ cause of outage (210 MW Cap. group)	No. of Outages			MU Loss			% of Group F.O. Loss		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
(c) Drum level high/ low	123	145	116	250.13	302.28	262.77	1.69	1.53	1.43
8. Other Misc. Problems	63	38	30	432.00	233.18	699.94	2.92	1.18	3.81
Total Boiler	1080	1233	1091	7464.06	8148.10	8195.79	50.34	41.30	44.57
B. Turbine									
14. Turbine Bearing problems	12	8	4	358.89	293.36	3.25	2.42	1.49	0.02
15. Governing /Oil System Failures	20	20	16	77.41	150.81	106.47	0.52	0.76	0.58
16. Turbine differential expansion problem	3	6	0	4.20	56.37	0.00	0.03	0.29	0.00
17. Axial shift/thrust pad problem	13	4	11	193.55	8.95	161.71	1.31	0.05	0.88
18. Turbine eccentricity / high vibrations	15	27	27	446.94	673.58	680.25	3.01	3.41	3.7
19. Turbine rotor failure/ damaged	3	2	4	65.00	149.49	56.33	0.44	0.76	0.31
20. Turbine control valve problem	8	10	8	38.55	71.85	45.15	0.26	0.36	0.25
21. Condenser tube leakage/ cleaning	28	28	29	204.93	378.72	273.2	1.38	1.92	1.49
22. Main Steam line problem	16	23	15	103.66	43.41	82.32	0.70	0.22	0.45
23. Emergency Stop Valve (ESV) closure	3	0	0	15.61	0.00	0.00	0.11	0.00	0.00
24. Condenser low vacuum	50	52	65	114.86	114.70	175.02	0.77	0.58	0.95
25. H.P/LP by-pass system	5	4	10	10.71	4.12	36.86	0.07	0.02	0.2
26. Other Misc. Problems	37	55	26	179.90	274.68	140.64	1.21	1.39	0.76
Total Turbine	213	239	215	1814.20	2220.05	1761.2	12.23	11.25	9.58
C. Generator									
1. Stator/ Stator earth fault	21	22	19	449.90	709.89	174.16	3.03	3.60	0.95
2. Rotor/ Rotor earth fault	13	12	5	12.42	19.37	12.81	0.08	0.10	0.07
3. Gen. Transformer	NA.	NA.	25	NA.	NA.	118.11	NA.	NA.	0.65
4. Excitation problems	24	16	11	35.88	28.69	11.21	0.24	0.15	0.06
5. Gen. Cooling system failure	9	5	3	14.60	4.54	1.36	0.10	0.02	0.01
6. Seal oil system problem	5	5	2	34.43	108.16	0.59	0.23	0.55	0.00
7. Gen. Bearing problem	0	1	1	0.00	0.55	0.58	0.00	0.00	0.00
8. Fire in Gen. bushing/ bushing failure	0	3	2	0.00	23.54	22.91	0.00	0.12	0.12

Area/ cause of outage (210 MW Cap. group)	No. of Outages			MU Loss			% of Group F.O. Loss		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
9. A.V.R. problems	6	7	11	3.77	36.73	121.66	0.03	0.19	0.66
10. Generator transformer protection relay operation problem	43	45	33	87.32	404.08	42.5	0.59	2.05	0.23
11. Hydrogen System	10	10	8	160.11	19.02	508.86	1.08	0.10	2.77
12. Other Misc. Problems	15	22	15	282.89	40.67	414.24	1.91	0.21	2.25
Total Generator	146	148	115	1081.31	1395.25	1330.35	7.29	7.07	7.23
II. AUXILIARIES									
A. Boiler Auxiliaries									
7. I.D. Fans problem	28	46	40	160.55	367.26	438.58	1.08	1.86	2.39
8. F.D. Fans problem	4	4	11	4.47	11.38	18.68	0.03	0.06	0.1
9. P.A. Fans problem	34	34	34	126.64	103.34	121.67	0.85	0.52	0.66
10. Milling system / RC feeder problem	11	14	1	19.95	114.25	27.62	0.13	0.58	0.15
11. Pipes and valves	2	2	2	10.84	10.01	9.28	0.07	0.05	0.05
12. Other misc. Problems	7	4	14	28.76	16.90	40.28	0.19	0.09	0.22
Total Boiler Aux.	86	104	102	351.19	623.14	656.1	2.37	3.16	3.57
B. Turbine Auxiliaries									
1. Boiler feed pump problems	19	23	23	35.90	92.99	82.13	0.24	0.47	0.45
2. Condensate pump problems	1	6	5	0.83	3.36	10.67	0.01	0.02	0.06
3. C.W. pump problems	13	9	13	12.30	50.98	86.2	0.08	0.26	0.47
4. Regenerative System problem	1	0	0	0.33	0.00	0	0.00	0.00	0
5. Pipes and valves (Turbine Aux.)	0		1	0.00	0.00	8.7	0.00	0.00	0.05
6. De-aerator system Problem	3	2	0	44.29	13.10	0	0.30	0.07	0
7. Other Misc. Problems	23	6	14	186.38	10.01	38.53	1.26	0.05	0.21
Total Turbine Aux.	60	46	56	280.02	170.44	226.23	1.89	0.86	1.23
Total Boiler & Turbine Aux.	146	150	158	631.22	793.58	882.34	4.26	4.02	4.8
III. OTHERS MISC. PROBLEMS									
A. Other Electrical Problems									
1. Unit aux. Transformer/ Station Transformer problems	30	35	29	36.27	174.74	84.45	0.24	0.89	0.46
2. H.T./L.T. supply problem	30	17	12	78.4	245.76	56.84	0.53	1.25	0.31
3. DC supply problem	23	23	14	20.43	24.89	20.89	0.14	0.13	0.11
4. Switch yard/Bus Bar problem	40	23	38	61.32	58.31	55.09	0.41	0.3	0.3

Area/ cause of outage (210 MW Cap. group)	No. of Outages			MU Loss			% of Group F.O. Loss		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
5. Breaker/Isolator problems	15	9	2	33.06	17.96	7.66	0.22	0.09	0.04
6. Misc. fire hazards / fire in cable gallery	4	5	7	38.54	9.22	40.99	0.26	0.05	0.22
7. Instrumentation problem	4	3	0	27.56	2.12		0.19	0.01	
8. Air supply problem	5	13	2	13.66	49.26	8.56	0.09	0.25	0.05
9. Other electrical miscellaneous	77	88	107	183.13	293.84	303.82	1.23	1.49	1.65
Subtotal	261	249	231	724.08	2370.57	676.96	4.87	12.04	3.68
B. Fuel and Other Misc. problems									
10. Coal/Lignite Shortage/ Feeding Problem	62	45	64	2070.39	886.91	1901.27	13.96	4.50	10.34
11. Wet/ Poor Quality Coal/ Lignite	3	41	30	18.94	357.97	303.6	0.13	1.81	1.65
12. Fuel Oil problem	14	24	15	11.94	77.72	120.62	0.08	0.39	0.66
13. Cooling Tower problem	2	2	1	6.81	11.23	7.94	0.05	0.06	0.04
14. Ash handling system problem	4	8	16	11.14	136.91	291.46	0.08	0.69	1.59
15. Raw water problem	4	7	5	23.05	892.01	18.73	0.16	4.52	0.1
16. D.M. water problem	2	2	1	5.09	10.26	0.89	0.03	0.05	0
17. E. S.P. problem	4	4	3	45.69	52.55	51.44	0.31	0.27	0.28
18. Non-Readiness Of Residual Work Of New Unit	0	0	3	0.00	0.00	33.43	0.00	0.00	0.18
19. Vintage unit withdrawn and closed For Operation	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00
20. Other misc. problems	50	29	19	255.29	142.39	239.38	1.72	0.72	1.31
Subtotal	145	162	157	2448.34	2567.95	2968.78	16.52	13.01	16.15
C. Grid System									
21. Transmission Constraints/ Grid Disturbance	72	58	36	194.53	187.44	735.95	1.31	0.95	4
22. Reserve Shut Down	27	85	112	457.05	2039.29	1836.62	3.08	10.34	9.99
Subtotal	99	143	148	651.58	2226.73	2572.57	4.39	11.29	13.99
Total Miscellaneous	521	564	765	3837.47	7171.50	6959.37	25.88	36.35	33.82

6.2.6 195-200 MW CAPACITY GROUP

6.2.6.1 The operating availability and PLF % of 195-200 MW capacity group units reduced mainly on account increased Forced Outage during 201-12 as compared to previous year. Details are given in Section 2. Performance of 195-200 MW capacity group units during the years 2009-10, 2010-11 and 2011-2012 are given below: -

Particulars	195-200 MW		
	09-10	10-11	11-12
1. Units commissioned by the end of the year			
(a) Number	25	25	25
(b) Capacity MW	4990	4990	4990
2. Units considered in the review			
(a) Number	25	25	25
(b) Capacity MW	4990	4990	4990
(c) Generation (MU)	34559.69	33903.7	32865.72
3. Planned Maintenance (%)	7.51	10.35	9.33
4. Forced Outage (%)	5.18	5.03	7.64
5. Operating Availability (%)	87.31	84.62	83.03
6. Plant Load Factor (%)	80.35	77.56	74.98

6.2.6.2 Forced outage details due to equipment and auxiliaries and energy loss of 195-200 MW capacity group units for the years 2009-10, 2010-11 and 2011-2012 are shown below:

Area/ Cause of Outage of 195-200 MW capacity group	No. of Outages			MU Loss			% of Group F.O. Loss		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
I. EQUIPMENTS									
1. Boiler	150	162	144	1125.25	1197.43	1058.42	51.25	54.43	31.61
2. Turbine	34	29	25	622.77	167.50	520.79	28.36	7.61	15.55
3. Generator	10	17	23	21.40	100.42	245	0.97	4.56	7.32
Total	194	208	192	1769.42	1465.35	1824.21	80.59	66.61	54.48
II. AUXILIARIES									
1. Boiler	26	31	40	218.75	244.68	467.69	9.96	11.12	13.97
2. Turbine	14	6	19	36.77	60.38	229.83	1.67	2.74	6.86
Total Aux.	40	37	59	255.52	305.06	697.53	11.64	13.87	20.83
III. Boiler & Boiler Aux.	176	193	184	1344.00	1442.12	1526.11	61.21	65.55	45.58
IV. Turbine & Turbine Aux.	48	35	44	659.55	227.88	750.63	30.04	10.36	22.42
V. Generator	10	17	23	21.40	100.42	245	0.97	4.56	7.32
VI. Misc. (Elect./Mech.)	49	79	64	170.67	394.70	680.84	7.77	17.94	20.33
VII. Total excluding RSD of the Group	283	324	315	2195.62	2165.11	3202.58	100.00	98.41	95.65
VII. RSD	0	1	5	0.00	34.92	145.73	0.00	1.59	4.35
Total	283	325	320	2195.62	2200.03	3348.31	100.00	100.00	100

6.2.6.3 The break-up of the area/ cause of forced outages and generation loss for 195-200 MW capacity group during the years 2009-10, 2010-11 and 2011-2012 are shown below: -

Area/ cause of outage (195-200 MW Cap. group)	No. of Outages			MU Loss			% of Group F.O. Loss		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
I. EQUIPMENTS									

Area/ cause of outage (195-200 MW Cap. group)	No. of Outages			MU Loss			% of Group F.O. Loss		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
A. Boiler									
1. Water wall tube leakage	66	67	55	630.92	581.01	441.51	28.74	26.41	13.19
2. Super heater tube leakage	17	16	10	162.40	137.88	108.97	7.40	6.27	3.25
3. Re-heater tube leakage	11	13	19	106.53	173.76	186.64	4.85	7.90	5.57
4. Economizer tube leakage	16	16	13	123.73	124.05	95.19	5.64	5.64	2.84
5. Air pre-heater problems	1	6	2	6.28	16.17	21.29	0.29	0.73	0.64
6. Furnace trouble	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7. Boiler operational problems									
(a) Furnace fire out/flame failure	19	11	15	65.18	9.62	140.71	2.97	0.44	4.2
(b) Furnace draft abnormal	8	23	7	5.93	104.44	2.42	0.27	4.75	0.07
(c) Drum level high/ low	9	6	22	16.64	32.99	61.32	0.76	1.50	1.83
8. Other Misc. Problems	3	4	1	7.64	17.51	0.39	0.35	0.80	0.01
Total Boiler	150	162	144	1125.25	1197.43	1058.42	51.25	54.43	31.61
B. Turbine									
1. Turbine Bearing problems	1	0	0	0.51	0.00	0.00	0.02	0.00	0.00
2. Governing /Oil System Failures	5	2	2	6.06	11.38	34.54	0.28	0.52	1.03
3. Turbine differential expansion problem	0	1	0	0.00	0.56	0.00	0.00	0.03	0.00
4. Axial shift/thrust pad problem	1	4	1	0.05	52.42	1.12	0.00	2.38	0.03
5. Turbine eccentricity / high vibrations	6	5	3	513.39	22.42	355.71	23.38	1.02	10.62
6. Turbine rotor failure/ damaged	0	0	1	0.00	0.00	7.97	0.00	0.00	0.24
7. Turbine control valve problem	0	0	1	0.00	0.00	2.68	0.00	0.00	0.08
8. Condenser tube leakage/ cleaning	4	4	5	22.18	56.11	35.45	1.01	2.55	1.06
9. Main Steam line problem	4	1	2	27.45	11.52	5	1.25	0.52	0.15
10. Emergency Stop Valve (ESV) closure	0	0	1	0.00	0.00	4.67	0.00	0.00	0.14
11. Condenser low vacuum	9	6	5	41.24	7.81	24.62	1.88	0.35	0.74
12. H.P/LP by-pass system	0	1	2	0.00	0.10	48.1	0.00	0.00	1.44
13. Other Misc. Problems	4	5	2	11.89	5.18	0.95	0.54	0.24	0.03
Total Turbine	34	29	25	622.77	167.50	520.79	28.36	7.61	15.55
C. Generator									
1. Stator/ Stator earth fault	0	3	4	0.00	70.54	184.12	0.00	3.21	5.5
2. Rotor/ Rotor earth fault	1	1	3	6.35	0.93	3.89	0.29	0.04	0.12
3. Gen. Transformer	NA.	NA.	6	NA.	NA.	16.21	NA.	NA.	0.48
4. Excitation problems	6	2	5	12.54	0.35	6.74	0.57	0.02	0.2

Area/ cause of outage (195-200 MW Cap. group)	No. of Outages			MU Loss			% of Group F.O. Loss		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
5. Gen. Cooling system failure	0	0	2	0.00	0.00	1	0.00	0.00	0.03
6. Seal oil system problem	0	1	0	0.00	4.30		0.00	0.20	
7. Gen. Bearing problem	0	0	1	0.00	0.00	0.56	0.00	0.00	0.02
8. Fire in Gen. bushing/ bushing failure	0	0	0	0.00	0.00		0.00	0.00	
9. A.V.R. problems	0	1	1	0.00	0.43	0.75	0.00	0.02	0.02
10. Generator transformer protection relay operation problem	1	6	3	0.38	9.06	2.38	0.02	0.41	0.07
11. Hydrogen System	1	1	1	1.76	6.94	43.06	0.08	0.32	1.29
12. Other Misc. Problems	1	2	1	0.39	7.87	0.47	0.02	0.36	0.01
Total Generator	10	17	23	21.40	100.42	245	0.97	4.56	7.32
II. AUXILIARIES									
A. Boiler Auxiliaries									
1. I.D. Fans problem	14	17	25	115.61	156.09	391.73	5.27	7.09	11.7
2. F.D. Fans problem	4	0	4	59.89	0.00	17.44	2.73	0.00	0.52
3. P.A. Fans problem	3	10	7	23.61	72.57	39.47	1.08	3.30	1.18
4. Milling system / RC feeder problem	4	3	2	13.63	6.07	1.59	0.62	0.28	0.05
5. Pipes and valves	1	0	0	6.00	0.00	0	0.27	0.00	0
6. Other misc. Problems	0	1	2	0.00	9.95	17.46	0.00	0.45	0.52
Total Boiler Aux.	26	31	40	218.75	244.68	467.69	9.96	11.12	13.97
B. Turbine Auxiliaries									
1. Boiler feed pump problems	3	3	8	15.54	14.37	16.54	0.71	0.65	0.49
2. Condensate pump problems	1	0	3	0.98	0.00	10.68	0.04	0.00	0.32
3. C.W. pump problems	2	1	7	12.76	43.86	199.46	0.58	1.99	5.96
4. Regenerative System problem	0	0	0	0.00	0.00	0	0.00	0.00	0
5. Pipes and valves (Turbine Aux.)	0	0	0	0.00	0.00	0	0.00	0.00	0
6. De-aerator system Problem	0	0	0	0.00	0.00	0	0.00	0.00	0
7. Other Misc. Problems	8	2	1	7.49	2.15	3.15	0.34	0.10	0.09
Total Turbine Aux.	14	6	19	36.77	60.38	229.83	1.67	2.74	6.86
Total Boiler & Turbine Aux.	40	37	59	255.52	305.06	697.53	11.64	13.87	20.83
III. OTHERS MISC. PROBLEMS									
A. Other Electrical Problems									
1. Unit aux. Transformer/ Station Transformer problems	0	4	1	2.71	2.3	0.76	0.12	0.1	0.02

Area/ cause of outage (195-200 MW Cap. group)	No. of Outages			MU Loss			% of Group F.O. Loss		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
2. H.T./L.T. supply problem	3	1	2	11.93	2.87	23.08	0.54	0.13	0.69
3. DC supply problem	2	8	1	1.11	15.21	1.12	0.05	0.69	0.03
4. Switch yard/Bus Bar problem	2	4	3	1.19	3.96	4.98	0.05	0.18	0.15
5. Breaker/Isolator problems	0	0		0	0	0	0	0	0
6. Misc. fire hazards / fire in cable gallery	2	2	0	23.78	1.32	0	1.08	0.06	
7. Instrumentation problem	0	1		0	2.94		0	0.13	
8. Air supply problem	0	0		0	0		0	0	
9. Other electrical miscellaneous	11	22	20	9.1	34.3	21.72	0.41	1.56	0.65
Subtotal	24	49	31	83.61	102.36	65.84	3.79	4.64	1.96
B. Fuel and Other Misc. problems									
10. Coal/Lignite Shortage/ Feeding Problem	8	9	22	54.88	177.48	334.75	2.50	8.07	9.99
11. Wet/ Poor Quality Coal/ Lignite	0	2	0	0.00	1.63	0.00	0.00	0.07	0.00
12. Fuel Oil problem	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00
13. Cooling Tower problem	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00
14. Ash handling system problem	0	0	4	0.00	0.00	135.75	0.00	0.00	4.05
15. Raw water problem	0	0	1	0.00	0.00	9.49	0.00	0.00	0.28
16. D.M. water problem	0	2	0	0.00	50.91	0.00	0.00	2.31	0.00
17. E.S.P. problem	0	0		0.00	0.00	0.00	0.00	0.00	0.00
18. Non-Readiness Of Residual Work Of New Unit	0	0	5	0.00	0.00	131.26	0.00	0.00	3.92
19. Vintage unit withdrawn and closed For Operation	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00
20. Other misc. problems	5	9	0	9.49	42.49	0.00	0.43	1.84	0.00
Subtotal	13	22	32	64.38	272.50	611.25	2.93	12.39	18.24
C. Grid System									
1. Transmission Constraints/ Grid Disturbance	9	5	1	21.91	13.43	3.74	1.00	0.61	0.11
2. Reserve Shut Down	0	1	5	0.00	34.92	145.73	0.00	1.59	4.35
Subtotal	9	6	6	21.91	48.35	149.47	1.00	2.20	4.46
Total Miscellaneous	49	80	109	170.67	429.62	870.01	7.77	19.53	24.69

6.2.7 100-150 MW CAPACITY GROUP

6.2.7.1 Performance of 100 MW- 150 MW capacity group units during the year 2011-12 continued to be much below national average mainly on account of:

- After commissioning of new units of higher capacity having better efficiency the operation of some units at Koradi (unit 1 to 4 each of capacity 105 MW) was discontinued from 7th January'11 onward.
- Trombay Unit# 4 (150 MW) remained under reserve shut down for most of the time during the year in view of environmental restrictions.
- Some other units such as Wardha Warora TPs unit #1 (capacity 135 MW), Gandhi Nagar TPS 1 (120 MW) remained under reserve shut down on account of low schedules from beneficiaries.
- Long duration forced outages of some units at especially in the eastern region (Patratu TPS, Muzaffarpur TPS, DPL, Santaldih TPS)) due to various reasons.
- The generation loss due to reserve shutdown was reduced in 2011-12 due to retirement of Dhuvran U#5,6 (110MW each) which were kept under reserve shutdown during 2010-11
- Performance of 100-150 MW capacity group units during the years 2009-10, 2010-11 and 2011-2012 are given below: -

Particulars	100-150 MW		
	09-10	10-11	11-12
1. Units commissioned by the end of the year			
(a) Number	85	88	91
(b) Capacity MW	9820	10280	10720
2. Units considered in the review			
(a) Number	84	83	88
(b) Capacity MW	9695	9645	10300
(c) Generation (MU)	45818.21	44973.28	43279.35
3. Planned Maintenance (%)	11.57	10.50	13.02
4. Forced Outage (%)	20.73	26.16	27.75
5. Operating Availability (%)	67.70	63.34	59.23
6. Plant Load Factor (%)	54.50	52.39	49.11

6.2.7.2 Forced outage details due to equipment and auxiliaries and energy loss of 100-150 MW capacity group units for the years 2009-10, 2010-11 and 2011-2012 are shown below:

Area/ Cause of Outage of 100-150 MW capacity group	No. of Outages			MU Loss			% of Group F.O. Loss		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
I. EQUIPMENTS									
1. Boiler	825	900	665	4082.82	3878.07	4708.98	23.41	18.36	19.44
2. Turbine	183	214	147	3383.70	4379.40	4063.58	19.40	20.74	16.77
3. Generator	115	97	69	2693.03	1774.05	2492.31	15.44	8.40	10.29
Total	1123	1211	881	10159.55	10031.51	11264.87	58.26	47.50	46.5
II. AUXILIARIES									
1. Boiler	120	124	79	961.46	1981.20	2584.96	5.51	9.38	10.67
2. Turbine	75	57	53	142.73	103.38	142.93	0.82	0.49	0.59
Total Aux.	195	181	132	1104.18	2084.59	2727.89	6.33	9.87	11.26
III. Boiler & Boiler Aux.	945	1024	744	5044.28	5859.27	7293.94	28.93	27.74	30.11
IV. Turbine & Turbine Aux.	258	271	200	3526.43	4482.79	4206.51	20.22	21.22	17.36
V. Generator	115	97	69	2693.03	1774.05	2492.31	15.44	8.40	10.29
VI. Misc. (Elect. /Mech.)	444	431	386	4706.94	4953.75	7514.8	26.99	23.45	31.02
VII. Total excluding RSD of the Group	1762	1823	1399	15970.67	17069.85	21507.56	91.58	80.82	88.78
VII. RSD	18	50	79	1467.63	4050.94	2718.58	8.42	19.18	11.22
Total	1780	1873	1478	17438.30	21120.79	24226.14	100.00	100.00	100

6.2.7.3 The break-up of the area/causes of forced outages and energy loss of 100-150 MW capacity group units during the years 2009-10, 2010-11 and 2011-2012 are given below:

Area/ cause of outage (100-150 MW Cap. group)	No. of Outages			MU Loss			% of Group F.O. Loss		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
I. EQUIPMENTS									
A. Boiler									
1. Water wall tube leakage	231	232	189	1364.42	1769.64	1674.85	7.82	8.38	6.91
2. Super heater tube leakage	92	78	66	750.69	591.18	718.97	4.30	2.8	2.97
3. Re-heater tube leakage	56	49	25	351.69	289.3	127	2.02	1.37	0.52
4. Economizer tube leakage	81	85	100	403.56	455.88	583.62	2.31	2.16	2.41
5. Air pre-heater problems	11	7	4	76.11	35.31	6.12	0.44	0.17	0.03
6. Furnace trouble	6	8	5	123.40	114.69	22.11	0.71	0.54	0.09
(a) Furnace fire out/ flame failure	138	221	105	161.54	113.88	52.96	0.93	0.54	0.22
(b) Furnace draft abnormal	80	120	80	222.69	215.12	153.01	1.28	1.02	0.63
(c) Drum level high/ low	69	52	42	134.49	113.97	73.69	0.77	0.54	0.3
7. Other Misc. Problems	61	48	49	494.23	179.09	1296.67	2.84	0.85	5.35
Total Boiler	825	900	665	4082.82	3878.07	4708.98	23.41	18.36	19.44
B. Turbine									

Area/ cause of outage (100-150 MW Cap. group)	No. of Outages			MU Loss			% of Group F.O. Loss		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
1. Turbine Bearing problems	11	6	3	419.39	385.87	2.68	2.41	1.83	0.01
2. Governing /Oil System Failures	28	25	24	351.92	1232.77	1170.95	2.02	5.84	4.83
3. Turbine differential expansion problem	4	8	0	17.39	25.41	~	0.10	0.12	0.0
4. Axial shift/thrust pad problem	12	17	9	26.47	13.56	19.34	0.15	0.06	0.08
5. Turbine eccentricity / high vibrations	15	31	12	1210.41	1400.56	1286.9	6.94	6.63	5.31
6. Turbine rotor failure/ damaged	0	0	1	0.00	0.00	70.24	0.00	0.00	0.29
7. Turbine control valve problem	5	7	9	9.25	12.10	5.52	0.05	0.06	0.02
8. Condenser tube leakage/ cleaning	18	7	14	93.02	18.54	124.97	0.53	0.09	0.52
9. Main Steam line problem	10	11	10	37.27	22.82	25.33	0.21	0.11	0.1
10. Emergency Stop Valve (ESV) closure	1	3	7	3.76	2.05	9.71	0.02	0.01	0.04
11. Condenser low vacuum	45	58	32	36.34	72.07	92.61	0.21	0.34	0.38
12. H.P/LP by-pass system	4	3	2	10.03	98.90	0.7	0.06	0.47	0.0
13. Other Misc. Problems	30	38	24	1168.43	1094.75	1254.63	6.70	5.18	5.18
Total Turbine	183	214	147	3383.70	4379.40	4063.58	19.40	20.74	16.77
C. Generator									
1. Stator/ Stator earth fault	11	7	6	588.35	479.61	928.05	3.37	2.27	3.83
2. Rotor/ Rotor earth fault	10	5	2	486.54	10.40	270.94	2.79	0.05	1.12
3. Gen. Transformer	NA.	NA.	25	NA.	NA.	223.15	NA.	NA.	0.92
4. Excitation problems	16	7	11	33.49	6.31	14.89	0.19	0.03	0.06
5. Gen. Cooling system failure	1	2	2	0.15	2.95	5.86	0.00	0.01	0.02
6. Seal oil system problem	5	11	2	46.08	64.86	21.36	0.26	0.31	0.09
7. Gen. Bearing problem	0	3		0.00	19.60	0.00	0.00	0.09	0.00
8. Fire in Gen. bushing/ bushing failure	9	0	2	72.38	0.00	0.37	0.42	0.00	0
9. A.V.R. problems	7	3	9	28.12	0.56	1.87	0.16	0.00	0.01

Area/ cause of outage (100-150 MW Cap. group)	No. of Outages			MU Loss			% of Group F.O. Loss		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
10. Generator transformer protection relay operation problem	24	26	13	145.63	21.47	8.13	0.84	0.10	0.03
11. Hydrogen System	13	11	2	1131.43	1148.92	1062.72	6.49	5.44	4.39
12. Other Misc. Problems	19	22	8	160.87	19.37	11.54	0.92	0.09	0.05
Total Generator	115	97	69	2693.03	1774.05	2492.31	15.44	8.40	10.29
II. AUXILIARIES									
A. Boiler Auxiliaries									
1. I.D. Fans problem	45	38	30	236.84	219.99	161.64	1.36	1.04	0.67
2. F.D. Fans problem	10	6	8	3.46	34.68	6.52	0.02	0.16	0.03
3. P.A. Fans problem	37	25	18	98.81	137.59	224.17	0.57	0.65	0.93
4. Milling system / RC feeder problem	18	33	9	552.58	1496.22	2123.66	3.17	7.08	8.77
5. Pipes and valves	1	3	3	1.58	25.60	2.83	0.01	0.12	0.01
6. Other misc. Problems	9	19	11	68.19	67.12	66.14	0.39	0.32	0.27
Total Boiler Aux.	120	124	79	961.46	1981.20	2584.96	5.51	9.38	10.67
B. Turbine Auxiliaries									
1. Boiler feed pump problems	36	32	29	48.53	53.40	27.63	0.28	0.25	0.11
2. Condensate pump problems	7	5	2	10.15	7.81	7.07	0.06	0.04	0.03
3. C.W. pump problems	10	10	8	12.76	37.35	65.85	0.07	0.18	0.27
4. Regenerative System problem	3	0	0	6.11	0.00	0	0.04	0.00	0
5. Pipes and valves (Turbine Aux.)	1	1	3	2.55	0.56	30.94	0.01	0.00	0.13
6. De-aerator system Problem	0	0	1	0.00	0.00	1.28	0.00	0.00	0.01
7. Other Misc. Problems	18	9	10	62.62	4.26	10.16	0.36	0.02	0.04
Total Turbine Aux.	75	57	53	142.73	103.38	142.93	0.82	0.49	0.59
Total Boiler & Turbine Aux.	195	181	132	1104.18	2084.59	2727.89	6.33	9.87	11.26
III. OTHERS MISC. PROBLEMS									
A. Other Electrical Problems									
1. Unit aux. Transformer/ Station Transformer problems	22	15	14	96.28	4.72	38.6	0.55	0.02	0.16
2. H.T./L.T. supply problem	36	36	10	68.73	60.1	26.49	0.39	0.28	0.11
3. DC supply problem	9	12	12	5.46	10.25	8.3	0.03	0.05	0.03
4. Switch yard/Bus Bar problem	33	26	28	40.94	41.74	21.5	0.23	0.2	0.09

Area/ cause of outage (100-150 MW Cap. group)	No. of Outages			MU Loss			% of Group F.O. Loss		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
5. Breaker/Isolator problems	7	8	5	21.74	31.59	2.89	0.12	0.15	0.01
6. Misc. fire hazards / fire in cable gallery	8	10	3	2118.82	1443.17	0.75	12.15	6.83	0
7. Instrumentation problem	3	4	3	0.58	2.89	5.75	0	0.01	0.02
8. Air supply problem	8	5	0	7.71	24.18		0.04	0.11	
9. Other electrical miscellaneous	64	46	93	158.81	176.82	648.84	0.91	0.84	2.68
Subtotal	219	191	181	2567.89	1841.78	809.68	14.7	8.71	3.33
B. Fuel and Other Misc. problem									
10. Coal/Lignite Shortage/ Feeding Problem	55	80	75	472.42	691.38	914.26	2.71	3.27	3.78
11. Wet/ Poor Quality Coal/ Lignite	7	13	4	102.50	218.56	138.46	0.59	1.03	0.57
12. Fuel Oil problem	10	11	9	20.72	21.65	17.88	0.12	0.10	0.07
13. Cooling Tower problem	1	1	1	0.35	4.13	18.97	0.00	0.02	0.08
14. Ash handling system problem	9	3	9	61.57	9.71	133.4	0.35	0.05	0.55
15. Raw water problem	5	7	1	52.04	256.99	690.3	0.30	1.22	2.85
16. D.M. water problem	5	3	2	29.16	4.26	17.38	0.17	0.02	0.07
17. E.S.P. problem	8	3	1	134.42	27.86	8.74	0.77	0.13	0.04
18. Non-Readiness Of Residual Work Of New Unit	0	0	3	0.00	0.00	18.8	0.00	0.00	0.08
19. Vintage unit withdrawn and closed For Operation/ uneconomic operation	1	5	4	1051.20	837.55	3689.28	6.03	3.97	15.23
20. Other misc. problems	38	34	26	129.99	1694.64	866.87	0.75	8.03	3.58
Subtotal	139	160	135	2054.36	2950.20	6514.34	11.79	13.97	26.9
C. Grid System									
21. Transmission Constraints/ Grid Disturbance	83	63	68	83.78	138.58	190.18	0.48	0.66	0.79
22. Reserve Shut Down	18	50	79	1467.63	4050.94	2718.58	8.42	19.18	11.22
Subtotal	101	113	147	1551.41	4189.52	2908.76	8.90	19.84	12.01
Total Miscellaneous	462	481	673	6174.57	9004.69	12322.56	35.41	42.63	42.24

6.2.8 25 -99 MW (<100MW) CAPACITY GROUP

6.2.8.1 Performance of 25 -99 MW capacity group units during the year 2010-11 also continued to be much below national average mainly due to uneconomic operation and frequent outages in these vintage units. Performance of these units during 2009-10, 2010-11 and 2011-2012 are given below: -

Particulars	<100 MW		
	09-10	10-11	11-12
1. Units commissioned by the end of the year			
(a) Number	76	75	85
(b) Capacity MW	4462	4402	4842
2. Units considered in the review			
(a) Number	76	75	71
(b) Capacity MW	4462	4402	4128
(c) Generation (MU)	22795.14	21407.68	20394.94
3. Planned Maintenance (%)	5.60	5.30	5.6
4. Forced Outage (%)	23.65	24.85	24.9
5. Operating Availability (%)	70.75	69.86	69.5
6. Plant Load Factor (%)	57.20	55.47	55.46

6.2.8.2 Forced outage details due to equipment and auxiliaries and energy loss of 25 - 99 MW capacity group units for the years 2008-09, 2009-10 and 2009-10 are shown below :

Area/ Cause of Outage of 25-99 MW capacity group	No. of Outages			MU Loss			% of Group F.O. Loss		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
I. EQUIPMENTS									
1. Boiler	658	575	507	2064.16	2358.54	2133.57	21.16	24.61	23.34
2. Turbine	282	185	160	1409.64	608.55	978.77	14.45	6.35	10.71
3. Generator	106	80	61	673.02	740.33	175.47	6.90	7.73	1.92
Total	1046	840	728	4146.82	3707.41	3287.81	42.52	38.69	35.96
1. Boiler	136	102	81	455.15	281.01	633.45	4.67	2.93	6.93
2. Turbine	75	59	35	121.24	156.17	116.15	1.24	1.63	1.27
Total Aux.	211	161	116	576.40	437.18	749.6	5.91	4.56	8.2
III. Boiler & Boiler Aux.	794	677	588	2519.31	2639.55	2767.03	25.83	27.55	30.26
IV. Turbine & Turbine Aux.	357	244	195	1530.89	764.72	1094.91	15.70	7.98	11.98
V. Generator	106	80	61	673.02	740.33	175.47	6.90	7.73	1.92
VI. Misc. (Elect./Mech.)	483	456	438	4182.38	4239.48	4522.42	42.88	44.24	49.46

Area/ Cause of Outage of 25-99 MW capacity group	No. of Outages			MU Loss			% of Group F.O. Loss		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
VII. Total excluding RSD of the Group	1740	1457	1282	8905.60	8384.07	8559.84	91.31	87.49	93.62
VII. RSD	603	691	389	847.79	1198.37	583.05	8.69	12.51	6.38
Total	2343	2148	1671	9753.39	9582.44	9142.88	100.00	100.00	100

6.2.8.3 The break-up of the area/causes of forced outages and energy loss of 25 -99 MW capacity group units during the years 2009-10, 2010-11 and 2011-2012 are given below: -

Area/ cause of outage (25-99 MW Cap. group)	No. of Outages			MU Loss			% of Group F.O. Loss		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
I. EQUIPMENTS									
A. Boiler									
1. Water wall tube leakage	199	178	168	834.71	701.1	929.49	8.56	7.32	10.17
2. Super heater tube leakage	63	65	46	226.51	378.59	228.36	2.32	3.95	2.5
3. Re-heater tube leakage	3	1	1	5.58	3.38	2.28	0.06	0.04	0.02
4. Economizer tube leakage	84	92	63	264.52	297.74	223.05	2.71	3.11	2.44
5. Air pre-heater problems	10	5	2	16.51	68.35	28.99	0.17	0.71	0.32
6. Furnace trouble	7	15	4	38.13	54.92	5.41	0.39	0.57	0.06
7.0 Boiler operational problems									
(a) Furnace fire out/flame failure	78	70	71	57.61	31.21	100.02	0.59	0.33	1.09
(b) Furnace draft abnormal	122	70	108	28.56	25.43	34.37	0.29	0.27	0.38
(c) Drum level high/ low	31	44	19	17.17	101.95	29.62	0.18	1.06	0.32
7. Other Misc. Problems	61	35	25	574.88	695.88	551.99	5.89	7.26	6.04
Total Boiler	658	575	507	2064.16	2358.54	2133.57	21.16	24.61	23.34
B. Turbine									
1. Turbine Bearing problems	9	3	5	9.45	2.37	2.49	0.10	0.02	0.03
2. Governing /Oil System Failures	18	30	8	191.24	37.91	14.3	1.96	0.40	0.16
3. Turbine differential expansion problem	1	0	1	0.14	0.00	17.96	0.00	0.00	0.2
4. Axial shift/thrust pad problem	21	25	6	178.66	370.37	382.66	1.83	3.87	4.19
5. Turbine eccentricity / high vibrations	36	14	15	657.82	12.52	111.17	6.74	0.13	1.22
6. Turbine rotor failure/ damaged	1	0	5	1.81	0.00	121.21	0.02	0.00	1.33
7. Turbine control valve problem	6	4	5	21.57	8.47	7.25	0.22	0.09	0.08
8. Condenser tube leakage/ cleaning	52	32	39	219.59	93.45	169.08	2.25	0.98	1.85
9. Main Steam line problem	18	13	22	19.39	14.30	56.59	0.20	0.15	0.62
10. Emergency Stop Valve (ESV) closure	5	4	1	2.09	5.50	0.06	0.02	0.06	0

Area/ cause of outage (25-99 MW Cap. group)	No. of Outages			MU Loss			% of Group F.O. Loss		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
11. Condenser low vacuum	79	33	32	69.12	23.62	42.84	0.71	0.25	0.47
12. H.P/LP by-pass system	5	2	0	5.81	5.45	0.0	0.06	0.06	0.0
13. Other Misc. Problems	31	25	21	32.97	34.59	53.15	0.34	0.36	0.58
Total Turbine	282	185	160	1409.64	608.55	978.77	14.45	6.35	10.71
C. Generator									
1. Stator/ Stator earth fault	6	8	2	192.85	440.73	0.45	1.98	4.60	0
2. Rotor/ Rotor earth fault	8	6	2	376.14	191.00	1.11	3.86	1.99	0.01
3. Gen. Transformer	NA.	NA.	21	NA.	NA.	16.4	NA.	NA.	0.18
4. Excitation problems	31	21	14	20.79	16.13	8.35	0.21	0.17	0.09
5. Gen. Cooling system failure	1	1	1	0.44	1.42	0.15	0.00	0.01	0
6. Seal oil system problem	3	3	1	1.68	6.31	0.02	0.02	0.07	0
7. Gen. Bearing problem	0	4	2	0.00	8.63	6.16	0.00	0.09	0.07
8. Fire in Gen. bushing/ bushing failure	1	8	7	0.21	33.94	0.34	0.00	0.35	0
9. A.V.R. problems	16	7	3	21.90	0.84	3.31	0.22	0.01	0.04
10. Generator transformer protection relay operation problem	14	12	10	6.10	33.85	9.2	0.06	0.35	0.1
11. Hydrogen System	7	2	4	36.25	0.64	132.26	0.37	0.01	1.45
12. Other Misc. Problems	19	8	8	16.65	6.83	3.08	0.17	0.07	0.03
Total Generator	106	80	61	673.02	740.33	175.47	6.90	7.73	1.92
II. AUXILIARIES									
A. Boiler Auxiliaries									
1. I.D. Fans problem	46	31	19	236.13	109.40	43.47	2.42	1.14	0.48
2. F.D. Fans problem	8	7	4	1.87	2.42	1.76	0.02	0.03	0.02
3. P.A. Fans problem	13	2	5	32.85	1.76	15.47	0.34	0.02	0.17
4. Milling system / RC feeder problem	39	39	34	82.43	114.65	170.49	0.85	1.20	1.86
5. Pipes and valves	2	3	0	1.94	4.87	0	0.02	0.05	0
6. Other misc. Problems	28	20	19	99.93	47.90	402.26	1.02	0.50	4.4
Total Boiler Aux.	136	102	81	455.15	281.01	633.45	4.67	2.93	6.93
B. Turbine Auxiliaries									
7. Boiler feed pump problems	39	30	13	58.43	45.81	78.07	0.60	0.48	0.85
8. Condensate pump problems	2	6	4	0.58	31.00	6.48	0.01	0.32	0.07
9. C.W. pump problems	17	9	7	39.33	75.18	6.86	0.40	0.78	0.08
10. Regenerative System problem	1	8	0	0.08	0.91	0	0.00	0.01	0
11. Pipes and valves (Turbine Aux.)	0	0	0	0.00	0.00	0	0.00	0.00	0
12. De-aerator system Problem	1	0	0	0.02	0.00	0	0.00	0.00	0
13. Other Misc. Problems	15	6	11	22.81	3.28	24.74	0.23	0.03	0.27
Total Turbine Aux.	75	59	35	121.24	156.17	116.15	1.24	1.63	1.27
Total Boiler & Turbine Aux.	211	161	116	576.40	437.18	749.6	5.91	4.56	8.2

Area/ cause of outage (25-99 MW Cap. group)	No. of Outages			MU Loss			% of Group F.O. Loss		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
III. OTHERS MISC. PROBLEMS									
A. Other Electrical Problems									
1. Unit aux. Transformer/ Station Transformer problems	19	32	13	4	45.2	10.16	0.04	0.47	0.11
2. H.T./L.T. supply problem	49	48	17	55.22	43.31	21.65	0.57	0.45	0.24
3. DC supply problem	9	14	15	23.07	9.8	4.08	0.24	0.1	0.04
4. Switch yard/Bus Bar problem	41	15	37	259.04	8.88	25.43	2.66	0.09	0.28
5. Breaker/Isolator problems	5	15	4	3.04	44.27	3.15	0.03	0.46	0.03
6. Misc. fire hazards / fire in cable gallery	7	20	9	0.4	8.52	3.27	0	0.09	0.04
7. Instrumentation problem	5	3	3	1.07	1.25	0.7	0.01	0.01	0.01
8. Air supply problem	4	5	1	4.07	21.6	0.59	0.04	0.23	0.01
9. Other electrical miscellaneous	65	66	144	101.85	40.21	219.87	1.04	0.42	2.4
Subtotal	240	238	257	1022.6	508.16	294.27	10.48	5.3	3.22
B. Fuel and Other Misc. problem									
10. Coal/Lignite Shortage/ Feeding Problem	41	71	65	216.11	369.43	505.87	2.22	3.86	5.53
11. Wet/ Poor Quality Coal/ Lignite	0	12	4	0.00	148.73	29.89	0.00	1.55	0.33
12. Fuel Oil problem	5	11	5	20.84	14.00	3.79	0.21	0.15	0.04
13. Cooling Tower problem	2	2	1	2.69	1.18	0.04	0.03	0.01	0
14. Ash handling system problem	7	19	15	14.90	80.13	62.6	0.15	0.84	0.68
15. Raw water problem	8	0	2	18.06	0.00	1.05	0.19	0.00	0.01
16. D.M. water problem	14	1	2	66.95	7.56	10.35	0.69	0.08	0.11
17. E.S.P. problem	11	5	7	1765.44	1676.03	2270.36	18.10	17.49	24.83
18. Non-Readiness Of Residual Work Of New Unit	0	0	5	0.00	0.00	14.45	0.00	0.00	0.16
19. Vintage unit withdrawn and closed For Operation/ uneconomic operation	2	5	4	525.60	489.00	650.52	5.39	5.10	7.12
20. Other misc. problems	34	39	20	432.32	919.54	580.84	4.43	9.60	6.35
Subtotal	124	165	130	3062.93	3705.61	4129.75	31.41	38.68	45.16
C. Grid System									
21. Transmission Constraints/ Grid Disturbance	113	44	51	80.13	25.12	98.4	0.82	0.26	1.08
22. Reserve Shut Down	603	691	389	847.79	1198.37	583.05	8.69	12.51	6.38
Subtotal	716	735	440	927.91	1223.49	681.44	9.51	12.77	7.46
Total Miscellaneous	1084	1147	1133	5015.35	5437.85	5862.49	51.57	56.75	55.84

SECTION-7

Partial unavailability and Non – utilization of energy due to system load variation

7.1 Partial unavailability under review comprises the following :-

- i) Unavailability due to internal constraints arising out of the deficiency in achieving full rating of the units either in equipment or auxiliaries as a result of which the operating units could not deliver the rated output.
- ii) Unavailability due to external constraints arising out of the cause external to power station such as shortage of fuel and cooling water and low system demand including grid constraints resulting in reduced generation of one or more units in the station.

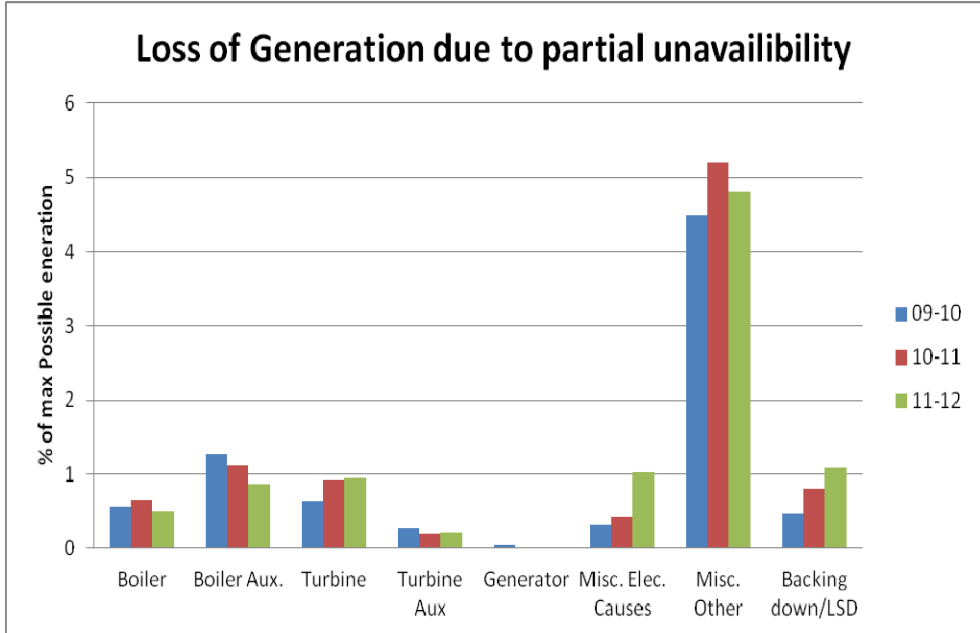
7.2 OVERALL PARTIAL UNAVAILABILITY

7.2.1 Energy loss due to partial unavailability of the thermal generating units operating in the country during 2011-12 had increased to 9.43% in terms of the maximum possible generation in comparison with the 9.34% in 2009-10. The energy loss due to partial unavailability of the thermal generating units on account of the equipment problems in the main has declined from 8.53% during 2010-11 to 8.34% during 2011-12.

However, the energy loss due to backing down of units due to Low system demand was increased from 0.81% during 2010-11 to 1.09% during 2011-12. The broad details of energy loss due to partial unavailability of the thermal generating units due to various equipments on All India basis during the period 2009-10 ,2010-11 and 2011-12 are shown below: -

S N	Constraint Area	MU Loss			% Total Partial Loss			% of Max. Possible Gen.		
		09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
1	Boiler	3836.31	4725.05	3924.55	6.94	6.94	5.13	0.56	0.65	0.48
2	Boiler Aux.	8702.02	8148.55	6941.83	15.75	11.96	9.08	1.27	1.12	0.86
	Boiler + Boiler Aux.	12538.3	12873.6	10866.4	22.7	18.9	14.21	1.82	1.76	1.34
3	Turbine	4366.46	6651.88	7670.45	7.9	9.77	10.03	0.64	0.91	0.95
4	Turbine Aux	1898.47	1484.82	1664.12	3.44	2.18	2.18	0.28	0.2	0.21
	Turbine + Turbine Aux.	6264.93	8136.7	9334.58	11.34	11.95	12.21	0.91	1.12	1.15
5	Generator	352.38	91.94	201.36	0.64	0.13	0.26	0.05	0.01	0.02
6	Misc. Elec. Causes	2187.36	3066.02	8229.85	3.96	4.5	10.77	0.32	0.42	1.02
7	Misc. Other Causes	30766.09	38027.96	38965.18	55.69	55.83	50.97	4.48	5.21	4.81
	Total	52109.1	62196.2	67597.3	94.33	91.32	88.43	7.58	8.53	8.34
8	Backing down/LSD	3134.06	5913.38	8847.36	5.67	8.68	11.57	0.46	0.81	1.09
	Grand Total	55243.2	68109.6	76444.7	100	100	100	8.04	9.34	9.43

The pictorial representation of the loss of generation on account of partial unavailability of the various parts in the main equipment & its auxiliaries and because of low system demand including grid constraints during the financial years 2009-10 ,2010-11 and 2011-12 is given below: -



7.2.2 ENERGY LOSS DUE TO REGION-WISE PARTIAL AVAILABILITY:

Region wise broad details of the energy loss due to partial unavailability of the thermal generating units in terms of percentage of maximum possible generation due to failure of various equipments during the period 2010-11 and 2011-12 are shown below: -

Type of Equip.	Northern Region		Western Region		Southern Region		Eastern Region		ALL INDIA	
	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12
1. Main Equipment	2.22	2.62	3.21	3.81	2.64	2.16	2.97	5.38	2.8	3.56
2. Auxiliaries	1.22	0.9	1.3	1.13	0.45	0.34	2.21	1.75	1.32	1.06
3. Other	2.94	2.74	7.26	6.44	3.89	3.61	5.77	5.54	5.21	4.81
Total	6.38	6.26	11.77	11.38	6.98	6.11	10.95	12.67	9.34	9.43

Region-wise details of partial unavailability due to various long and short duration constraints in the main equipment and its auxiliaries during 2011-12 (in MUs) are given in **Annexure 7.1**.

7.3 CAPACITY GROUP-WISE PARTIAL UNAVAILABILITY :

7.3.1 The partial unavailability due to various constraints in terms of percentage of All India Maximum Possible Generation in different capacity groups during the years 2009-10 ,2010-11 and 2011-12 are shown below :

Partial Unavailability as percentage of Maximum Possible Generation												
Capacity Group (MW)	Main			Auxiliary			Others			Total		
	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12	09-10	10-11	11-12
660-800	-	-	0.18	-	-	-	-	-	0.08	-	-	0.26
450-600	0.24	0.54	1.43	0.05	0.16	0.12	1.01	1.11	1.14	1.3	1.81	2.68
300-330	0.06	0.27	0.32	0.09	0.05	0.09	0.16	0.25	0.22	0.31	0.57	0.64
250-250	0.12	0.25	0.17	0.07	0.05	0.05	0.22	0.36	0.42	0.41	0.66	0.64
210-210	0.71	0.96	0.73	0.59	0.47	0.38	1.76	2.13	1.9	3.06	3.55	3.01
195-200	0.11	0.12	0.17	0.14	0.14	0.08	0.28	0.27	0.23	0.53	0.52	0.48
100-150	0.45	0.42	0.35	0.38	0.3	0.22	0.76	0.76	0.54	1.59	1.48	1.11
25-99	0.32	0.26	0.21	0.23	0.16	0.12	0.29	0.33	0.27	0.84	0.75	0.6
Total	2.02	2.8	3.56	1.54	1.32	1.06	4.48	5.21	4.81	8.04	9.34	9.43

Detail breakup of cause wise partial unavailability during 2011-12 of major capacity groups of thermal units are given in **Annexure 7.2**.

7.4 MAKE-WISE PARTIAL UNAVAILABILITY

7.4.1 Make-wise energy loss due to partial unavailability of the thermal generating units in terms of percentage of All India Maximum Possible Generation during 2010-11 and 2011-12 are shown below. It was maximum (19.98% of the make-wise maximum possible generation) in respect of BHEL/ABL make vintage units.

Make of Units	PARTIAL UNAVAILABILITY (%)			
	(% of make-wise Maximum Possible Generation)		(% of All India Maximum Possible Generation)	
	2010-11	2011-12	2010-11	2011-12
BHEL/ BHEL	8.78	8.51	6.32	5.90
BHEL / ABL	16.93	19.98	0.64	0.65
RUSSIA/RUSSIA	9.61	8.38	0.38	0.30
CHINA/CHINA	11.91	13.21	0.63	1.40
OTHERS/OTHERS	13.72	13.55	1.36	1.18
ALL MAKES	9.34	9.43	9.34	9.43

7.5 SECTOR WISE PARTIAL UNAVAILABILITY INCLUDING LOW SYSTEM DEMAND:

7.5.1 Sector wise details of energy loss due to partial unavailability of the thermal generating units in terms of percentage of All India Maximum Possible Generation during 2009-2010, 2010-11 and 2011-12 are shown below:

Year	Central Sector (%)	Private Sector (%)	State Sector (%)	All India Average
2009-2010	1.44	6.09	0.50	8.03
2010-2011	1.95	6.28	1.11	9.34
2011-2012	2.41	5.06	1.95	9.43

7.6 NON – UTILISATION OF ENERGY DUE TO SYSTEM LOAD VARIATION

7.6.1 During the year 2011-12, some thermal units could not operate at their full rated capacity due to low schedule from the beneficiaries. loss of energy due to backing down of coal/ lignite based thermal units increased from 5913 MU to 8847 MU. However the loss due to reserve shutdown of units have decreased from 7741 MU during 2010-11 to 6543 MU during 2011-12. Details of non utilization of energy due to system load variations in different regions during 2010-11 and 2011-12 are given at **Annexure 7.3**.

Annexure - 7.1

Sheet _ of 6

REGION-WISE DETAILS OF PARTIAL UNAVAILABILITY DUE TO VARIOUS LONG AND SHORT DURATION CONSTRAINTS IN THE MAIN EQUIPMENT AND ITS AUXILIARIES DURING 2011-12 (IN MUs)

CAUSE OF PARTIAL LOSS (Due to Further Breakup of Equipment & Aux.)	NORTHERN REGION			WESTERN REGION			SOUTHERN REGION		
	REGIONAL GEN. LOSS	% OF MAX. POSS. GEN.	% OF TOTAL REGIONAL P.LOSS	REGIONAL GEN. LOSS	% OF MAX. POSS. GEN.	% OF TOTAL REGIONAL P.LOSS	REGIONAL GEN. LOSS	% OF MAX. POSS GEN.	% OF TOTAL REGIONAL P.LOSS
MAIN BOILER									
PRESSURE PARTS LEAKAGE	84.43	0.04	0.71	114.65	0.04	0.36	16.97	0.01	0.18
DRUM PRESSURE RESTRICTION	319.45	0.17	2.67	95.67	0.03	0.3	1.71	0.00	0.02
AIR HEATERS	18.88	0.01	0.16	305.67	0.11	0.97	6.04	0.00	0.06
FURNACE	73.87	0.04	0.62	109.19	0.04	0.35	16.78	0.01	0.17
FURNACE DRAFT	56.37	0.03	0.47	0.00	0.00	0.00	0.00	0.00	0.00
HIGH FUEL GAS/ STEAM TEMPERATURE	41.95	0.02	0.35	2.00	0.00	0.01	0.65	0.00	0.01
AGEING	14.16	0.01	0.12	8.5	0.00	0.03	0.00	0.00	0.00
MISCELLANEOUS PROBLEMS - MAIN BOILER	373.53	0.2	3.12	1060.9	0.38	3.37	16.77	0.01	0.17
TOTAL BOILER	982.65	0.51	8.21	1696.57	0.61	5.39	58.92	0.04	0.61
BOILER AUXILIARIES									
I.D. FAN	58.17	0.03	0.49	716.42	0.26	2.28	45.99	0.03	0.48
P.A. FAN	149.84	0.08	1.25	78.74	0.03	0.25	2.74	0.00	0.03
F.D. FAN	14.45	0.01	0.12	171.01	0.06	0.54	0.19	0.00	0.00
MILLING SYSTEM	948.72	0.5	7.93	593.55	0.21	1.89	129.4	0.08	1.34
P.C & R.C. FEEDERS	96.8	0.05	0.81	100.07	0.04	0.32	7.02	0.00	0.07
PRESIPITATORS	65.27	0.03	0.55	0.43	0.00	0.00	7.23	0.00	0.07
MISCELLANEOUS PROBLEMS-BOILER AUXILIARIES	198.2	0.1	1.66	990.77	0.36	3.15	260.69	0.16	2.7
TOTAL BOILER AUXILIARIES	1531.45	0.8	12.8	2651	0.96	8.43	453.25	0.29	4.69
BOILER & ITS AUXILIARIES	2514.1	1.31	21.01	4347.57	1.57	13.82	512.17	0.32	5.3
MAIN TURBINE									
VIBRATIONS/ECCENTRICITY	2.04	0.00	0.02	160.57	0.06	0.51	171.89	0.11	1.78
TURBINE DIFFERENTIAL	8.37	0.00	0.07	19.08	0.01	0.06	0.00	0.00	0.00
HIGH CURTIS WHEEL PRESSURE	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
HIGH EXAUST TEMP	9.09	0.00	0.08	0.00	0.00	0.00	11.36	0.01	0.12
LOW VACCUM	483.96	0.25	4.04	548.9	0.2	1.75	144.29	0.09	1.49
STARTUP/ SHUT DOWN	838.2	0.44	7	1769.41	0.64	5.63	619.01	0.39	6.41
AXIAL SHIFT	34.3	0.02	0.29	0.28	0.00	0.00	30.57	0.02	0.32
CONTROL VALVE	6.04	0.00	0.05	39.42	0.01	0.13	29.09	0.02	0.3
CONDENSER	0.71	0.00	0.01	6.6	0.00	0.02	3.45	0.00	0.04
GOVERNING SYSTEM	72.63	0.04	0.61	200.47	0.07	0.64	208.26	0.13	2.16
MISCELLANEOUS PROBLEMS - MAIN TURBINE	6.3	0.00	0.05	19.17	0.01	0.06	0.00	0.00	0.00

Annexure - 7.1

Sheet _ of 6

REGION-WISE DETAILS OF PARTIAL UNAVAILABILITY DUE TO VARIOUS LONG AND SHORT DURATION CONSTRAINTS IN THE MAIN EQUIPMENT AND ITS AUXILIARIES DURING 2011-12 (IN MUs)

CAUSE OF PARTIAL LOSS (Due to Further Breakup of Equipment & Aux.)	NORTHERN REGION			WESTERN REGION			SOUTHERN REGION		
	REGIONAL GEN. LOSS	% OF MAX. POSS. GEN.	% OF TOTAL REGIONAL P.LOSS	REGIONAL GEN. LOSS	% OF MAX. POSS. GEN.	% OF TOTAL REGIONAL P.LOSS	REGIONAL GEN. LOSS	% OF MAX. POSS GEN.	% OF TOTAL REGIONAL P.LOSS
TOTAL TURBINE	1461.63	0.76	12.21	2763.9	1.00	8.79	1217.91	0.77	12.61
TURBINE AUXILIARIES									
B.F. PUMPS	18.59	0.01	0.16	86.42	0.03	0.27	2.66	0.00	0.03
REGENERATIVE SYSTEM	24.11	0.01	0.2	17.45	0.01	0.06	2.4	0.00	0.02
C.W. PUNPS	25.72	0.01	0.21	32.32	0.01	0.1	1.04	0.00	0.01
CONDENSATE PUMP	20.94	0.01	0.17	49.74	0.02	0.16	5.04	0.00	0.05
MISCELLANEOUS PROBLEMS - TURBINE AUX.	97.49	0.05	0.81	292.7	0.11	0.93	67.6	0.04	0.7
TOTAL TURBINE AUXILIARIES	186.85	0.1	1.56	478.63	0.17	1.52	78.75	0.05	0.82
TURBINE & ITS AUXILIARIES	1648.48	0.86	13.77	3242.53	1.17	10.31	1296.66	0.82	13.42
GENERATOR									
HYDROGEN PRESSURE/ PURITY	23.64	0.01	0.2	36.34	0.01	0.12	1.75	0.00	0.02
EXCITER	0.00	0.00	0.00	74.88	0.03	0.24	0.00	0.00	0.00
GENERATOR COOLING SYSTEM	16.11	0.01	0.13	7.29	0.00	0.02	0.14	0.00	0.00
SEAL OIL SYSTEM	0.00	0.00	0.00	12.28	0.00	0.04	6.31	0.00	0.07
MISCELLANEOUS PROBLEM GENERATOR	1.00	0.00	0.01	5.43	0.00	0.02	0.22	0.00	0.00
GENERATOR	40.74	0.02	0.34	136.22	0.05	0.43	8.42	0.01	0.09
ELECTRICAL									
MAIN TRANSFORMER	2.27	0.00	0.02	7.99	0.00	0.03	1.85	0.00	0.02
MISCELLANEOUS OTHERS	7.4	0.00	0.06	12.27	0.00	0.04	3.05	0.00	0.03
MISCELLANEOUS PROBLEMS - ELECTRICAL SYSTEM	68.4	0.04	0.57	124.53	0.05	0.4	101.67	0.06	1.05
GRID SYSTEM	850.83	0.44	7.11	2318.05	0.84	7.37	1458.14	0.92	15.1
TOTAL ELECTRICAL	928.9	0.49	7.76	2462.83	0.89	7.83	1564.72	0.99	16.2
OTHER MISC. CAUSES									
COAL SHORTAGE	820.69	0.43	6.86	2617.51	0.95	8.32	664.58	0.42	6.88
COAL HANDLING PROBLEM / FEEDING TROUBLE	167.89	0.09	1.4	1425.56	0.52	4.53	113.82	0.07	1.18
POOR QUALITY/ WET COAL	1485.62	0.78	12.41	9451.6	3.42	30.05	2774.4	1.75	28.72
FUEL OIL SHORTAGE	22.66	0.01	0.19	136.62	0.05	0.43	0.00	0.00	0.00
D.M. WATER	0.00	0.00	0.00	0.46	0.00	0.00	0.00	0.00	0.00
COOLING WATER PROBLEMS	35.22	0.02	0.29	4.87	0.00	0.02	10.63	0.01	0.11
OPERATIONAL PROBLEMS	68.37	0.04	0.57	0.41	0.00	0.00	12.44	0.01	0.13
AIR SUPPLY PROBLEMS	130.11	0.07	1.09	32.66	0.01	0.1	0.00	0.00	0.00

Annexure - 7.1

Sheet _ of 6

REGION-WISE DETAILS OF PARTIAL UNAVAILABILITY DUE TO VARIOUS LONG AND SHORT DURATION CONSTRAINTS IN THE MAIN EQUIPMENT AND ITS AUXILIARIES DURING 2011-12 (IN MUs)

CAUSE OF PARTIAL LOSS (Due to Further Breakup of Equipment & Aux.)	NORTHERN REGION			WESTERN REGION			SOUTHERN REGION		
	REGIONAL GEN. LOSS	% OF MAX. POSS. GEN.	% OF TOTAL REGIONAL P.LOSS	REGIONAL GEN. LOSS	% OF MAX. POSS. GEN.	% OF TOTAL REGIONAL P.LOSS	REGIONAL GEN. LOSS	% OF MAX. POSS GEN.	% OF TOTAL REGIONAL P.LOSS
ASH HANDLING PROBLEMS	259.37	0.14	2.17	190.85	0.07	0.61	126.12	0.08	1.31
MALFUNCTION OF RELAYS/ INSTRUMENT TROUBLE	26.82	0.01	0.22	610.28	0.22	1.94	141.34	0.09	1.46
MISCELLANEOUS PROBLEMS - OTHERS	2215.64	1.16	18.51	3323.05	1.2	10.57	1858.24	1.17	19.24
MISCELLANEOUS PROBLEMS - OTHERS	0.06	0.00	0.00	1.04	0.00	0.00	0.00	0.00	0.00
TRANSMISSION CONSTRAINTS / EVACUATION PROBLEM	3.72	0.00	0.03	1.69	0.00	0.01	10.22	0.01	0.11
TOTAL OTHER MISC. CAUSES	5236.16	2.74	43.75	17796.6	6.44	56.58	5711.8	3.61	59.14
TOTAL	10368.4	5.42	86.63	27985.74	10.12	88.98	9093.77	5.75	94.15
BACKING DOWN/LOW SYSTEM DEMAND									
BACKING DOWN/ LOW SYSTEM DEMAND	1600.46	0.84	13.37	3465.79	1.25	11.02	565.08	0.36	5.85
GRAND TOTAL	11968.86	6.26	100	31451.54	11.38	100	9658.85	6.11	100

Annexure - 7.1

Sheet _ of 6

REGION-WISE DETAILS OF PARTIAL UNAVAILABILITY DUE TO VARIOUS LONG AND SHORT DURATION CONSTRAINTS IN THE MAIN EQUIPMENT AND ITS AUXILIARIES DURING 2011-12 (IN MUs)

CAUSE OF PARTIAL LOSS (Due to Further Breakup of Equipment & Aux.)	EASTERN REGION			NORTH EASTERN REGION			ALL INDIA		
	REGIONAL GEN. LOSS	% OF MAX. POSS. GEN.	% OF TOTAL REGIONAL P.LOSS	REGIONAL GEN. LOSS	% OF MAX. POSS. GEN.	% OF TOTAL REGIONAL P.LOSS	REGIONAL GEN. LOSS	% OF MAX. POSS GEN.	% OF TOTAL REGIONAL P.LOSS
MAIN BOILER									
PRESSURE PARTS LEAKAGE	172.59	0.09	0.74	0.00	0.00	0.00	388.64	0.05	0.51
DRUM PRESSURE RESTRICTION	513.5	0.28	2.2	0.00	0.00	0.00	930.33	0.11	1.22
AIR HEATERS	113.16	0.06	0.48	0.00	0.00	0.00	443.75	0.05	0.58
FURNACE	54.28	0.03	0.23	0.00	0.00	0.00	254.12	0.03	0.33
FURNACE DRAFT	2.22	0.00	0.01	0.00	0.00	0.00	58.59	0.01	0.08
HIGH FUEL GAS/ STEAM TEMPERATURE	12.26	0.01	0.05	0.00	0.00	0.00	56.86	0.01	0.07
AGEING	69.95	0.04	0.3	0.00	0.00	0.00	92.61	0.01	0.12
MISCELLANEOUS PROBLEMS - MAIN BOILER	248.46	0.13	1.06	0.00	0.00	0.00	1699.65	0.21	2.22
TOTAL BOILER	1186.41	0.64	5.08	0.00	0.00	0.00	3924.55	0.48	5.13
BOILER AUXILIARIES									
I.D. FAN	119.96	0.07	0.51	0.00	0.00	0.00	940.55	0.12	1.23
P.A. FAN	355.44	0.19	1.52	0.00	0.00	0.00	586.76	0.07	0.77
F.D. FAN	5.3	0.00	0.02	0.00	0.00	0.00	190.96	0.02	0.25
MILLING SYSTEM	759.37	0.41	3.25	0.00	0.00	0.00	2431.04	0.3	3.18
P.C & R.C. FEEDERS	195.28	0.11	0.84	0.00	0.00	0.00	399.17	0.05	0.52
PRESIPITATORS	5.33	0.00	0.02	0.00	0.00	0.00	78.26	0.01	0.1
MISCELLANEOUS PROBLEMS-BOILER AUXILIARIES	865.42	0.47	3.7	0.00	0.00	0.00	2315.09	0.29	3.03
TOTAL BOILER AUXILIARIES	2306.12	1.25	9.87	0.00	0.00	0.00	6941.83	0.86	9.08
BOILER & ITS AUXILIARIES	3492.53	1.89	14.95	0.00	0.00	0.00	10866.37	1.34	14.21
MAIN TRUBINE									
VIBRATIONS/ECCENTRICITY	17.52	0.01	0.07	0.00	0.00	0.00	352.02	0.04	0.46
TURBINE DIFFERENTIAL	0.00	0.00	0.00	0.00	0.00	0.00	27.45	0.00	0.04
CAUSE OF PARTIAL LOSS									
(Due To Further Breakup of Equipment & Aux.)	EASTERN REGIONAL	% OF MAX.	% OF TOTAL	NORTH REGIONAL	% OF MAX.	% OF TOTAL	ALL INDIA REGIONAL	% OF MAX.	% OF TOTAL
	GEN.	POSS.	REGIONAL	GEN.	POSS.	REGIONAL	GEN.	POSS.	REGIONAL
	LOSS	GEN.	P.LOSS	LOSS	GEN.	P.LOSS	LOSS	GEN.	P.LOSS
HIGH CURTIS WHEEL PRESSURE	22.18	0.01	0.09	0.00	0.00	0.00	22.18	0.00	0.03
HIGH EXHAUST TEMP	25.96	0.01	0.11	0.00	0.00	0.00	46.41	0.01	0.06
LOW VACCUM	475.53	0.26	2.04	0.00	0.00	0.00	1652.68	0.2	2.16

Annexure - 7.1

Sheet _ of 6

REGION-WISE DETAILS OF PARTIAL UNAVAILABILITY DUE TO VARIOUS LONG AND SHORT DURATION CONSTRAINTS IN THE MAIN EQUIPMENT AND ITS AUXILIARIES DURING 2011-12 (IN MUs)

CAUSE OF PARTIAL LOSS (Due to Further Breakup of Equipment & Aux.)	EASTERN REGION			NORTH EASTERN REGION			ALL INDIA		
	REGIONAL GEN. LOSS	% OF MAX. POSS. GEN.	% OF TOTAL REGIONAL P.LOSS	REGIONAL GEN. LOSS	% OF MAX. POSS. GEN.	% OF TOTAL REGIONAL P.LOSS	REGIONAL GEN. LOSS	% OF MAX. POSS GEN.	% OF TOTAL REGIONAL P.LOSS
STARTUP/ SHUT DOWN	1651.31	0.9	7.07	0.00	0.00	0.00	4877.91	0.6	6.38
AXIAL SHIFT	13.01	0.01	0.06	0.00	0.00	0.00	78.15	0.01	0.1
CONTROL VALVE	0.00	0.00	0.00	0.00	0.00	0.00	74.55	0.01	0.1
CONDENSER	0.38	0.00	0.00	0.00	0.00	0.00	11.14	0.00	0.01
GOVERNING SYSTEM	21.13	0.01	0.09	0.00	0.00	0.00	502.48	0.06	0.66
MISCELLANEOUS PROBLEMS - MAIN TURBINE	0.00	0.00	0.00	0.00	0.00	0.00	25.47	0.00	0.03
TOTAL TURBINE	2227.01	1.21	9.53	0.00	0.00	0.00	7670.45	0.95	10.03
TURBINE AUXILIARIES									
B.F. PUMPS	9.47	0.01	0.04	0.00	0.00	0.00	117.15	0.01	0.15
REGENERATIVE SYSTEM	69.5	0.04	0.3	0.00	0.00	0.00	113.47	0.01	0.15
C.W. PUNPS	3.75	0.00	0.02	0.00	0.00	0.00	62.83	0.01	0.08
CONDENSATE PUMP	0.00	0.00	0.00	0.00	0.00	0.00	75.71	0.01	0.1
MISCELLANEOUS PROBLEMS - TURBINE AUX.	837.17	0.45	3.58	0.00	0.00	0.00	1294.96	0.16	1.69
TOTAL TURBINE AUXILIARIES	919.89	0.5	3.94	0.00	0.00	0.00	1664.12	0.21	2.18
TURBINE & ITS AUXILIARIES	3146.91	1.71	13.47	0.00	0.00	0.00	9334.58	1.15	12.21
GENERATOR									
HYDROGEN PRESSURE/ PURITY	0.00	0.00	0.00	0.00	0.00	0.00	61.72	0.01	0.08
EXCITER	15.98	0.01	0.07	0.00	0.00	0.00	90.86	0.01	0.12
GENERATOR COOLING SYSTEM	0.00	0.00	0.00	0.00	0.00	0.00	23.54	0.00	0.03
SEAL OIL SYSTEM	0.00	0.00	0.00	0.00	0.00	0.00	18.59	0.00	0.02
MISCELLANEOUS PROBLEM GENERATOR	0.00	0.00	0.00	0.00	0.00	0.00	6.66	0.00	0.01
GENERATOR	15.98	0.01	0.07	0.00	0.00	0.00	201.36	0.02	0.26
ELECTRICAL									
MAIN TRANSFORMER	0.00	0.00	0.00	0.00	0.00	0.00	12.11	0.00	0.02
MISCELLANEOUS OTHERS	33.08	0.02	0.14	0.00	0.00	0.00	55.8	0.01	0.07
MISCELLANEOUS PROBLEMS - ELECTRICAL SYSTEM	317.48	0.17	1.36	0.00	0.00	0.00	612.08	0.08	0.8
GRID SYSTEM	2922.84	1.58	12.51	0.00	0.00	0.00	7549.86	0.93	9.88
TOTAL ELECTRICAL	3273.39	1.77	14.01	0.00	0.00	0.00	8229.85	1.02	10.77
OTHER MISC. CAUSES									
COAL SHORTAGE	2208.44	1.2	9.45	0.00	0.00	0.00	6311.23	0.78	8.26
COAL HANDLING PROBLEM / FEEDING	551.66	0.3	2.36	0.00	0.00	0.00	2258.94	0.28	2.95

Annexure - 7.1

Sheet _ of 6

REGION-WISE DETAILS OF PARTIAL UNAVAILABILITY DUE TO VARIOUS LONG AND SHORT DURATION CONSTRAINTS IN THE MAIN EQUIPMENT AND ITS AUXILIARIES DURING 2011-12 (IN MUs)

CAUSE OF PARTIAL LOSS (Due to Further Breakup of Equipment & Aux.)	EASTERN REGION			NORTH EASTERN REGION			ALL INDIA		
	REGIONAL GEN. LOSS	% OF MAX. POSS. GEN.	% OF TOTAL REGIONAL P.LOSS	REGIONAL GEN. LOSS	% OF MAX. POSS. GEN.	% OF TOTAL REGIONAL P.LOSS	REGIONAL GEN. LOSS	% OF MAX. POSS GEN.	% OF TOTAL REGIONAL P.LOSS
TROUBLE									
POOR QUALITY/ WET COAL	3560.08	1.93	15.24	0.00	0.00	0.00	17271.69	2.13	22.59
FUEL OIL SHORTAGE	7.21	0.00	0.03	0.00	0.00	0.00	166.49	0.02	0.22
D.M. WATER	0.05	0.00	0.00	0.00	0.00	0.00	0.51	0.00	0.00
COOLING WATER PROBLEMS	8.22	0.00	0.04	0.00	0.00	0.00	58.94	0.01	0.08
OPERATIONAL PROBLEMS	16.47	0.01	0.07	0.00	0.00	0.00	97.69	0.01	0.13
AIR SUPPLY PROBLEMS	0.65	0.00	0.00	0.00	0.00	0.00	163.43	0.02	0.21
ASH HANDLING PROBLEMS	12.29	0.01	0.05	0.00	0.00	0.00	588.63	0.07	0.77
MALFUNCTION OF RELAYS/ INSTRUMENT TROUBLE	73.72	0.04	0.32	0.00	0.00	0.00	852.16	0.11	1.11
MISCELLANEOUS PROBLEMS - OTHERS	3781.82	2.05	16.19	0.00	0.00	0.00	11178.75	1.38	14.62
TRANSMISSION CONSTRAINTS / EVACUATION PROBLEM	0.00	0.00	0.00	0.00	0.00	0.00	15.63	0.00	0.02
TOTAL OTHER MISC. CAUSES	10220.62	5.54	43.74	0.00	0.00	0.00	38965.18	4.81	50.97
TOTAL	20149.42	10.93	86.24	0.00	0.00	0.00	67597.33	8.34	88.43
BACKING DOWN/LOW SYSTEM DEMAND									
BACKING DOWN/ LOW SYSTEM DEMAND	3216.02	1.74	13.76	0.00	0.00	0.00	8847.36	1.09	11.57
GRAND TOTAL	23365.44	12.67	100	0.00	0.00	0.00	76444.69	9.43	100

Annexure - 7.2

CAUSE WISE PARTIAL UNAVAILABILITY DURING 2011-12 OF MAJOR CAPACITY GROUPS OF THERMAL UNITS

CAUSE OF PARTIAL LOSS	660-800		490-600MW		300-330MW		250-250MW		25-99MW		210-210MW		195-200		100-150MW	
	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS
MAIN BOILER	7.22	0.34	913.75	4.2	294.84	6	131.16	2.53	329.07	6.72	1110.9	4.54	226.62	5.8	911.03	10.14
BOILER AUXILIARIES	25.33	1.2	871.13	4	654.46	13	328.3	6.34	800.86	16.35	2468.9	10.1	664.3	16.99	1128.59	12.56
TOTAL BOILER	32.55	1.54	1785	8.2	949.3	18	459.5	8.88	1130	23.06	3580	14.64	890.9	22.79	2039.62	22.7
MAIN TURBINE	678.97	32.09	2380.8	10.94	538.64	10	460.62	8.9	526.71	10.75	1518.1	6.21	519.72	13.29	1046.87	11.65
TURBINE AUXILIARIES	0	0	86.02	0.4	104.93	2	49.29	0.95	161.99	3.31	620.82	2.54	14.55	0.37	626.52	6.97
TOTAL TURBINE	678.97	32.09	2467	11.33	643.6	12	509.9	9.85	688.7	14.06	2139	8.75	534.3	13.66	1673.39	18.63
GENERATOR	18.42	0.87	0	0	71.78	1	4.97	0.1	19.12	0.39	41.65	0.17	0.69	0.02	44.74	0.5
ELECTRICAL	646.8	30.57	3992.2	18.34	1291.3	25	279.24	5.39	143.37	2.93	1529.9	6.26	225.55	5.77	121.47	1.35
OTHER MISCELLANEOUS CAUSES	642.7	30.37	9208.9	42.31	1772.5	34	3419.1	66.05	2224	45.39	15442	63.17	1845.3	47.19	4410.37	49.09
LOW SYSTEM DEMAND	96.68	4.57	4311	19.81	423.26	8	503.91	9.73	693.77	14.16	1711.7	7	413.01	10.56	694.1	7.73
GRAND TOTAL	2116.13	100	21764	100	5152	100	5177	99.99	4899	99.99	24444	99.99	3910	99.99	8983.7	99.99
MAIN BOILER																
PRESSURE PARTS LEAKAGE	7.22	0.34	148.56	0.68	0	0	0.31	0.01	2.5	0.05	137.06	0.56	0	0	92.98	1.03
DRUM PRESSURE RESTRICTION	0	0	624.26	2.87	15.96	0	3.14	0.06	16.86	0.34	168.24	0.69	0.98	0.03	100.88	1.12
AIR HEATERS	0	0	18.49	0.08	1.23	0	45.09	0.87	0	0	273.84	1.12	90.61	2.32	14.48	0.16
FURNACE	0	0	15.73	0.07	0	0	0	0	18.34	0.37	72.97	0.3	0	0	147.08	1.64
FURNACE DRAFT	0	0	0	0	0	0	0	0	0	0	3.22	0.01	0	0	55.37	0.62
HIGH FUEL GAS/ STEAM TEMPERATURE	0	0	0	0	7.05	0	0	0	0.86	0.02	44.24	0.18	0	0	4.7	0.05
AGEING	0	0	0	0	6.63	0	0	0	28.32	0.58	14.16	0.06	0	0	43.5	0.48
MISCELLANEOUS PROBLEMS - MAIN BOILER	0	0	106.71	0.49	263.96	5	82.61	1.6	262.18	5.35	397.13	1.62	135.03	3.45	452.04	5.03
TOTAL MAIN BOILER	7.22	0.34	913.8	4.2	294.8	6	131.2	2.53	329.1	6.72	1111	4.54	226.6	5.8	911.03	10.1
BOILER AUXILIARIES																
I.D. FAN	0	0	257.42	1.18	7.77	0	42.58	0.82	0	0	368.12	1.51	58.48	1.5	206.18	2.29
P.A. FAN	0	0	14.58	0.07	12.46	0	139.74	2.7	0.02	0	251.32	1.03	137.71	3.52	30.93	0.34
MILLING SYSTEM	4.73	0.22	215.02	0.99	456.04	9	31.12	0.6	316.48	6.46	747.64	3.06	394.96	10.1	265.04	2.95
F.D. FAN	20.6	0.97	13.34	0.06	1.21	0	18.21	0.35	1.31	0.03	18.11	0.07	2.35	0.06	115.83	1.29

Annexure - 7.2																Sheet _ of 3
CAUSE WISE PARTIAL UNAVAILABILITY DURING 2011-12 OF MAJOR CAPACITY GROUPS OF THERMAL UNITS																
CAUSE OF PARTIAL LOSS	660-800		490-600MW		300-330MW		250-250MW		25-99MW		210-210MW		195-200		100-150MW	
	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS
P.C & R.C. FEEDERS	0	0	118.55	0.54	0.13	0	17.6	0.34	101.93	2.08	30.14	0.12	37.99	0.97	92.83	1.03
PRESIPITATORS	0	0	0	0	0	0	5.33	0.1	3.64	0.07	41.27	0.17	0	0	28.02	0.31
MISCELLANEOUS PROBLEMS-BOILER AUXILIARIES	0	0	252.22	1.16	176.84	3	73.73	1.42	377.48	7.7	1012.2	4.14	32.82	0.84	389.76	4.34
TOTAL BOILER AUXILIARIES	25.33	1.2	871.1	4	654.5	13	328.3	6.34	800.9	16.35	2469	10.1	664.3	16.99	1128.6	12.6
BOILER & BOILER AUXILIARIES																
BOILER & BOILER AUX	32.55	1.54	1784.9	8.2	949.3	18	459.46	8.88	1129.9	23.06	3579.7	14.64	890.92	22.79	2039.62	22.7
TOTAL BOILER & BOILER AUX	32.55	1.54	1785	8.2	949.3	18	459.5	8.88	1130	23.06	3580	14.64	890.9	22.79	2039.6	22.7
MAIN TURBINE																
VIBRATIONS/ECCENTRICITY	0	0	40.01	0.18	0.55	0	15.98	0.31	55.07	1.12	96.73	0.4	0	0	143.69	1.6
TURBINE DIFFERENTIAL	0	0	15.61	0.07	0	0	0	0	0	0	9.52	0.04	0	0	2.32	0.03
HIGH CURTIS WHEEL PRESSURE	0	0	14	0.06	0	0	0	0	0	0	8.18	0.03	0	0	0	0
HIGH EXHAUST TEMP	0	0	0	0	19.96	0	0	0	16.18	0.33	0	0	9.09	0.23	1.17	0.01
LOW VACCUM	0	0	425.99	1.96	219.51	4	60.39	1.17	131.83	2.69	377.08	1.54	305.12	7.8	132.76	1.48
STARTUP/ SHUT DOWN	660.79	31.23	1582.5	7.27	292.56	6	363.98	7.03	241.19	4.92	920.11	3.76	198.91	5.09	617.91	6.88
AXIAL SHIFT	0	0	25.92	0.12	0	0	0	0	34.3	0.7	13.28	0.05	0	0	4.65	0.05
CONTROL VALVE	18.18	0.86	0	0	0	0	0	0	22.95	0.47	20.94	0.09	0	0	12.48	0.14
CONDENSER	0	0	3.45	0.02	0	0	0	0	0.71	0.01	0.38	0	6.6	0.17	0	0
GOVERNING SYSTEM	0	0	273.4	1.26	6.06	0	20.28	0.39	24.48	0.5	71.85	0.29	0	0	131.89	1.47
TOTAL MAIN TURBINE	679	32.09	2381	10.94	538.6	10	460.6	8.9	526.7	10.75	1518	6.21	519.7	13.29	1046.9	11.7
TURBINE AUXILIARIES																
B.F. PUMPS	0	0	23.84	0.11	0.07	0	14.12	0.27	0.33	0.01	42.35	0.17	6	0.15	30.44	0.34
REGENERATIVE SYSTEM	0	0	2.12	0.01	22.45	0	0.43	0.01	43.99	0.9	3.18	0.01	2.46	0.06	38.83	0.43
C.W. PUNPS	0	0	39.72	0.18	0.82	0	0.01	0	0	0	21.94	0.09	0	0	0.34	0
CONDENSATE PUMP	0	0	5.2	0.02	17.06	0	0	0	10.9	0.22	36.47	0.15	6.09	0.16	0	0
MISCELLANEOUS PROBLEMS - TURBINE	0	0	15.14	0.07	64.53	1	34.72	0.67	106.78	2.18	516.88	2.11	0	0	556.91	6.2

Annexure - 7.2																Sheet _ of 3
CAUSE WISE PARTIAL UNAVAILABILITY DURING 2011-12 OF MAJOR CAPACITY GROUPS OF THERMAL UNITS																
CAUSE OF PARTIAL LOSS	660-800		490-600MW		300-330MW		250-250MW		25-99MW		210-210MW		195-200		100-150MW	
	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS
AUX.																
TOTAL TURBINE AUXILIARIES	0	0	86.02	0.4	104.9	2	49.29	0.95	162	3.31	620.8	2.54	14.55	0.37	626.52	6.97
TURBINE & TURBINE AUX																
TURBINE & TURBINE AUX	678.97	32.09	2466.9	11.33	643.57	12	509.91	9.85	688.7	14.06	2138.9	8.75	534.26	13.66	1673.39	18.6
TOTAL TURBINE & TURBINE AUX	679	32.09	2467	11.33	643.6	12	509.9	9.85	688.7	14.06	2139	8.75	534.3	13.66	1673.4	18.6
GENERATOR																
HYDROGEN PRESSURE/PURITY	0	0	0	0	0	0	1.46	0.03	6.9	0.14	22.8	0.09	0.69	0.02	29.87	0.33
TOTAL GENERATOR	0	0	0	0	0	0	1.46	0.03	6.9	0.14	22.8	0.09	0.69	0.02	29.87	0.33
MAIN TURBINE																
MISCELLANEOUS PROBLEMS - MAIN TURBINE	0	0	273.4	1.26	6.06	0	20.28	0.39	24.48	0.5	71.85	0.29	0	0	131.89	1.47
TOTAL MAIN TURBINE	0	0	273.4	1.26	6.06	0	20.28	0.39	24.48	0.5	71.85	0.29	0	0	131.89	1.47
GENERATOR																
EXCITER	18.42	0.87	0	0	71.78	1	0	0	0	0	0.1	0	0	0	0.56	0.01
GENERATOR COOLING SYSTEM	0	0	0	0	0	0	1.33	0.03	12.21	0.25	10	0.04	0	0	0	0
SEAL OIL SYSTEM	0	0	0	0	0	0	2.18	0.04	0	0	6.31	0.03	0	0	10.1	0.11
MISCELLANEOUS PROBLEM GENERATOR	0	0	0	0	0	0	0	0	0	0	2.44	0.01	0	0	4.21	0.05
TOTAL GENERATOR	18.42	0.87	0	0	71.78	1	3.51	0.07	12.21	0.25	18.85	0.08	0	0	14.87	0.17
ELECTRICAL																
MAIN TRANSFORMER	0	0	0	0	0	0	0	0	4.12	0.08	0.11	0	0	0	7.88	0.09
MISCELLANEOUS PROBLEMS - ELECTRICAL SYSTEM	32.08	1.52	243.59	1.12	3.95	0	67.47	1.3	41.41	0.85	254.17	1.04	9.58	0.25	15.62	0.17
MISCELLANEOUS OTHERS	32.08	1.52	243.59	1.12	3.95	0	67.47	1.3	41.41	0.85	254.17	1.04	9.58	0.25	15.62	0.17
GRID SYSTEM	614.72	29.05	3748.6	17.22	1287.4	25	211.77	4.09	97.84	2	1275.6	5.22	215.97	5.52	97.96	1.09

Annexure - 7.2																Sheet _ of 3
CAUSE WISE PARTIAL UNAVAILABILITY DURING 2011-12 OF MAJOR CAPACITY GROUPS OF THERMAL UNITS																
CAUSE OF PARTIAL LOSS	660-800		490-600MW		300-330MW		250-250MW		25-99MW		210-210MW		195-200		100-150MW	
	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS
TOTAL ELECTRICAL	678.9	32.08	4236	19.46	1295	25	346.7	6.7	184.8	3.77	1784	7.3	235.1	6.01	137.09	1.53
OTHER MISCELLANEOUS CAUSES																
COAL SHORTAGE	55.79	2.64	2941.1	13.51	262.18	5	744.62	14.38	119.77	2.44	1677.1	6.86	317.19	8.11	193.47	2.15
COAL HANDLING PROBLEM / FEEDING TROUBLE	0	0	240.99	1.11	75.38	1	313.56	6.06	69.61	1.42	1151.2	4.71	25.55	0.65	382.6	4.26
POOR QUALITY/ WET COAL	17.08	0.81	3381	15.53	659.42	13	1398	27	395.37	8.07	9310.2	38.08	861.5	22.03	1249.21	13.9
FUEL OIL SHORTAGE	0	0	104.73	0.48	0	0	0	0	0	0	47.27	0.19	0	0	14.49	0.16
D.M. WATER	0	0	0.03	0	0	0	0.02	0	0	0	0.46	0	0	0	0	0
COOLING WATER PROBLEMS	0	0	10.63	0.05	0	0	0	0	0	0	10.05	0.04	0	0	38.26	0.43
OPERATIONAL PROBLEMS	0	0	0	0	16.47	0	0.41	0.01	0	0	26.84	0.11	0	0	53.97	0.6
AIR SUPPLY PROBLEMS	0	0	0.26	0	0	0	0.65	0.01	0	0	90.11	0.37	17.25	0.44	55.15	0.61
ASH HANDLING PROBLEMS	0	0	38.74	0.18	10.41	0	17.79	0.34	162.67	3.32	60.1	0.25	23.26	0.59	275.66	3.07
MALFUNCTION OF RELAYS/ INSTRUMENT TROUBLE	307.88	14.55	23.92	0.11	177.98	3	29.03	0.56	56.01	1.14	157.94	0.65	0.18	0	99.22	1.1
MISCELLANEOUS PROBLEMS - OTHERS	261.95	12.38	2467.6	11.34	568.27	11	915.06	17.68	1419.1	28.96	2901.9	11.87	600.32	15.35	2044.57	22.8
MISCELLANEOUS PROBLEMS - OTHERS	0	0	0	0	1.04	0	0	0	0	0	0	0	0	0	0.06	0
TRANSMISSION CONSTRAINTS / EVACUATION PROBLEM	0	0	0	0	1.3	0	0	0	1.48	0.03	9.12	0.04	0	0	3.72	0.04
TOTAL OTHER MISCELLANEOUS CAUSES	642.7	30.37	9209	42.31	1772	34	3419	66.05	2224	45.39	15442	63.17	1845	47.19	4410.4	49.1
LOW SYSTEM DEMAND																
LOW SYSTEM DEMAND	96.68	4.57	4311	19.81	423.26	8	503.91	9.73	693.77	14.16	1711.7	7	413.01	10.56	694.1	7.73
TOTAL LOW SYSTEM DEMAND	96.68	4.57	4311	19.81	423.3	8	503.9	9.73	693.8	14.16	1712	7	413	10.56	694.1	7.73

Annexure - 7.2																Sheet _ of 3
CAUSE WISE PARTIAL UNAVAILABILITY DURING 2011-12 OF MAJOR CAPACITY GROUPS OF THERMAL UNITS																
CAUSE OF PARTIAL LOSS	660-800		490-600MW		300-330MW		250-250MW		25-99MW		210-210MW		195-200		100-150MW	
	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS	MU LOSS	% OF GROUP TOTAL PARTIAL LOSS
GRAND TOTAL	2148	101.5	22281	102.37	5162	100	5264	101.7	4965	101.3	3919	101.3	3919	100.2	9131.2	101.6

Annexure - 7.3

NON UTILIZATION OF ENERGY DUE TO SYSTEM LOAD VARIATIONS IN DIFFERENT REGIONS DURING 2010-11 AND 2011-12

Region	Energy not utilized due to											
	Reserve Shut Down of units				Backing down of the units				Total			
	MU		% of All India possible generation		MU		% of All India possible generation		MU		% of All India possible generation	
	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12
Northern	1444.13	1953.3	0.2	0.24	1159.09	1600.46	0.16	0.2	2603.22	3553.76	0.36	0.44
Western	4793.98	3848.35	0.66	0.47	2098.36	3465.79	0.29	0.43	6892.35	7314.14	0.94	0.9
Southern	375.48	36.87	0.05	0.00	673.87	565.08	0.09	0.07	1049.35	601.95	0.14	0.07
Eastern	1127.61	704.53	0.15	0.09	1982.06	3216.02	0.27	0.4	3109.66	3920.55	0.43	0.48
North-Eastern	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
All India	7741.21	6543.05	1.06	0.81	5913.38	8847.36	0.81	1.09	13654.59	15390.41	1.87	1.9

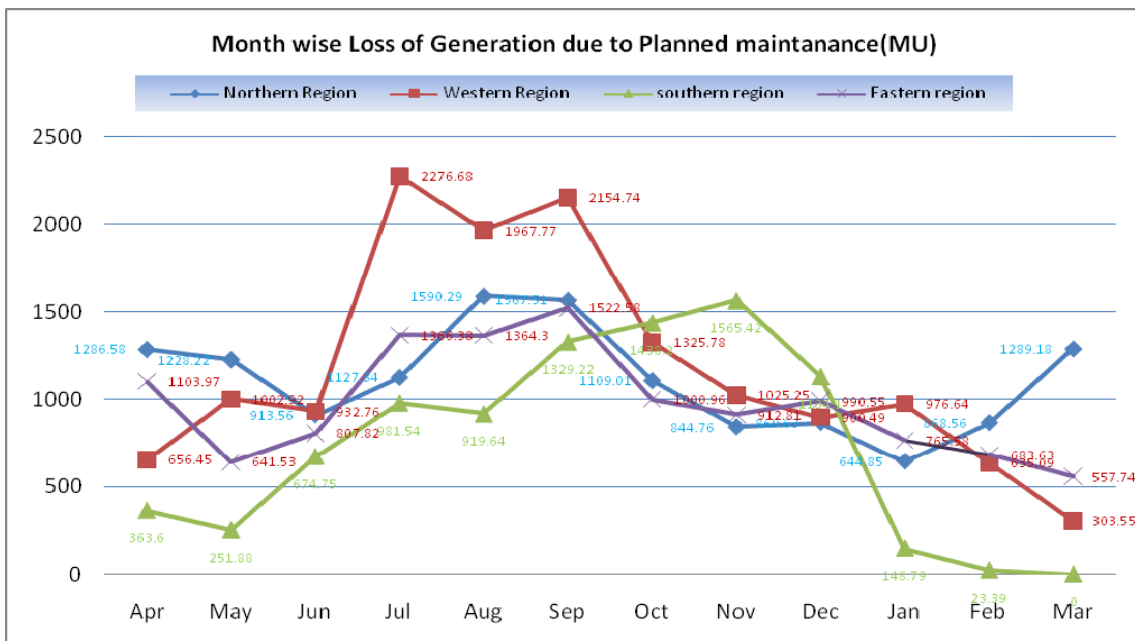
SECTION-8

EFFECT OF OUTAGES ON GENERATION RELIABILITY

- 8.1** The effect of outages of thermal units on generation reliability discussed in this section relates to the program of thermal generation and not with reference to the system requirement because inability of the system at the consumer end does not depend only on the quantum of thermal generation but also on the generation from the other sources and factors such as transformation, transmission and distribution facilities etc.
- 8.2** Unavailability of thermal generating units affected the generation during the year under review e.g. the level of forced outage unavailability beyond the originally anticipated level together with the changes in the Mean Time Between Failures (MTBF), extension of planned shutdown duration beyond the programmed time and also the unavailability due to partial constraints of auxiliaries and equipment in excess of the originally assessed level affecting the output of the operating units.
- 8.3 EFFECT OF PLANNED MAINTENANCE ON GENERATION RELIABILITY**
- 8.3.1** Each power system of the country formulated generation program for 2011-12 to meet as much system requirement as possible. All the power systems program to carry out the planned maintenance of their thermal units in a phased manner in order to keep them ready to meet the seasonal peak to the extent possible.
- 8.3.2** Region-wise month-wise details of loss of generation due to planned maintenance (actual) of thermal units during 2011-12 are shown below.

Region and Month Wise Loss of generation (MU) due to Planned Maintenance					
Month	Northern Region	Western Region	Southern Region	Eastern Region	Total All India
APR	1286.58	656.45	363.6	1103.97	3410.60
MAY	1228.22	1002.92	251.88	641.53	3124.54
JUN	913.56	932.76	674.75	807.82	3328.89
JUL	1127.34	2276.68	981.54	1366.38	5751.94
AUG	1590.29	1967.77	919.64	1364.3	5842.01
SEP	1567.51	2154.74	1329.22	1522.58	6574.05
OCT	1109.01	1325.78	1438.2	1000.96	4873.94
NOV	844.76	1025.25	1565.42	912.81	4348.24
DEC	869.63	900.49	1134.1	990.55	3894.77
JAN	644.85	976.64	148.79	765.58	2535.86
FEB	868.56	635.09	23.39	683.63	2210.67
MAR	1289.18	303.55	0	557.74	2150.47
Total	13339.48	14158.12	8830.53	11717.85	48046.00

Note: North-Eastern Region has not been considered as all the thermal units at Chandrapura (Assam) were under forced outage through out the year.

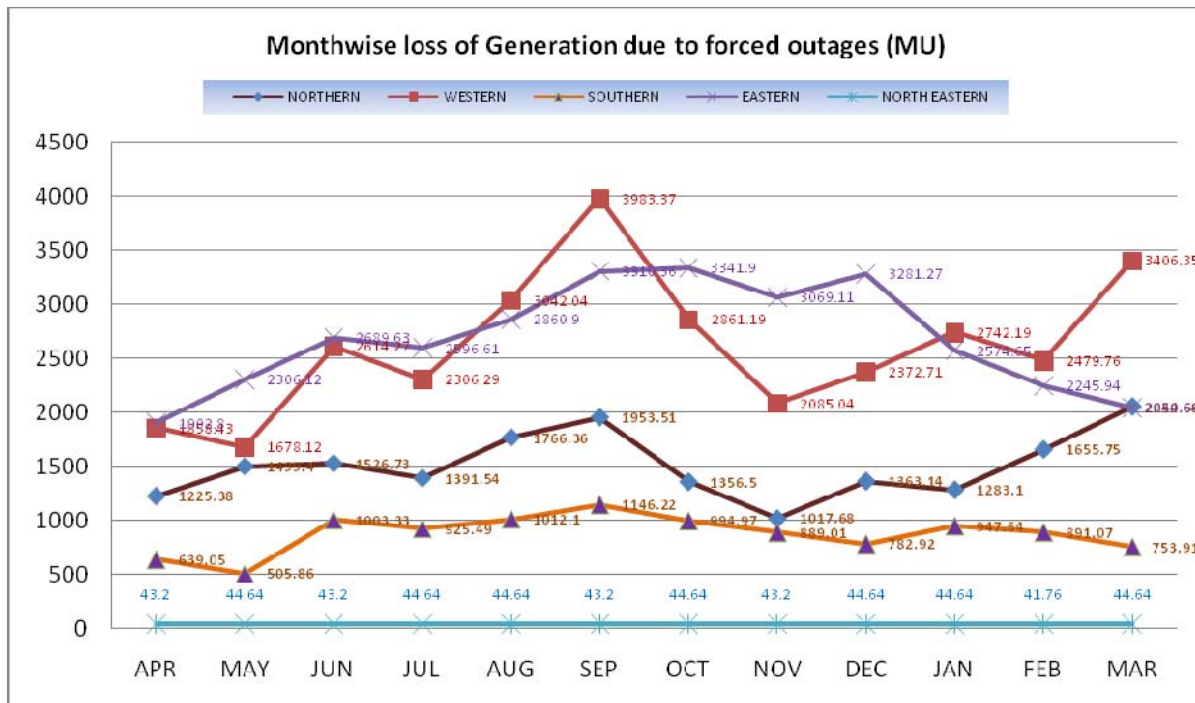


During September '2011, the total loss of generation (6574 MU) due to planned maintenance of thermal units was highest.

8.4 EFFECT OF FORCED OUTAGE ON GENERATION RELIABILITY

8.4.1 Long duration forced outage upsets the generation reliability resulting in postponement of scheduled planned maintenance and consequential variation in the actual peaking availability from programmed peaking availability. Short duration repetitive forced outage, on the other hand, causes serious dent in the quality of envisaged reliability scheme. Loss of generation due to various forced outages was maximum during the month of September'11 (10436 MU) Loss of generation due to various forced outages was minimum (5668 MU) during April'11. Eastern Region experienced maximum forced outage losses. The Region wise and month wise generation loss due to Forced outages is given below:

Region-wise and month-wise generation Loss (in MUs) due to Forced Outage						
Month	NORTHERN	WESTERN	SOUTHERN	EASTERN	NORTH EASTERN	ALL INDIA
APR	1225.38	1858.43	639.05	1902.8	43.2	5668.85
MAY	1499.4	1678.12	505.86	2306.12	44.64	6034.15
JUN	1526.73	2614.27	1003.33	2689.63	43.2	7877.16
JUL	1391.54	2306.29	925.49	2596.61	44.64	7264.56
AUG	1766.36	3042.04	1012.1	2860.9	44.64	8726.04
SEP	1953.51	3983.37	1146.22	3310.36	43.2	10436.66
OCT	1356.5	2861.19	994.97	3341.9	44.64	8599.20
NOV	1017.68	2085.04	889.01	3069.11	43.2	7104.05
DEC	1363.14	2372.71	782.92	3281.27	44.64	7844.69
JAN	1283.1	2742.19	947.64	2574.65	44.64	7592.21
FEB	1655.75	2479.76	891.07	2245.94	41.76	7314.27
MAR	2050.68	3406.35	753.91	2044.64	44.64	8300.22
Total	18089.78	31429.75	10491.55	32223.93	527.04	92929.05



8.4.2 Apart from the duration of unscheduled outages that affected the thermal generation reliability, the other aspect that contributed equally significantly to the unreliability is the frequency of unscheduled outages. In other words, the length of survival time of thermal generating units between two consecutive outages/failures played an important role.

8.5 MEAN TIME BETWEEN FAILURE

8.5.1 The degree of reliability of thermal generation is directly proportional to the Mean Time between Failures (MTBF) of the units. Number of units in different MTBF ranges of different capacity groups during 2010-11 & 2011-12 are given at **Annexure 8.1**.

8.5.2 All India / Region wise and Capacity Group-wise details of Mean Time Between Failures (MTBF) of thermal units for 2010-11 are given in **Annexure 8.2**.

8.6 CONTINUOUS UNINTERRUPTED OPERATION OF COAL/ LIGNITE BASED UNITS:

8.6.1 Measurement of maximum continuous uninterrupted operation between two consecutive shutdowns and/or failures of a thermal unit also provides the degree of reliability of that unit. Such review was started from the financial year 2008-09. It was observed that till the end of 31st March 2012:

- JOJOBERA TPS # 1 (120 MW) of TATA PCL and Dadri (NCTPP) U#1 (250MW) of NTPC had operated continuously for 340 days & 324 days respectively.
- 10 coal/lignite based thermal generating units (6 of NTPC, and one of each from Tata PCL, GSECL JSWEL, RIL (DAHANU)) continuously operated for more than 250 days.

- o 23 coal/lignite based thermal generating units (NTPC-11, Tata PCL-3, JSWEL-2 and one each of RIL, GSECL, WBPDC, NLC, TNGDCL, APGENCO & CESE) operated continuously for more than 200 days.

Details of units operated for more than 200 days till 31st March, 2012 are as under:

S no.	Station name	Unit No	Capacity	Organisation	From date	To date	Days
1	JOJOBERA TPS	1	120	TATA PCL	25-Apr-2011	31-MAR-12	340
2	DADRI (NCTPP)	1	210	NTPC Ltd.	09-Aug-2010	29-JUN-11	324
3	WANAKBORI TPS	2	210	GSECL	10-Jul-2010	27-APR-11	290
4	TALCHER (OLD) TPS	4	62.5	NTPC Ltd.	30-Oct-2010	12-AUG-11	285
5	RAMAGUNDEM STPS	1	200	NTPC Ltd.	07-Oct-2010	11-JUL-11	277
6	TORANGALLU TPS(SBU-I)	2	130	JSWEL	09-Jan-2011	06-OCT-11	270
7	RIHAND STPS	2	500	NTPC Ltd.	14-Dec-2010	04-SEP-11	264
8	DAHANU TPS	2	250	RIL (DAHANU)	18-Nov-2010	08-AUG-11	263
9	RAMAGUNDEM STPS	3	200	NTPC Ltd.	06-Jan-2011	25-SEP-11	262
10	FARAKKA STPS	3	200	NTPC Ltd.	06-Nov-2010	21-JUL-11	257
11	BAKRESWAR TPS	4	210	WBPDC	17-Jan-2011	20-SEP-11	246
12	TALCHER (OLD) TPS	3	62.5	NTPC Ltd.	15-Sep-2010	19-MAY-11	246
13	TORANGALLU TPS(SBU-I)	1	130	JSWEL	09-Jan-2011	06-SEP-11	241
14	TROMBAY TPS	6	500	TATA PCL	01-Feb-2011	30-SEP-11	241
15	NEYVELI TPS- I	1	50	NLC	15-Mar-2011	04-NOV-11	234
16	METTUR TPS	4	210	TNGDCL	18-Dec-2010	05-AUG-11	230
17	SINGRAULI STPS	3	200	NTPC Ltd.	15-Sep-2010	02-MAY-11	229
18	Dr. N.TATA RAO TPS	7	500	APGENCO	16-May-2011	30-DEC-11	229
19	TROMBAY TPS	5	500	TATA PCL	18-Aug-2010	01-APR-11	226
20	VINDHYACHAL STPS	6	210	NTPC Ltd.	25-Jan-2011	19-AUG-11	206
21	RAMAGUNDEM STPS	6	500	NTPC Ltd.	08-Sep-2011	CONTINUE TO OPERATE	204
22	BUDGE BUDGE TPS	3	250	CESC	09-Sep-2011	CONTINUE TO OPERATE	204
23	RIHAND STPS	1	500	NTPC Ltd.	19-Jan-2011	10-AUG-11	202

**Annexure- 8.1
Sheet 1 of 1**

NUMBER OF UNITS IN DIFFERENT MTBF RANGES OF DIFFERENT CAPACITY GROUPS DURING 2010-2011 & 2011-12

MTBF Range (Days)	No. of Units in Different Capacity Groups															
	660-800MW				490-600 MW				300-330 MW				250 MW			
	Absolute	%	Absolute	%	Absolute	%	Absolute	%	Absolute	%	Absolute	%	Absolute	%	Absolute	%
	10-11		11-12		10-11		11-12		10-11		11-12		10-11		11-12	
Above 30	0	0	2	50	33	73.33	29	50.88	3	17.65	9	45	9	25.00	14	35
>25 & up to 30	0	0	0	0	2	4.44	7	12.28	0	0.00	4	20	9	25.00	3	7.5
>20 & up to 25	0	0	0	0	3	6.67	5	8.77	1	5.88	0	0	3	8.33	6	15
>15 & up to 20	0	0	1	25	3	6.67	3	5.26	6	35.29	4	20	3	8.33	7	17.5
>10 & up to 15	0	0	1	25	3	6.67	4	7.02	4	23.53	2	10	4	11.11	2	5
>5 & up to 10	0	0	0	0	1	2.22	8	14.04	3	17.65	1	5	6	16.67	6	15
>1 & up to 5	0	0	0	0	0	0.00	1	1.75	0	0.00	0	0	2	5.56	2	5
Up to 1	0	0	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00	0	0
Total	0	0	4	100	45	100.0	57	100	17	100.00	20	100	36	100.00	40	100

MTBF Range (Days)	No. of Units in Different Capacity Groups															
	210 MW				195-200 MW				100-150 MW				25-99 MW			
	Absolute	%	Absolute	%	Absolute	%	Absolute	%	Absolute	%	Absolute	%	Absolute	%	Absolute	%
	10-11		11-12		10-11		11-12		10-11		11-12		10-11		11-12	
Above 30	52	36.62	52	36.36	14	56.00	13	52	15	17.05	11	12.22	11	14.67	0	0
>25 & up to 30	17	11.97	20	13.99	1	4.00	3	12	5	5.68	7	7.78	5	6.67	0	0
>20 & up to 25	24	16.90	24	16.78	0	0.00	1	4	6	6.82	9	10	7	9.33	0	0
>15 & up to 20	20	14.08	22	15.38	1	4.00	1	4	6	6.82	8	8.89	5	6.67	0	0
>10 & up to 15	13	9.15	14	9.79	6	24.00	6	24	17	19.32	13	14.44	11	14.67	0	0
>5 & up to 10	15	10.56	11	7.69	2	8.00	1	4	15	17.05	19	21.11	14	18.67	0	0
>1 & up to 5	1	0.70	0	0	0	0.00	0	0	11	12.50	9	10	12	16.00	0	0
Up to 1	0	0.00	0	0	1	4.00	0	0	13	14.77	14	15.56	10	13.33	0	0
Total	142	100.00	143	100	25	100.00	25	100	88	100.00	90	100	75	100.00	0	0

MTBF Range (Days)	No. of Units in Different Capacity Groups			
	ALL CAPACITY			
	Absolute	%	Absolute	%
	10-11		11-12	
Above 30	137	32.01	144	31.72
>25 & up to 30	39	9.11	48	10.57
>20 & up to 25	44	10.28	47	10.35
>15 & up to 20	44	10.28	50	11.01
>10 & up to 15	58	13.55	59	13
>5 & up to 10	56	13.08	60	13.22
>1 & up to 5	26	6.07	21	4.63
Up to 1	24	5.61	25	5.51
Total	428	100.00	454	100

Annexure- 8.2

Sheet _ OF 4

**STATEMENT OF MEANTIME BETWEEN FAILURES OF THERMAL UNITS OUTAGES
DURING 2011-12****All India****Number of Units : 454****Capacity : 97768 MW**

Capacity Range ->	660- 800MW	490- 600 MW	300-330 MW	250 MW	210 MW	195-200 MW	100-150 MW	25-99 MW	TOTAL
Above 270 Days	0	1	0	0	0	0	0	0	1
>180 and Upto 270 Days	0	0	0	0	0	0	1	0	1
>120 and Upto 180 Days	0	1	0	0	1	1	0	1	4
>90 and Upto 120 Days	0	2	1	0	4	2	2	2	13
>80 and Upto 90 Days	0	2	0	3	0	1	3	1	10
>70 and Upto 80 Days	0	3	0	1	2	1	1	1	9
>60 and Upto 70 Days	0	5	1	0	8	0	1	2	17
>50 and Upto 60 Days	0	0	0	3	5	2	1	0	11
>40 and Upto 50 Days	1	9	1	3	13	4	1	5	37
>30 and Upto 40 Days	1	6	6	4	19	2	1	2	41
>25 and Upto 30 Days	0	7	4	3	20	3	7	4	48
>20 and Upto 25 Days	0	5	0	6	24	1	9	2	47
>15 and Upto 20 Days	1	3	4	7	22	1	8	4	50
>10 and Upto 15 Days	1	4	2	2	14	6	13	17	59
>5 and Upto 10 Days	0	8	1	6	11	1	19	14	60
>3 and Upto 5 Days	0	1	0	1	0	0	6	4	12
>1 and Upto 3 Days	0	0	0	1	0	0	3	5	9
Upto 1 Day	0	0	0	0	0	0	14	11	25
Total	4	57	20	40	143	25	90	75	454

NORTHERN REGION**Number of Units : 109****Capacity : 23578 MW**

Capacity Range ->	660-800MW	490-600 MW	300-330 MW	250 MW	210 MW	195-200 MW	100-150 MW	25-99 MW	TOTAL
Above 270 Days	0	0	0	0	0	0	0	0	0
>180 and Upto 270 Days	0	0	0	0	0	0	0	0	0
>120 and Upto 180 Days	0	0	0	0	0	0	0	0	0
>90 and Upto 120 Days	0	0	0	0	2	0	0	0	2
>80 and Upto 90 Days	0	0	0	0	0	1	2	0	3
>70 and Upto 80 Days	0	1	0	0	1	0	0	0	2
>60 and Upto 70 Days	0	2	1	0	0	0	0	0	3
>50 and Upto 60 Days	0	0	0	0	0	1	1	0	2
>40 and Upto 50 Days	0	2	0	1	2	3	0	0	8
>30 and Upto 40 Days	0	3	0	0	3	0	0	1	7
>25 and Upto 30 Days	0	1	2	1	4	1	2	0	11
>20 and Upto 25 Days	0	1	0	4	8	1	2	0	16
>15 and Upto 20 Days	0	0	1	2	6	0	2	2	13
>10 and Upto 15 Days	0	0	0	2	2	4	4	1	13
>5 and Upto 10 Days	0	3	1	1	1	1	9	6	22
>3 and Upto 5 Days	0	0	0	0	0	0	4	0	4
>1 and Upto 3 Days	0	0	0	1	0	0	0	1	2
Upto 1 Day	0	0	0	0	0	0	1	0	1
Total	0	13	5	12	29	12	27	11	109

WESTERN REGION**Number of Units : 146****Capacity : 33297.5MW**

Capacity Range ->	660-800MW	490-600 MW	300-330 MW	250 MW	210 MW	195-200 MW	100-150 MW	25-99 MW	TOTAL
Above 270 Days	0	0	0	0	0	0	0	0	0
>180 and Upto 270 Days	0	0	0	0	0	0	0	0	0
>120 and Upto 180 Days	0	1	0	0	0	0	0	0	1
>90 and Upto 120 Days	0	0	0	0	1	0	0	0	1
>80 and Upto 90 Days	0	0	0	2	0	0	0	0	2
>70 and Upto 80 Days	0	1	0	1	0	1	0	0	3
>60 and Upto 70 Days	0	2	0	1	2	0	0	0	5
>50 and Upto 60 Days	0	0	0	2	1	0	0	0	3
>40 and Upto 50 Days	1	4	0	1	4	0	1	0	11
>30 and Upto 40 Days	1	2	6	2	7	2	1	0	21
>25 and Upto 30 Days	0	5	1	1	4	1	2	3	17
>20 and Upto 25 Days	0	0	0	1	7	0	4	1	13
>15 and Upto 20 Days	1	0	2	2	8	1	5	2	21
>10 and Upto 15 Days	1	1	1	0	7	2	4	8	24
>5 and Upto 10 Days	0	0	0	2	6	0	8	2	18
>3 and Upto 5 Days	0	0	0	0	0	0	0	0	0
>1 and Upto 3 Days	0	0	0	0	0	0	2	0	2
Upto 1 Day	0	0	0	0	0	0	2	2	4
Total	4	16	10	15	47	7	29	18	146

SOUTHERN REGION**Number of Units : 85****Capacity : 18582.5MW**

Capacity Range ->	660-800MW	490-600MW	300-330 MW	250 MW	210 MW	195-200 MW	100-150 MW	25-99 MW	TOTAL
Above 270 Days	0	1	0	0	0	0	0	0	1
>180 and Upto 270 Days	0	0	0	0	0	0	1	0	1
>120 and Upto 180 Days	0	0	0	0	0	1	0	0	1
>90 and Upto 120 Days	0	2	1	0	1	2	1	1	8
>80 and Upto 90 Days	0	2	0	0	0	0	0	0	2
>70 and Upto 80 Days	0	0	0	0	1	0	1	1	3
>60 and Upto 70 Days	0	1	0	0	3	0	0	1	5
>50 and Upto 60 Days	0	0	0	0	2	0	0	0	2
>40 and Upto 50 Days	0	1	1	0	3	0	0	5	10
>30 and Upto 40 Days	0	0	0	0	7	0	0	1	8
>25 and Upto 30 Days	0	0	0	1	8	0	2	1	12
>20 and Upto 25 Days	0	0	0	0	5	0	2	0	7
>15 and Upto 20 Days	0	1	0	2	6	0	1	0	10
>10 and Upto 15 Days	0	2	0	0	3	0	2	3	10
>5 and Upto 10 Days	0	2	0	1	0	0	1	0	4
>3 and Upto 5 Days	0	0	0	0	0	0	0	0	0
>1 and Upto 3 Days	0	0	0	0	0	0	0	0	0
Upto 1 Day	0	0	0	0	0	0	1	0	1
Total	0	12	2	4	39	3	12	13	85

EASTERN REGION**Number of Units : 112****Capacity : 22250 MW**

Capacity Range →	660- 800MW	490- 600 MW	300-330 MW	250 MW	210 MW	195-200 MW	100-150 MW	25-99 MW	TOTAL
Above 270 Days	0	0	0	0	0	0	1	0	1
>180 and Upto 270 Days	0	0	0	0	0	0	0	0	0
>120 and Upto 180 Days	0	0	0	0	1	0	0	1	2
>90 and Upto 120 Days	0	0	0	0	0	0	1	1	2
>80 and Upto 90 Days	0	0	0	1	0	0	1	1	3
>70 and Upto 80 Days	0	1	0	0	0	0	0	0	1
>60 and Upto 70 Days	0	0	0	0	3	0	1	1	5
>50 and Upto 60 Days	0	0	0	1	2	1	0	0	4
>40 and Upto 50 Days	0	2	0	0	4	1	0	0	7
>30 and Upto 40 Days	0	1	0	2	2	0	0	0	5
>25 and Upto 30 Days	0	1	1	0	4	1	1	0	8
>20 and Upto 25 Days	0	4	0	1	4	0	1	1	11
>15 and Upto 20 Days	0	2	1	1	2	0	0	0	6
>10 and Upto 15 Days	0	1	1	0	2	0	3	5	12
>5 and Upto 10 Days	0	3	0	2	4	0	1	6	16
>3 and Upto 5 Days	0	1	0	1	0	0	2	4	8
>1 and Upto 3 Days	0	0	0	0	0	0	1	4	5
Upto 1 Day	0	0	0	0	0	0	9	7	16
Total	0	16	3	9	28	3	22	31	112

NORTH-EASTERN REGION**Number of Units : 2****Capacity : 60 MW**

Capacity Range →	660- 800MW	490- 600 MW	300-330 MW	250 MW	210 MW	195-200 MW	100-150 MW	25-99 MW	TOTAL
Upto 1 Day	0	0	0	0	0	0	0	2	2
Total	0	0	0	0	0	0	0	2	2

SECTION-9

FUEL SUPPLY TO VARIOUS POWER STATIONS

9.1 Coal supply to one hundred (100) thermal power stations considered in this review were monitored during for the year 2011-12. Out of 100 thermal power stations, 94 were monitored on daily basis .Five thermal power stations based on imported coal i.e. Torangallu TPS, Mundra TPS, Trombay TPS, Udupi TPS , Ratnagiri TPS and one OP Jindal TPS having its own captive mine and not requiring transportation logistics were excluded from the daily monitoring.

9.2 COMPARATIVE COAL SUPPLY POSITION IN THE YEAR 2011-12

During the year 2011-12, the supply of coal to thermal power stations commissioned up to 31st March 2009 was in accordance with the Annual Contracted Quantity (ACQ) defined in the fuel supply agreement signed between the coal companies and the power utilities. While the supply of coal for power stations commissioned during the years 2009-10, 2010-11 & 2011-12 was based on the Memorandum of Understanding (MOU) between the power utilities and coal companies.

A Summary of coal receipt at various power stations, consumption of coal and stock position at various utility power stations during the last 3 years is given as under:

(Million Tonne)

STATUS	YEAR		
	2009-10	2010-11	2011-12
Demand/Requirement	404	445	475
Receipt (indigenous coal)	352.3	354.9	376.1
Receipt (Imported coal)	23.2	30.8	45.2
Total Receipt (including Imported Coal)	375.5	385.7	421.3
Opening Stock (includes Imported coal)	11.7	14.6	16
Consumption (includes Imported coal)	367.3	386.6	417.6
Closing Stock (includes Imported coal)	14.6	16.0	15.6

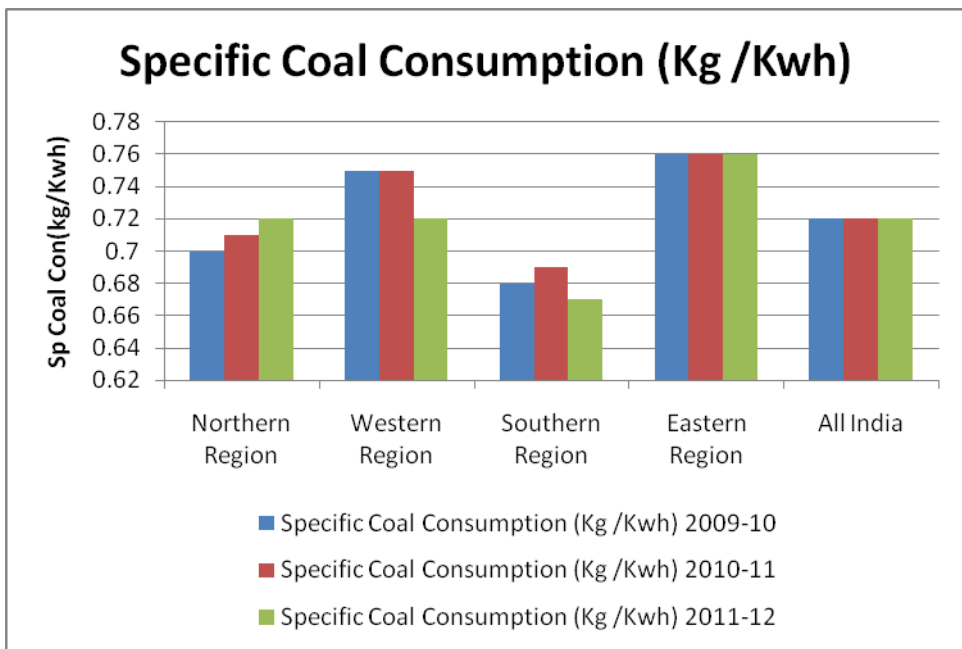
Power station wise break up is given in Annexure-9.1A.

9.3 SPECIFIC COAL CONSUMPTION

The All India specific coal consumption of thermal power stations during 2011-12 was 0.72 Kg/Kwh. Specific coal consumption for last three years is given below:

Specific Coal Consumption (Kg /Kwh)

REGION	2009-10	2010-11	2011-12
Northern Region	0.70	0.71	0.72
Western Region	0.75	0.75	0.72
Southern Region	0.68	0.69	0.67
Eastern Region	0.76	0.76	0.76
All India	0.72	0.72	0.72



A power station in the states of Eastern Region has registered higher specific consumption of coal than the All India average.

Specific coal consumption of imported coal based TPSs (1400 MW Trombay, 860 MW Torangallu, 2640 MW Mundra, 1200 MW JSW Ratnagiri and 1200 MW Udupi in Western and Southern Region is comparatively less. Station wise details for the last three years is given in Annexure-9.2

9.4 LOSS OF GENERATION DUE TO SHORT SUPPLY OF COAL

Total generation loss of 11.6 BU was reported due to coal shortage by the power utilities during 2011-12. Station wise details are furnished in Annexure-9.3

9.5 COAL QUALITY ISSUES

It was observed that uncrushed / oversized coal was still received by some of the thermal power stations in the country causing unloading constraints resulting in heavy demurrage charges on Power Utilities. CEA had sent details of the complaints about coal quality, received from power stations to Ministry of Coal, Ministry of Power, Ministry of Railways and Coal India Limited for necessary remedial action.

9.5.1 COAL CONSUMPTION TREND

All India coal consumption for utility thermal power stations during 2011-12 was 417.6 Million Tonne against 386.6 million Tonne consumed during 2010-11.

The corresponding coal based generation during 2010-11 and 2011-12 were 535.3 and 584.8 Billion Units respectively.

Thus, All India coal consumption for utility thermal power stations during 2011-12 had increased by 8% while the generation had increase by 9.2% during the same period. Coal based generation was about 66% of total energy generated in the country during the year 2011-12.

Coal consumption from 2006-07 onwards are as under

YEAR	CAPACITY (MW)	GENERATION (BU)	CONSUMPTION (MT)	Sp. Consumption (Kg/Kwh)
2006-07	71121.38	431.1	302.5	0.72
2007-08	76048.88	453.0	329.6	0.73
2008-09	77648.88	489.1	355.4	0.74
2009-10	84198.38	514.7	367.3	0.71
2010-11	93918.38	535.3	386.6	0.72
2011-12	105583.38	584.8	417.6	0.72

9.5.2 COMPANYWISE COAL SUPPLY POSITION

During the year 2011-12 thermal power station received about 421.2 Million Tonne against the requirement of 475 Million Tonne in 2011-12. company wise coal receipt during the year is furnished below:

COMPANYWISE CUMULATIVE COAL RECEIPT**FOR THE YEAR OF APR to MAR-2012**

COMPANY	COAL RECEIPT
BCCL	20.9
CCL	32.2
ECL	27.9
MCL	59.8
NCL	56.8
NECL(Nec)	.4
SECL	83
WCL	30.4
TOTAL CIL	311.4
SCCL	35.4
Total Captive	22.3
import (Import)	45.2
GRAND TOTAL	421.28*

* included 6.960 MT from auction.

9.5.3 Sector wise Coal Consumption

Sector	Generation by coal based stations(Gwh)		Coal Consumption in '000T		Sp. Coal Consumption (Kg / Kwh)	
	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12
Centre	216285.54	222713.2	152982	158945	0.71	0.71
Private	62779.27	83491.14	31811	46583	0.51	0.56
State	256275.48	278583	201796	212029	0.79	0.75
Total	535340.29	584787.3	386589	417557	0.72	0.72

9.6 GAS SUPPLY TO VARIOUS GAS BASED POWER STATIONS**9.6.1 Gas Supply and Requirement**

The production and supply of gas to power sector has not kept pace with the demand of gas in the country, Even the commitment of gas allocation made to power stations was not fulfilled. With the production of gas from KG basin (D-6) has started from April 2009 the gas supply to Gas based GT stations has since improved considerably. Accordingly, the gas supply of gas to GT

Power Station has been 59.31MMSCMD during the year 2010-11, However the gas supply to GT Pan Station has decrease to 55.98 MMSCMD during the year 2011-12 on a/c of less gas availability Reliance K.G.D.6. The supply of gas to gas based power stations during the last few years have been as under:

Sl. No.	Years	Capacity at the end of year (MW)	Gas Required* (MMSCMD)	Aver. Gas Supplied (MMSCMD)	Shortfall (MMSCMD)
(1)	(2)	(3)	(4)	(5)	(6)=(4)-(5)
1	2000-01	9028.70	44.54	24.40	20.14
2	2001-02	9432.90	46.31	24.33	21.98
3	2002-03	9949.00	48.26	25.12	23.14
4	2003-04	10,154.90	49.25	25.62	23.63
5	2004-05	10,224.90	49.73	30.70	19.03
6	2005-06	10,919.62	53.38	35.37	18.01
7	2006-07	12,444.42	61.18	35.10	26.08
8	2007-08	13,408.92	65.67	38.14	27.53
9	2008-09	13,599.62	66.61	37.45	29.16
10	2009-10	15,769.27	78.09	55.45	22.64
11	2010-11	16,639.77	81.42	59.31	22.11
12	2011-12	16,926.27	81.78	55.98	25.80

* Normative gas requirement at 90% PLF taking GCV of gas= 9000 K.Cal/SCM (except for Ramgarh CCGT for which GCV is 4150 K Cal/SCM), station heat rate- 2900K.Cal/kWh for open cycle and 2000 K.Cal/kWh for combined cycle and as on last day of year.

MMSCMD – Million Metric Standard Cubic Metres per Day

Power Station- wise details of requirement and supply of gas to power plants during the year 2011-12 are given in **Annexure- 9.4.**

9.6.2 Generation Loss due to gas shortage

The country has been facing acute shortage of gas. Due to this of gas based power stations have provision for the use of alternate fuels, such as Naphtha, HSD for augmentation of power generation. The actual generation using liquid fuels has, however, been dependent upon the requirement/acceptance by the beneficiaries on account of higher cost fuel

cost leading to higher cost of generation. The generation loss due to short supply of gas during the last few years is as under:

S.No.	Year	Generation Loss during the year (BUs)	
		As reported to CEA by Gas Based Power Stations	Based on possible operate. of gas power plants at 90% PLF
1	2004-05	7.03	23.71
2	2005-06	7.69	23.88
3	2006-07	8.06	26.33
4	2007-08	9.34	31.17
5	2008-09	11.99	33.71
6	2009-10	3.24	25.02
7	2010-11	6.39	28.27
8	2011-12	10.01	36.71

The station-wise details of generation loss due to short supply of gas reported by gas based power station during the year 2011-12 are given in **Annexure 9.4.**

9.7 FUEL SUPPLY TO VARIOUS LIQUID FUEL BASED POWER STATIONS DURING THE YEAR 2011-12

On account of the prevailing high cost of these fuels resulting in high cost of liquid fuel results in higher in cost of generation. The generation using these fuels is dependent upon the requirement/acceptance by the beneficiaries. The Power Station-wise details of power generation and fuel consumption during the year 2011-12 are given in **Annexure- 9.5.**

9.8 FUEL SUPPLY TO VARIOUS DG POWER STATIONS

Fuel supply for DG Power Stations (10 MW & above) in the Country is being collected on an annual basis by CEA. The station-wise details of power generation and fuel consumption during the Year 2011-12 are given in **Annexure 9.6.**

9.9 SPECIFIC SECONDARY FUEL OIL CONSUMPTION (SFOC)

Station-wise details of specific fuel oil consumption in the coal/lignite based power stations, as received in CEA, for the year 2011-12 are given in **Annexure9.7.**

Annexure 9.1A
SHEET _ of 4

COMPARATIVE COAL SUPPLY POSITION IN THE YEAR 2010-11

Fig. in '000 Tonne

Sl.No.	Name of TPS	Cap (MW) 31.03.2012	2009-10				2010-11						2011-12				
			ACQ/ MOU	Receipt	Consumption.	C/Stock	Demand	Receipt Indigenous	Receipt Imported	Total Receipt	Consumption	Stock	Requirement	Receipt Indigenous	Receipt Imported	Total Receipt	Consumption
I TPS Designed on Indigenous Coal																	
NORTHERN REGION																	
DELHI																	
1	Badarpur	705.0	4200	4196	4029	205	4200	3301	439	3740	3745	144	4398	4061	23	4084	4221
2	I.P.Stn.(DVB)	0.0	570	342	384	14	0		0	0	0	0		0			
3	Rajghat(DVB)	135.0	804	553	636	10	804	611	0	611	700	4	813	679	0	679	680
	Sub Total	840.0	5574	5091	5049	229	5004	3912	439	4351	4445	148	5211	4740	23	4763	4901
HARYANA																	
4	Faridabad	0.0	292	392	418	11	0	0	0	0	0	0					
5	Panipat	1360.0	6593	6939	7432	138	7347	7103	21	7124	7099	38	7500	7822	475	8297	7824
6	Yamuna Nagar	600.0	2796	2496	2489	62	3252	2719	4	2723	2616	103	2800	1958	201	2159	2172
7	Rajiv Gandhi (Hissar)	1200.0					3200	1936	57	1993	2165	27	5544	4121	600	4721	4754
8	Indra Gandhi	500.0					500	207	0	207	8	199	2976	1967	364	2331	1976
	CLP	1320.0											433	239	0	239	148
	Sub Total	4980.0	9681	9827	10339	211	14299	11965	82	12047	11888	367	19253	16107	1640	17747	16874
PUNJAB																	
9	Bhatinda	440.0	2041	1961	2015	118	2053	1265	0	1265	1328	124	1800	1407	0	1407	1389
10	Lehra Mohabbat	920.0	4353	4551	4525	148	4981	4298	0	4298	4228	215	4500	4559	0	4559	4705
11	Roper	1260.0	6347	7123	6797	384	7066	6623	0	6623	6491	532	7002	6181	0	6181	6427
	Sub Total	2620.0	12741	13635	13337	650	14100	12186	0	12186	12047	871	13302	12147	0	12147	12521
RAJASTHAN																	
12	Kota	1240.0	6006	6015	6251	84	7578	6803	223	7026	7238	129	6999	6561	497	7058	7018
13	Suratgarh	1500.0	6609	6644	6598	185	7897	6386	227	6613	6615	181	7200	7192	451	7643	7036
14	Chhabra TPS	500.0	670	140	161	3	3011	1063	0	1063	905	237	2202	1572	91	1663	1910
	Sub Total	3240.0	13285	12799	13010	272	18486	14252	450	14702	14758	547	16401	15325	1039	16364	15964
UTTAR PRADESH																	
										0							

15	Anpara	1630.0	8496	8763	8736	312	8496	8682	0	8682	8793	304	8800	8379	0	8379	8447
16	Harduaganj	665.0	897	890	830	82	897	719	0	719	655	92	957	466	0	466	546
17	Obra	1278.0	5004	4662	4765	146	5004	4306	0	4306	4240	213	4800	3716	0	3716	3895
18	Panki Extn.	210.0	900	1082	1009	121	900	851	0	851	954	92	1200	798	0	798	894
19	Parichha	890.0	3201	2974	2932	108	3817	2991	0	2991	2792	284	3198	2451	0	2451	2501
20	Tanda (NTPC)	440.0	2700	2457	2302	356	4032	2386	90	2476	2820	238	2700	2793	69	2862	3028
21	Unchahar (NTPC)	1050.0	5700	5509	5342	278	7032	5842	134	5976	5781	446	6102	5194	264	5458	5986
22	Rihand STPS	2500.0	10500	10575	10463	658	11828	9860	501	10361	10393	709	11100	10377	423	10800	10837
23	Singrauli(STP S)	2000.0	11004	11097	11297	484	11004	11817	331	12148	11994	614	11298	10923	167	11090	11030
24	NCTPP(Dadri)	1820.0	4404	4399	4526	225	7288	6371	726	7097	7390	114	9198	7121	1684	8805	8855
25	Rosa	1200.0					1981	1572	0	1572	1684	43	3000	1925	569	2494	2275
26	Anpara C	1200.0											2260	543	43	586	935
27	Barkhera	90.0											120	88	0	88	84
28	Maqsoodpur	90.0											120	70	0	70	68
29	Khambarkhera	90.0											120	89	0	89	85
30	Kundarki	90.0											120	34	0	34	32
31	Utraula	90.0											120	10	0	10	8
	Sub Total	15333.0	52806	52408	52202	2770	62279	55397	1782	57179	57496	3149	65213	54977	3219	58196	59506
	TOTAL N. R.	27013.0	94087	93760	93937	4132	114168	97712	2753	100465	100634	5082	119380	103296	5921	109217	109766
	WESTERN REGION									0							
	GUJARAT									0							
32	Ahemedabad	400.0	1341	1291	1316	5	2151	1469	480	1949	1760	96	2200	1288	576	1864	1881
33	Gandhinagar	870.0	3259	3857	3737	52	4755	3637	687	4324	4281	109	4902	3859	474	4333	4215
34	Sikka	240.0	1224	1131	1075	84	1452	1096	43	1139	1158	22	1308	949	0	949	939
35	Ukai	850.0	4164	4030	3993	135	4587	4564	0	4564	4648	53	4200	4437	110	4547	4632
36	Wanakbori	1470.0	8580	8061	8077	73	8988	7776	418	8194	8185	130	7800	8497	68	8565	8360
37	OP JINDAL	1000.0	5340	5489	5444	123	5448	5331	0	5331	5670	153	5074	4661	0	4661	4999
	Sub Total	4830.0	23908	23859	23642	472	27381	23873	1628	25501	25702	563	25484	23691	1228	24919	25026
	MADHYAPR ADESH									0							
38	Amarkantak	450.0	2004	1141	1231	34	2289	1509	4	1513	1362	170	1800	2024	0	2024	1516
39	Birsingpur	1340.0	6396	6212	6054	137	6828	5886	8	5894	5800	30	6402	6089	104	6193	5859
40	Satpura	1142.5	6600	6335	5625	269	6600	6112	65	6177	5942	130	6198	5807	282	6089	5530
41	Vindhyachal STPS	3260.0	17196	18176	18081	737	18732	17421	803	18224	18241	707	18702	17397	779	18176	17876
	Sub Total	6192.5	32196	31864	30991	1177	34449	30928	880	31808	31345	1037	33102	31317	1165	32482	30781

	CHHATTISGARH									0							
42	Korba East	440.0	2700	3026	2857	173	3397	2488	0	2488	2882	94	3000	2924	0	2924	2818
43	Korba East (EXP)	500.0	2604	3000	2956	74	2604	3081	0	3081	2995	122	3000	2378	0	2378	2306
44	Korba West	840.0	4704	5046	4713	476	4370	4886	0	4886	4816	468	4998	5018	0	5018	4701
45	Korba STPS	2600.0	12204	12932	12601	595	12816	11456	161	11617	12747	668	13002	12428	232	12660	12964
46	Pathadi TPS	600.0	1200	909	1094	78	2844	2895	0	2895	2608	527	3000	2527	23	2550	2883
47	Bhilai TPS	500.0	210	253	272	34	3200	2964	0	2964	2732	173	2700	2421	178	2599	2701
48	Sipat STPS	2980.0	5796	5908	5517	358	6129	5902	106	6008	5786	589	6000	7424	83	7507	7295
49	Sub Total	8460.0	29418	31074	30010	1788	35360	33672	267	33939	34566	2641	35700	35120	516	35636	35668
	MAHARASHTRA									0							
50	Bhusawal	1420.0	2796	2825	2922	68	3078	2627	307	2934	2456	253	2598	2409	305	2714	3002
51	Chandrapur	2340.0	12694	12814	12733	328	14452	9647	511	10158	10086	465	13800	9395	588	9983	9620
52	Koradi	1040.0	5301	5047	4736	241	6165	4520	19	4539	4563	236	4852	4686	19	4705	4183
53	Khaperkheda	1340.0	4998	5380	5152	289	5566	4972	431	5403	5322	37	5400	4965	435	5400	5320
54	Nasik	880.0	4692	4194	4548	198	5508	3974	598	4572	4402	227	4698	3687	607	4294	4103
55	Parli	1130.0	5757	5358	5288	193	6685	4993	451	5444	5341	86	5940	4621	449	5070	5210
56	Paras	500.0	1800	1897	1690	142	2340	2819	0	2819	2630	126	2182	2569	0	2569	2301
57	Dahanu	500.0	2421	1980	2021	11	3102	2256	815	3071	3041	40	3195	2566	778	3344	3312
58	Wardha Warora	540.0					604	223	86	309	466	20	2248	2003	175	2178	2170
	Sub Total	9690.0	40459	39495	39090	1470	47500	36031	3218	39249	38307	1490	44913	36901	3356	40257	39221
	TOTAL W.R.	29172.5	125981	126292	123733	4907	144690	124504	5993	130497	129920	5731	139199	127029	6265	133294	130696
	SOUTHERN REGION									0							
	ANDHRA PRADESH									0							
59	Kothagudem Ramagundam B	1720.0	7695	7753	7298	564	7695	6704	0	6704	6865	396	7215	8242	200	8442	8464
60	Vijayawada	62.5	300	349	350	21	300	290	0	290	331	10	348	337	0	337	326
61	Ramagundam STPS	1760.0	6000	7197	7603	282	6915	7154	609	7763	8645	153	9000	8556	1278	9834	9811
62	Royalaseema	2600.0	11308	12375	12157	572	13268	12466	498	12964	12965	482	13200	12479	426	12905	12801
63	Kakatiya	1050.0	2952	4274	4569	164	3540	4396	109	4505	4534	131	5700	5320	320	5640	5672
64	Simhadri	500.0					960	1023	0	1023	1106	101	1998	1636	0	1636	1488
65	Sub Total	2000.0	5196	5553	5569	90	5508	5267	615	5882	5989	90	7998	6561	1124	7685	7595
	Sub Total	9692.5	33451	37501	37546	1693	38186	37300	1831	39131	40435	1363	45459	43131	3348	46479	46157
	KARNATAKA									0							

66	Raichur	1720.0	6962	6046	7137	164	8023	5721	1070	6791	6479	481	8625	6499	1217	7716	7950
67	Bellary	1000.0	2496	1855	1774	108	2629	1687	7	1694	1698	77	3000	2096	32	2128	2059
	Total	2720.0	9458	7901	8911	272	10652	7408	1077	8485	8177	558	11625	8595	1249	9844	10009
	TAMIL NADU									0							
68	Ennore	450.0	1633	1461	1516	22	1608	1584	0	1584	1582	21	2798	1120	0	1120	1057
69	Mettur	840.0	3885	3811	3624	72	4067	3757	679	4436	4528	97	4698	4037	1066	5103	4887
70	Tuticorin	1050.0	5061	4459	4297	289	6533	4114	1062	5176	5568	46	6407	4665	1394	6059	5932
71	North Chennai	630.0	2919	3006	2987	89	3327	2829	436	3265	3289	64	3600	2440	669	3109	3061
	Sub Total	2970.0	13498	12737	12424	472	15535	12284	2177	14461	14967	228	17503	12262	3129	15391	14937
	TOTAL S.R.	15382.5	56407	58139	58881	2437	64373	56992	5085	62077	63579	2149	74587	63988	7726	71714	71103
										0							
	EASTERN REGION									0							
72	BIHAR									0							
73	Barauni	210.0	397	287	262	31	399	233	0	233	213	20	402	163	0	163	166
74	Muzaffarpur	220.0	504	429	417	5	504	296	0	296	304	4	600	187	0	187	194
75	Kahalgaoon STPS	2340.0	5988	8482	8587	0	8185	9985	1480	11465	11502	4	13998	9887	1664	11551	11518
	Sub Total	2770.0	6889	9198	9266	36	9088	10514	1480	11994	12019	28	15000	10237	1664	11901	11878
	JHARKHAND									0							
76	Patratu	770.0	996	1037	1003	61	996	652	0	652	624	90	1002	415	0	415	403
77	Tenughat	420.0	2004	1745	1504	251	2004	1467	0	1467	1646	37	1596	1720	0	1720	1596
78	Bokaro (DVC)	630.0	3000	3076	2758	347	3061	3034	0	3034	2930	370	3102	2809	0	2809	3051
79	Chandrapura (DVC)	890.0	1704	1888	1546	364	2318	1837	0	1837	2009	17	2802	2991	0	2991	2979
80	Mithan	1050.0											1461	889	0	889	822
81	Kodarma	1000.0											630		0	0	0
	Sub Total	4760.0	7704	7746	6811	1023	8379	6990	0	6990	7209	514	10593	8824	0	8824	8851
	WEST BENGAL									0							
82	Durgapur (DVC)	340.0	1392	1416	1555	60	1386	1520	0	1520	1212	275	1563	1520	0	1520	1562
83	Mejia (DVC)	2340.0	5152	4225	4109	9	6470	5804	320	6124	6039	0	10005	7397	0	7397	7245
84	Bandel	450.0	1288	1270	1358	44	1620	1585	7	1592	1599	31	1698	1512	131	1643	1680
85	Sagardighi	600.0	3519	1799	2103	37	3841	2554	88	2642	2659	29	2700	2811	181	2992	2941
86	Santalidih	730.0	1521	996	1030	29	1797	1044	3	1047	996	55	2202	1687	77	1764	1803
87	Kolaghat	1260.0	5604	5690	6088	75	5689	6118	157	6275	6320	31	6300	5998	365	6363	6467
88	Bakreswar	1050.0	5463	4016	4586	10	5939	5231	141	5372	5201	134	6210	4862	286	5148	5074

89	Calcutta(CESC)	160.0	364	380	378	16	300	380	0	380	377	18	450	271	0	271	277
90	Titagarh(CESC)	240.0	1509	1176	1231	45	1985	1200	28	1228	1239	39	1302	1066	0	1066	1090
91	S. G.St(CESC)	135.0	691	732	772	26	681	738	64	802	791	60	798	685	0	685	726
92	Budge Budge(CESC)	750.0	1899	2349	2438	183	3061	3190	278	3468	3325	296	3300	3209	414	3623	3564
93	Durgapur(DPL)	690.0	3708	2402	2255	159	3533	1671	0	1671	1490	169	2668	1627	0	1627	1583
94	Farakka STPS	2100.0	9009	7281	7090	60	10514	5689	1752	7441	7352	83	10998	5645	1666	7311	7136
95	Durgapur Steel	1000.0											630		0	0	0
	Sub Total	11845.0	41119	33732	34993	753	46816	36724	2838	39562	38600	1220	50824	38290	3120	41410	41148
	ORISSA									0							
96	Talcher Old	470.0	2496	2952	2883	215	3312	3066	35	3101	3097	244	3000	3042	7	3049	3045
97	Talcher STPS	3000.0	17304	17938	17950	106	18864	15370	2848	18218	17946	341	18180	13668	3128	16796	17030
98	Ib Valley	420.0	2700	2537	2539	203	2724	2604	0	2604	2735	61	2700	2611	3	2614	2574
99	Sterlite	2400.0					320	446	25	471	967	77	6000	5022	0	5022	4459
	Sub Total	6290.0	22500	23427	23372	524	25220	21486	2908	24394	24745	723	29880	24343	3138	27481	27108
	TOTAL E.R.	25665.0	78212	74103	74442	2336	89503	75714	7226	82940	82573	2485	106297	81694	7922	89616	88985
	Total All India	97233.0	354687	352294	350993	13812	412734	354922	21057	375979	376706	15447	439463	376007	27834	403841	400550
	Indigenous coal									0							
	TOTAL Imported	8490.0	28700	23230	16264	766				0	0	0					
II	Thermal Power Stations Designed on imported coal																
1	Trambay	1250.0					2800	0	2643	2643	2641	164	2595		2571	2571	2468
2	Torangallu	600.0					2200	0	2005	2005	2210	0	2361		2102	2102	2102
3	Adani Mundra	4620.0					3000	0	3702	3702	3534	170	6561		7337	7337	7118
4	JSW Ratnagiri	1200.0					2000	0	658	658	945	0	3630		3889	3889	3730
5	Udupi	1200.0					1000	0	689	689	553	237	3618		1543	1543	1558
	Sub Total	8870.0					11000	0	9697	9697	9883	571	18765	0	17442	17442	16976
	ALL INDIA TOTAL	106103.0	383387	375524	367257	14578	423734	354922	30754	385676	386589	16018	458228	376007	45276	421283	417526

Annexure 9.2A**Specific coal consumption**

SI No	NAME OF TPS	Capacity (MW) as on 31.03.2011	SPECIFIC COAL CONSUMPTION		
			2009-10	2010-11	2011-12
	NORTHERN REGION				
	DELHI				
1	Badarpur	705	0.82	0.82	0.88
2	Rajghat	135	0.99	0.9	0.83
	Sub Total	840	0.84	0.83	0.88
1	Badarpur	705	0.82	0.82	0.88
	HARYANA				
3	Panipat	1360	0.72	0.77	0.80
4	Rajiv Gandhi(Hissar)	1200	0	0.9	0.88
5	Yamuna Nagar	600	0.64	0.67	0.67
6	Indra Gandhi	1000		0	0.82
	Sub Total	4160	0.7	0.75	0.81
	PUNJAB				
7	Bhatinda (GNDTP)	440	0.74	0.75	0.74
8	Lehra Mahabbat(GHTP)	920	0.6	0.62	0.62
9	Ropar	1260	0.68	0.67	0.67
	Sub Total	2620	0.66	0.66	0.66
	RAJASTHAN				
10	Kota	1240	0.69	0.73	0.70
11	Chhabra	500	0.65	0.68	0.76
12	Suratgarh	1500	0.72	0.7	0.66
	Sub Total	3240	0.71	0.7	0.69
	UTTAR PRADESH				
13	Anpara	1630	0.73	0.73	0.72
14	Harduaganj	665	1.03	1.12	0.94
15	Obra	1278	0.93	0.92	0.87
16	Panki	210	0.86	0.93	0.91
17	Paricha	890	0.79	0.84	0.85
18	Tanda	440	0.73	0.79	0.89
19	Unchahar	1050	0.63	0.68	0.72
20	Rihand	2500	0.65	0.64	0.67
21	Rosa	1200	0	0.59	0.53
22	Singrauli	2000	0.69	0.71	0.71
23	Dadri(NCTPP)	1820	0.63	0.61	0.62
24	Anpara C	1200			0.69
	Sub Total	14883	0.7	0.73	0.71
	TOTAL NR	27063	0.70	0.70	0.72
	WESTERN REGION				
	GUJARAT				
25	Torrent Power (AEC+SAB)	400	0.57	0.59	0.64
26	Mundra #	1980	0.45	0.46	0.50
27	Gandhinagar	870	0.76	0.79	0.77
28	Sikka Rep.	240	0.9	0.99	0.96
29	Ukai	850	0.83	0.86	0.82
30	Wanakbori	1470	0.79	0.82	0.81
	Sub Total	5810	0.75	0.72	0.69
	MADHYA PRADESH				
31	Amarkantak(Incl Extn)	450	0.68	0.71	0.70
32	Birsingpur	1340	0.78	0.75	0.71
33	Satpura	1142.5	0.87	0.98	1.03
34	Vindhyachal	3760	0.67	0.68	0.69
	Sub Total	6692.5	0.72	0.73	0.74
	CHHATTISGARH				
35	Korba East (II,III& V)	940	0.86	0.98	0.75
36	Korba East V				0.90
37	Korba West	840	0.72	0.71	0.73
38	Korba STPS	2600	0.71	0.73	0.72
39	Sipat	2980	0.69	0.68	0.63

SI No	NAME OF TPS	Capacity (MW) as on 31.03.2011	SPECIFIC COAL CONSUMPTION		
			2009-10	2010-11	2011-12
40	Pathadi	600	0.72	0.71	0.72
41	Bhilai	500	0	0.68	0.68
42	OP Jindal TPS	1000	0.67	0.66	0.58
	Sub Total	9460	0.72	0.72	0.69
	MAHARASTRA				
43	Bhusawal	1420	0.93	0.98	1.28
44	Chandrapur	2340	0.87	0.93	0.71
45	Koradi	1040	0.93	1.06	1.24
46	Khaperkheda II	1340	0.86	0.93	0.85
47	Nasik	630	0.84	0.88	0.97
48	Parli (Incl. New Parli)	1130	0.93	1.3	1.02
49	Paras (Incl. Extn.)	500	0.96	1.5	0.81
50	Trombay*	1250	0.25	0.33	0.32
51	Dahanu	500	0.61	0.69	0.74
52	Wardha Warora	540	0	0.65	0.73
53	JSW Ratnagiri#	1320			0.57
	Sub Total	12010	0.76	0.81	0.77
	TOTAL WR	33972.5	0.75	0.75	0.72
	SOUTHERN REGION				
	ANDHRA PRADESH				
54	Kothagudem (Incl. Extn.)	1720	0.82	0.81	0.78
55	Ramagundam 'B'	62.5	0.68	0.7	0.72
56	Dr. N. Tata Rao (Vijayawada)	1760	0.71	0.7	0.69
57	R-gundam STPS	2600	0.6	0.63	0.60
58	Rayalseema	1050	0.72	0.73	0.70
59	Simhadri	2000	0.7	0.71	0.73
60	Kakatiya	500		0.6	0.61
	Sub Total	9692.5	0.68	0.69	0.68
	KARNATAKA				
61	Raichur	1720	0.69	0.74	0.75
62	Torangallu#	860	0.36	0.4	0.33
63	Bellary TPS	500	0.62	0.64	0.67
64	Udupi#	1320			0.46
	Sub Total	4400	0.61	0.61	0.58
	TAMIL NADU				
65	Ennore	450	1.01	1.05	1.18
66	Mettur	840	0.65	0.71	0.71
67	Tuticorin	1050	0.75	0.78	0.75
68	North Chennai	630	0.7	0.73	0.65
	Sub Total	2970	0.72	0.77	0.74
	TOTAL SR	17062.5	0.68	0.69	0.67
	EASTERN REGION				
	BIHAR				
69	BIHAR				
70	Barauni	210	0.99	0.98	1.00
71	Muzaffarpur	220	0.91	0.96	0.94
72	Kahalgaon	2340	0.84	0.82	0.86
	Sub Total	2870	0.85	0.82	0.86
	JHARKHAND				
73	Patratu	770	0.89	0.92	0.93
74	Tenughat	420	0.73	0.67	0.70
75	Bokaro'B'	630	0.72	0.85	0.91
76	Chandrapura	890	0.67	0.73	0.75
77	Maithon	1050			0.65
	Sub Total	3760	0.73	0.77	0.78
	WEST BENGAL				
78	Durgapur	340	0.76	0.81	0.80
79	Mejia	2340	0.65	0.69	0.71
80	Bandel	450	0.68	0.88	0.90
81	Santalidih	980	0.76	0.64	0.69
82	Kolaghat	1260	0.83	0.84	0.86
83	Bakreshwar	1050	0.65	0.67	0.66

SI No	NAME OF TPS	Capacity (MW) as on 31.03.2011	SPECIFIC COAL CONSUMPTION		
			2009-10	2010-11	2011-12
84	Sagardighi	600	0.63	0.7	0.72
85	New Cossipore	160	0.97	1.04	1.13
86	Titagarh	240	0.65	0.66	0.64
87	Southern REPL	135	0.7	0.73	0.70
88	Budge Budge	750	0.55	0.61	0.60
89	Durgapur(DPL)	630	0.79	0.92	0.89
90	Farakka STPS	2100	0.79	0.67	0.69
	Sub Total	11035	0.71	0.71	0.72
	ORISSA				
	Talcher	470	0.81	0.82	0.81
	Talcher STPS	3000	0.81	0.8	0.78
	Ib Valley	420	0.86	0.97	0.87
	Sterlite	2400		1.02	0.71
	Sub Total	6290	0.82	0.81	0.78
	TOTAL ER	23955	0.76	0.74	0.76
	TOTAL ALL INDIA	100733	0.71	0.72	0.72
# Imported coal based projects.					
* Trombay a multi fuel Project.					

Note: - Sp. coal consumption for Mahatma Gandhi TPS and Durgapur Steel TPS has not given above as these units / stations were commissioned as on 12.01.12 and 29.07.11 respectively.

Annexure-9.3

**GENERATION LOSS DUE TO COAL SHORTAGE FOR THE YEAR 2011-12
(AS REPORTED BY POWER UTILITIES)**

S.NO.	NAME OF POWER UTILITY	S. No.	MODE	NAME OF THERMAL POWER STATION	CAPACITY IN MW	Generation Loss in MUs
			OF TRANS. PORT			TOTAL
1	NTPC	1	P.H.	KAHALGAON STPS	2340	3749.2
		2	P.H.	SINGRAULI STPS	2000	69.0
		3	P.H.	RIHAND STPS	2000	5.0
		4	P.H.	FARAKKA STPS	2100	170.0
		5	P.H.	VINDHYACHAL STP	3260	229.9
		6	P.H.	TALCHER STPS	3000	872.5
	Sub Total				14700	5096
2	GSECL	1	RAIL	GANDHI NAGAR TPS	870	105.7
		2	RAIL	WANAKBORI	1470	157.4
	Sub Total				2340	263
3	M.P. Power Genco	1	RAIL	SATPURA	1143	634.0
		2	RAIL	SANJAY GANDHI	1340	471.0
	Sub Total				2483	1105
4	TANGEDCO	1	I.M.	ENNORE	450	41.3
		2	I.M.	METTUR	840	132.3
		3	I.M.	NORTH CHENNAI	630	3.3
	Sub Total				1920	177
5	DVC	1	RAIL	MEJIA TPS	2340	1026.6
	Sub Total				2340	1026.6
6	WBPDCL	1	RAIL	BAKRESHWAR	1050	76.2
		2	RAIL	BANDEL TPS	450	72.7
		3	RAIL	KOLAGHAT TPS	1260	136.9
		4	RAIL	SAGARDIGHI TPS	600	348.7
	Sub Total				3360	635
7	CESC	1	RAIL	BUDGE-BUDGE TPS	750	81.0
					750	81.0
	ALL INDIA TOTAL				27892.5	11582.7

Annexure-9.4

ANNUAL REPORT ON FUEL SUPPLY/CONSUMPTION FOR GAS BASED POWER STATIONS IN THE COUNTRY

For te year 2011-2012

S. No	Name of Power Station	Installed Capacity @ (MW)	Located in the State	Gen (MUs)	Gas * Requirement at 90% PLF (MMSCMD)	Gas Allotted (MMSCMD)	Avg. Gas Supplied/ Consumed+ (MMSCMD)	Alternate fuel used		Gen Loss due to short supply of Gas as reported (MUs)	Remarks
								Naphtha	HSD		
CENTRAL SECTOR											
1	FARIDABAD CCPP	431.59	HARYANA	3067.72	2.07	1.95	1.80	72.38	15.00	0.00	
2	ANTA CCPP	419.33	RAJASTHAN	2694.60	2.01	1.82	1.65	883.54	0.00	0.00	
3	AURAIYA CCPP	663.36	UTTAR PRADESH	3878.62	3.18	2.63	2.45	262.11	0.00	0.00	
4	DADRI CCPP	829.78	UTTAR PRADESH	5376.07	3.98	3.31	3.06	0.00	2.82	0.00	
	Sub Total (NR)	2344.06		15017.01	11.24	9.71	8.96	1218.03	17.82	0.00	
5	GANDHAR CCPP	657.39	GUJARAT	3684.07	3.16	3.09	2.09	0.00	0.00	2.09	
6	KAWAS CCPP	656.20	GUJARAT	3638.40	3.15	2.05	2.05	277.53	100.81	0.00	
7	RATNAGIRI CCPP I	740.00	MAHARASH TRA	2950.50	3.55	2.55	1.56	0.00	0.00	714.49	
8	RATNAGIRI CCPP II	740.00	MAHARASH TRA	4846.46	3.55	2.55	2.56	0.00	0.00	593.33	
9	RATNAGIRI CCPP III	740.00	MAHARASH TRA	3822.12	3.56	2.56	2.02	0.00	0.00	1661.26	
	Sub Total (WR)	3533.59		18941.55	16.97	12.80	10.28	277.53	100.81	2971.17	
10	KATHALGURI CCPP	291.00	ASSAM	1765.17	1.40	1.40	1.38	0.00	0.00	194.02	
11	AGARTALA GT	84.00	TRIPURA	666.12	0.58	0.75	0.75	0.00	0.00	0.00	
	Sub Total (NER)	375.00		2431.29	1.98	2.15	2.13	0.00	0.00	194.02	
	Total (CS)	6252.65		36389.85	30.19	24.66	21.37	1495.56	118.63	3165.20	
STATE SECTOR											
12	I.P.CCPP	270.00	DELHI	1243.72	1.30	1.37	0.89	0.00	19.10	0.00	
13	PRAGATI CCGT-III	750.00	DELHI	331.38	2.74	1.07	0.29	0.00	0.00	141.14	
14	PRAGATI CCPP	330.40	DELHI	2560.05	1.59	1.57	1.49	0.00	0.00	0.00	
15	DHOLPUR CCPP	330.00	RAJASTHAN	2253.77	1.58	1.57	1.36	0.00	0.00	249.42	
16	RAMGARH CCPP	113.80	RAJASTHAN	536.79	1.18	0.95	0.81	0.00	22.82	0.00	
	Sub Total (NR)	1794.20		6925.71	8.39	6.53	4.84	0.00	41.92	390.56	
17	DHUVARAN CCPP	218.62	GUJARAT	1008.70	1.05	0.76	0.56	0.00	0.00	0.00	

Annexure-9.4

ANNUAL REPORT ON FUEL SUPPLY/CONSUMPTION FOR GAS BASED POWER STATIONS IN THE COUNTRY

For te year 2011-2012

S. No	Name of Power Station	Installed Capacity @ (MW)	Located in the State	Gen (MUs)	Gas * Requirement at 90% PLF (MMSCMD)	Gas Allotted (MMSCMD)	Avg. Gas Supplied/ Consumed+ (MMSCMD)	Alternate fuel used		Gen Loss due to short supply of Gas as reported (MUs)	Remarks
								Naphtha	HSD		
18	HAZIRA CCPP	156.10	GUJARAT	907.62	0.75	0.65	0.65	0.00	0.00	0.52	
19	UTRAN CCPP	518.00	GUJARAT	2987.98	2.49	1.61	1.56	0.00	0.00	21.84	
20	URAN CCPP	672.00	MAHARASH TRA	4668.78	3.23	4.70	3.50	0.00	0.00	224.45	Less gas allocation from M/s GAIL & M/s RIL.
	Sub Total (WR)	1564.72		9573.08	7.52	7.72	6.27	0.00	0.00	246.81	
21	KARAIKAL CCPP	32.50	PUDUCHER RY	251.46	0.16	0.19	0.19	0.00	0.00	0.00	
22	KOVIKALPAL CCPP	107.00	TAMIL NADU	705.75	0.51	0.39	0.39	0.00	0.00	155.23	
23	KUTTALAM CCPP	100.00	TAMIL NADU	413.29	0.48	0.45	0.22	0.00	0.00	137.00	Daily Gas allocation from M/s is insufficient
24	NARIMANAM GPS	10.00	TAMIL NADU	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
25	VALUTHUR CCPP	186.20	TAMIL NADU	1114.56	0.89	0.65	0.65	0.00	0.00	0.00	
	Sub Total (SR)	435.70		2485.06	2.04	1.68	1.45	0.00	0.00	292.23	
26	LAKWA GT	120.00	ASSAM	771.99	0.84	0.95	0.83	0.00	0.00	77.56	
27	NAMRUP CCPP	95.00	ASSAM	565.73	0.43	0.66	0.67	0.00	0.00	27.00	
28	NAMRUP ST	24.00	ASSAM	0.00	0.14	0.00	0.00	0.00	0.00	0.00	
29	BARAMURA GT	58.50	TRIPURA	357.62	0.41	0.40	0.40	0.00	0.00	0.00	
30	ROKHIA GT	90.00	TRIPURA	419.10	0.63	0.58	0.50	0.00	0.00	0.00	
	Sub Total (NER)	387.50		2114.44	2.45	2.59	2.40	0.00	0.00	104.55	
	Total (SS)	4182.12		21098.29	20.40	18.52	14.96	0.00	41.92	1034.15	
PVT SECTOR											

Annexure-9.4

ANNUAL REPORT ON FUEL SUPPLY/CONSUMPTION FOR GAS BASED POWER STATIONS IN THE COUNTRY

For te year 2011-2012

S. No	Name of Power Station	Installed Capacity @ (MW)	Located in the State	Gen (MUs)	Gas * Requirement at 90% PLF (MMSCMD)	Gas Allotted (MMSCMD)	Avg. Gas Supplied/ Consumed+ (MMSCMD)	Alternate fuel used		Gen Loss due to short supply of Gas as reported (MUs)	Remarks
								Naphtha	HSD		
31	VATWA CCPP	100.00	GUJARAT	459.26	0.48	0.25	0.28	0.00	0.00	403.16	
32	TROMBAY CCPP	180.00	MAHARASH TRA	1567.90	0.86	0.84	0.90	0.00	0.00	29.00	
	Sub Total (WR)	280.00		2027.16	1.34	1.09	1.18	0.00	0.00	432.16	
	Total (PVT S)	280.00		2027.16	1.34	1.09	1.18	0.00	0.00	432.16	
PVT IPP SECTOR											
33	RITHALA CCPP	108.00	DELHI	241.83	0.52	0.40	0.27	0.00	0.00	141.70	
	Sub Total (NR)	108.00		241.83	0.52	0.40	0.27	0.00	0.00	141.70	
34	BARODA CCPP	160.00	GUJARAT	668.74	0.77	0.36	0.42	0.00	0.00	549.77	
35	ESSAR CCPP	515.00	GUJARAT	135.89	2.47	1.23	1.23	0.00	0.00	0.00	
36	PEGUTHAN CCPP	655.00	GUJARAT	3067.07	3.14	1.87	1.80	2386.82	2.05	0.00	
37	SUGEN CCPP	1147.50	GUJARAT	7592.16	5.51	4.65	3.87	0.00	0.00	921.96	
	Sub Total (WR)	2477.50		11463.86	11.89	8.11	7.32	2386.82	2.05	1471.73	
38	GAUTAMI CCPP	464.00	ANDHRA PRADESH	2898.67	2.23	1.86	1.57	0.00	0.00	960.34	
39	GMR Energy Ltd - Kakinada	220.00	ANDHRA PRADESH	1200.03	1.06	0.67	0.67	0.00	0.00	0.00	
40	GODAVARI CCPP	208.00	ANDHRA PRADESH	1282.46	1.00	0.73	0.73	4165.50	0.00	435.39	Gas shortage from gas wells.
41	JEGURUPADU CCPP	455.40	ANDHRA PRADESH	2833.49	2.19	2.67	1.58	0.00	0.00	860.97	Non availability of gas-short supply of APM gas and RIL gas.
42	KONASEEMA CCPP	445.00	ANDHRA PRADESH	2266.22	2.14	1.78	1.32	0.00	0.00	488.09	

Annexure-9.4

ANNUAL REPORT ON FUEL SUPPLY/CONSUMPTION FOR GAS BASED POWER STATIONS IN THE COUNTRY

For te year 2011-2012

S. No	Name of Power Station	Installed Capacity @ (MW)	Located in the State	Gen (MUs)	Gas * Requirement at 90% PLF (MMSCMD)	Gas Allotted (MMSCMD)	Avg. Gas Supplied/ Consumed+ (MMSCMD)	Alternate fuel used		Gen Loss due to short supply of Gas as reported (MUs)	Remarks
								Naphtha	HSD		
43	KONDAPALLI EXTN CCPP .	366.00	ANDHRA PRADESH	2203.54	1.76	1.23	1.23	0.00	0.00	0.00	
44	KONDAPALLI CCPP	350.00	ANDHRA PRADESH	2030.94	1.68	1.75	1.18	0.00	0.00	757.77	
45	PEDDAPURAM CCPP	220.00	ANDHRA PRADESH	1318.82	1.06	0.76	0.76	0.00	0.00	565.38	
46	VEMAGIRI CCPP	370.00	ANDHRA PRADESH	2066.81	1.78	1.48	1.02	0.00	0.00	409.07	
47	KARUPPUR CCPP	119.80	TAMIL NADU	797.10	0.58	0.49	0.53	0.00	0.00	0.00	
48	P.NALLUR CCPP	330.50	TAMIL NADU	1526.19	1.59	0.37	0.37	177240.54	63.00	0.00	
49	VALANTARVY CCPP	52.80	TAMIL NADU	377.51	0.25	0.37	0.25	0.00	0.00	9.14	
	Sub Total (SR)	3601.50		20801.78	17.32	14.16	11.21	181406.04	63.00	4486.15	
50	DLF ASSAM GT	24.50	ASSAM	0.00	0.12	0.17	0.06	0.00	0.00	124.76	
	Sub Total (NER)	24.50		0.00	0.12	0.17	0.06	0.00	0.00	124.76	
	Total (PVT IPP S)	6211.50		32507.47	29.85	22.84	18.86	183792.86	65.05	6224.34	
	GRAND TOTAL	16926.27		92022.77	81.78	67.11	56.37	185288.42	225.60	10855.84	

Annexure-9.5

ANNUAL REPORT ON FUEL CONSUMPTION FOR LIQUID FUEL BASED GT POWER PLANTS IN THE COUNTRY

For the year 2011-2012

S.No.	Name of Power Station	IC at the end of year (MW)	Located in the State	Owner	Gen. (MUs)	Primary Fuel	Alternate Fuel	Primary Fuel Consumed (KL)	Alternate Fuel Consumed (KL)	Gen. Loss due to short supply of Fuel as reported (MUs)	Remarks
CENTRAL											
1	R. GANDHI CCPP (Liq.)	359.58	KERALA	NTPC Ltd.	706.42	Naptha	HSD	123402.87	246.26	0.00	
	Sub Total (SR)	359.58			706.42			123402.87	246.26	0.00	
2	MAITHON GT (Liq.)	90.00	JHARKHAND	DVC	0.00	HSD	Naptha	0.00	0.00	0.00	Power station did not operate during the month.
	Sub Total (ER)	90.00			0.00			0.00	0.00	0.00	
	Total (CS)	449.58			706.42			123402.87	246.26	0.00	
STATE											
3	PAMPORE GPS (Liq.)	175.00	JAMMU AND KASHMIR	JK, PDD	5.41	HSD	Naptha/Gas	2221.26	0.00	0.00	The units were in operation from 2nd Jan 2012 to 27th Feb 2012 during the financial year 2011-12.
	Sub Total (NR)	175.00			5.41			2221.26	0.00	0.00	
4	BASIN BRIDGE GT (Liq.)	120.00	TAMIL NADU	TNGDCL	29.59	Naptha	HSD	12705.00	89.00	0.00	Alternate fuel consumed is HSD used as start up fuel.
	Sub Total (SR)	120.00			29.59			12705.00	89.00	0.00	
5	HALDIA GT (Liq.)	40.00	WEST BENGAL	WBPDCL	0.00	HSD	NP	0.00	0.00	0.00	Power station did not operate during the month.
6	KASBA GT (Liq.)	40.00	WEST BENGAL	WBPDCL	0.00	HSD	NP	0.00	0.00	0.00	Power station did not operate during the month.

7	SILIGURI GT (Liq.)	20.00	WEST BENGAL	WBPDC	0.00	HSD	NP	0.00	0.00	0.00	Power station did not operate during the month.
	Sub Total (ER)	100.00			0.00			0.00	0.00	0.00	
	Total (SS)	395.00			35.00			14926.26	89.00	0.00	
PVT IPP											
8	GOA CCPP (Liq.)	48.00	GOA	RELIANCE	277.09	Naptha	Natural Gas/LNG	80068.10	0.00	0.00	
	Sub Total (WR)	48.00			277.09			80068.10	0.00	0.00	
9	COCHIN CCPP (Liq.)	174.00	KERALA	BSES(C)	48.74	Naptha	HSD and Gas	8085.07	33.37	0.00	HSD is start up fuel Gas is not available in Kerala Station did not operate as per KSEB despatch instructions.
	Sub Total (SR)	174.00			48.74			8085.07	33.37	0.00	
	Total (PVT IPP S)	222.00			325.83			88153.17	33.37	0.00	
	Grand Total	1066.58			1067.25			226482.30	368.63	0.00	

MUs- Million Units
IC-Installed Capacity

KL-Kilo Litre
NP-No Provision

HSD-High Speed Diesel
LNG_liquified Natural Gas

@ Installed capacity is as on last day of the year.

* Normative gas requirement at 90 % PLF taking GCV of gas=9000k.Cal/SCM (except for Ramgarh CCGT for which GCV is 4150 kCal/SCM), station heat rate - 2900 k.Cal/kWh for open cycle and 2000 k.Cal/kWh for combined cycle and is as on last day of the year.

MUs - Million Units

MMSCMD - Million Standard Cubic Meters per Day

HSD - High Speed Diesel

KL - Kilo Litre

Annexure-9.6**STATION- WISE DETAILS OF FUEL CONSUMPTION FOR DG POWER PLANTS (10 MW & ABOVE) DURING THE YEAR 2010-11**

S.No.	Name of Power Station	IC at the end of year (MW)	Located in the State	Owner	Gen. (MUs)	Primary Fuel	Alternate Fuel	Primary Fuel Consumed (KL)	Alternate Fuel Consumed (KL)	Gen. Loss due to short supply of Fuel as reported (MUs)	Remarks
STATE											
1	YELHANKA (DG)	127.92	KARNATAKA	KPCL	415.64	LSHS	HSD, LSFO	80581.95	8872.73	156.01	638.42 KL HSD is used as alternate fuel for starting and stopping engines 8234.31 KL LSFO consumed during the year as alternate fuel.
2	BRAMHAPUR AM DG	106.60	KERALA	KSEB	56.99	LSHS	HSD	9288.81	3339.78	0.00	HSD is used only for starting the machine.
3	KOZHIKODE DG	128.00	KERALA	KSEB	233.58	LSHS	HSD	50560.81	0.00	0.00	HSD not being used and no separate accounting.
	Sub Total (SR)	362.52			706.21			140431.57	12212.51	156.01	
4	AND. NICOBAR DG	12.50	ANDAMAN NICOBAR	A&N ADM	25.45	HSD	Heavy fuel	7305.47	0.00	0.00	
	Sub Total (ER)	12.50			25.45			7305.47	0.00	0.00	
5	LEIMAKHONG DG	36.00	MANIPUR	ED, Manipur	0.31	HFO	LDO/HSD	58.05	15.32	0.00	Alternate fuel used is HSD.
6	BAIRABI DG	22.92	MIZORAM	P&ED, Mizoram	0.00	FO(Low Viscosity)	HSD	3.10	7.45	10.00	Non availability of funds.
	Sub Total (NER)	58.92			0.31			61.15	22.77	10.00	
	Total ((SS))	433.94			731.97			147798.19	12235.28	166.01	
PVT IPP											
7	LVS POWER DG	36.80	ANDHRA PRADESH	LVS POWER	12.69	LSHS	NP	2741.86	0.00	0.00	
8	BELGAUM DG	81.30	KARNATAKA	TATA PCL	186.18	HFO	NP	44976.22	0.00	0.00	
9	BELLARY DG	25.20	KARNATAKA	BELLARY	29.24	HFO	HSD	7222.48	31.84	0.00	
10	KASARGODE DG	21.84	KERALA	RPG	10.16	LSHS	HFHSD	2318.17	144.56	0.00	
11	B. BRIDGE D.G	200.00	TAMIL NADU	VASAVI	857.86	LSHS	LSFO	182006.32	0.00	0.00	

12	SAMALPATTI DG	105.70	TAMIL NADU	SAMALPATI	292.41	LSHS	NP	63586.32	0.00	0.00	
13	SAMAYANALLUR DG	106.00	TAMIL NADU	MADURAI P	281.85	LSFO	LSHS	61570.09	0.00	0.00	Actual generation depends on demand instructions from TNEB.
	Sub Total (SR)	576.84			1670.39			364421.46	176.40	0.00	
14	BAMBOOFLAT DG	20.00	ANDAMAN NICOBAR	SUR.CH.PL	138.05	HSD	NP	34468.00	0.00	0.00	
	Sub Total (ER)	20.00			138.05			34468.00	0.00	0.00	
	Total ((PVT IPP S))	596.84			1808.44			398889.46	176.40	0.00	
	Grand Total	1030.78			2540.41			546687.65	12411.68	166.01	

KL - Kilo Litre LSHS - Low Sulfer Heavy Stock FO - Furnaces Oil HFHSD - Heavy Fuel High Speed Diesel
 NP - No Provision HSD - High Speed Diesel LSFO - Low Sulphur Furnaces Oil HFO - Heavy Furnaces Oil
 NA - Not Available LDO - Light Diesel Oil MUs - Million Units IC - Installed Capacity

- Note:**
1. 1 KL= 0.95 MT has been used for conversion of LSHS from Metric Tons (MT) to Kilo Litres (KL) in respect of LVS Power DG , B. Bridge DG, Bramhapuram DG, Kozhikode DG, Samalpatti DG, Kasargode DG and Yelhanka DG.
 2. 1 KL= 0.90 MT has been used for conversion of FO/LSFO from Metric Tons (MT) to Kilo Litres (KL) in respect of Samayanallur DG.
 3. 1 KL= 0.90 MT has been used for conversion of HFO from Metric Tons (MT) to Kilo Litres (KL) in respect of Bellary DG and Belgaum DG.

Annexure-9.7
Sheet of 3

SECONDARY FUEL OIL CONSUMPTION (SFOC) REPORT FOR THE YEAR OF 2010-2011

Sl. No.	Name of Power Station	IC at the end of the year (MW)	Energy Gen (MU)	Secondary Fuel Oil Consumption(KL)							Weighted Average GCV (kcal/lit.)	Specific SFOC(ml /kWhr)
				LSHS	LDO	HPS	FO/HFO	HSD	HHS	TOTAL		
CENTRAL SECTOR												
1	BADARPUR TPS	705.00	4775.23	0.00	4637.00	0.00	0.00	136.00	0.00	4773.00	9477.81	0.95
2	INDIRA GANDHI STPP*	1000.00	2421.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	BARSINGSAR LIGNITE	250.00	617.08	0.00	1008.80	0.00	0.00	0.00	0.00	1008.80	10231.00	1.67
4	DADRI (NCTPP)	1820.00	14224.22	0.00	534.60	0.00	1756.60	0.00	0.00	2291.20	9708.64	0.16
5	RIHAND STPS	2000.00	16183.39	0.00	1354.62	0.00	4010.37	0.00	0.00	5364.99	9722.00	0.32
6	SINGRAULI STPS	2000.00	15584.71	0.00	0.00	0.00	10177.00	0.00	0.00	10177.00	9980.00	0.65
7	TANDA TPS	440.00	3404.84	0.00	1647.00	0.00	0.00	0.00	0.00	1647.00	9370.00	0.45
8	UNCHAHAR TPS	1050.00	8279.37	0.00	2569.46	0.00	3710.61	0.00	0.00	6280.07	9990.00	0.76
	Sub Total (NR)	9265.00	65490.45	0.00	11751.48	0.00	19654.58	136.00	0.00	31542.06	9818.58	0.47
9	BHILAI TPS*	500.00	3977.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	KORBA STPS	2600.00	18030.35	0.00	0.00	0.00	4004.70	39.00	0.00	4043.70	10008.91	0.22
11	SIPAT STPS	2320.00	11557.54	0.00	3695.51	0.00	14013.64	0.00	0.00	17709.15	10146.70	1.55
12	VINDHYACHAL STPS	3260.00	25885.58	0.00	579.71	0.00	4930.60	0.00	0.00	5510.31	9766.00	0.21
	Sub Total (WR)	8680.00	59451.42	0.00	4275.22	0.00	22948.94	39.00	0.00	27263.16	10049.32	0.46
13	RAMAGUNDEM STPS	2600.00	21255.39	0.00	0.00	0.00	1927.50	569.99	0.00	2497.49	9933.20	0.12
14	SIMHADRI	2000.00	10404.46	0.00	10366.49	0.00	663.27	0.00	0.00	11029.76	9546.02	1.01
15	NEYVELI (EXT) TPS	420.00	3042.73	0.00	387.47	0.00	2361.70	0.00	0.00	2749.17	10238.32	0.93
16	NEYVELI TPS- I	600.00	3986.99	0.00	47.69	0.00	5254.31	0.00	0.00	5302.00	10460.81	1.39
17	NEYVELI TPS-II	1470.00	11087.42	0.00	0.00	0.00	6803.53	0.00	0.00	6803.53	10197.00	0.63
	Sub Total (SR)	7090.00	49776.99	0.00	10801.65	0.00	17010.31	569.99	0.00	28381.95	9974.09	0.57
18	KAHALGAON TPS	2340.00	13438.17	0.00	166.74	0.00	11034.71	0.00	0.00	11201.45	9916.54	0.83
19	MUZAFFARPUR TPS	220.00	207.38	0.00	1353.00	0.00	0.00	0.00	0.00	1353.00	9599.00	6.26
20	BOKARO `B` TPS	630.00	3356.52	0.00	1637.06	0.00	3553.81	0.00	0.00	5190.87	9825.85	1.52
21	CHANDRAPURA(DVC) TPS	890.00	3989.63	0.00	7496.38	0.00	4765.72	0.00	0.00	12262.10	9295.62	2.86
22	TALCHER (OLD) TPS	470.00	3740.07	0.00	355.45	0.00	447.50	845.80	0.00	1648.75	9437.50	0.42
23	TALCHER STPS	3000.00	21857.11	0.00	567.00	0.00	8264.00	0.00	0.00	8831.00	9508.80	0.38
24	DURGAPUR TPS	340.00	1955.77	0.00	2824.00	0.00	3016.00	248.00	0.00	6088.00	8855.50	2.76
25	FARAKKA STPS	2100.00	10416.29	0.00	0.00	0.00	28338.00	0.00	0.00	28338.00	9700.00	2.64
26	MEJIA TPS*	2340.00	10196.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Sub Total (ER)	12330.00	69157.92	0.00	14399.63	0.00	59419.74	1093.80	0.00	74913.17	9576.14	1.04
	Total (CS)	37365.00	243876.78	0.00	41227.98	0.00	119033.57	1838.79	0.00	162100.34	9772.57	0.65

STATE	SECTOR											
27	RAJGHAT TPS	135.00	818.48	403.62	2392.34	0.00	0.00	0.00	0.00	2795.96	9100.49	3.11
28	PANIPAT TPS	1360.00	9736.88	0.00	0.00	0.00	22976.31	3.64	0.00	22979.96	10217.99	2.41
29	RAJIV GANDHI TPS*	1200.00	5415.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	YAMUNA NAGAR TPS	600.00	3238.70	0.00	278.00	0.00	6973.70	0.00	0.00	7251.70	10116.05	2.27
31	GH TPS (LEH.MOH.)	920.00	7621.30	0.00	2198.00	0.00	614.00	0.00	0.00	2812.00	9500.00	0.35
32	GND TPS(BHATINDA)	440.00	1883.01	0.00	737.00	0.00	2607.00	0.00	0.00	3344.00	9400.00	1.67
33	ROPAR TPS	1260.00	9564.12	0.00	123.41	0.00	4294.46	0.00	0.00	4417.87	10000.00	0.46
34	CHHABRA TPP	500.00	2497.18	0.00	864.90	0.00	12470.66	0.00	0.00	13335.56	10549.14	5.63
35	GIRAL TPS	250.00	488.47	0.00	1010.00	0.00	0.00	0.00	0.00	1010.00	9185.00	1.90
36	KOTA TPS	1240.00	10084.78	0.00	87.99	0.00	4299.40	337.02	0.00	4724.41	9929.36	0.47
37	SURATGARH TPS	1500.00	10674.37	0.00	405.46	0.00	8717.45	0.00	0.00	9122.91	9486.67	0.81
38	ANPARA TPS	1630.00	11665.50	0.00	12491.29	0.00	0.00	0.00	0.00	12491.29	10670.00	1.14
39	HARDUAGANJ TPS	415.00	578.38	0.00	7632.86	0.00	5693.74	0.00	0.00	13326.60	10278.35	23.68
40	OBRA TPS	1372.00	4466.06	0.00	0.00	0.00	11518.40	4690.62	0.00	16209.03	10589.97	3.84
41	PANKI TPS	210.00	980.83	0.00	2713.83	0.00	0.00	0.00	0.00	2713.83	9525.58	2.64
42	PARICHHA TPS*	640.00	2936.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Sub Total (NR)	13672.00	82650.20	403.62	30935.08	0.00	80165.12	5031.29	0.00	116535.11	10186.73	1.44
43	DSPM TPS	500.00	3145.20	0.00	0.00	0.00	551.78	568.77	0.00	1120.55	10262.13	0.37
44	KORBA-II	440.00	1430.11	0.00	0.00	0.00	4397.38	185.00	0.00	4582.38	10000.00	3.20
45	KORBA-WEST TPS	840.00	6432.81	0.00	0.00	0.00	2779.77	1518.39	0.00	4298.16	10400.00	0.69
46	AKRIMOTA LIG TPS	250.00	870.92	0.00	368.76	0.00	2866.65	0.00	0.00	3235.41	9912.12	3.68
47	GANDHI NAGAR TPS	870.00	5487.29	0.00	108.00	0.00	5239.37	0.00	0.00	5347.37	10478.00	1.02
48	KUTCH LIG. TPS	290.00	1525.83	0.00	2111.33	0.00	6272.56	0.00	0.00	8383.89	10425.16	5.73
49	SIKKA REP. TPS	240.00	976.60	0.00	551.00	0.00	2935.00	171.11	0.00	3657.11	9501.48	3.56
50	UKAI TPS	850.00	5618.83	0.00	118.81	0.00	6118.68	0.00	0.00	6237.49	10456.65	1.16
51	WANAKBORI TPS	1470.00	10280.45	0.00	537.00	0.00	5445.01	0.00	0.00	5982.01	10486.20	0.61
52	AMARKANTAK EXT TPS	450.00	2181.81	0.00	1055.90	0.00	2670.88	200.38	0.00	3927.16	10788.39	1.94
53	SANJAY GANDHI TPS	1340.00	8263.19	0.00	721.00	0.00	1887.00	850.00	0.00	3458.00	10258.10	0.43
54	SATPURA TPS	1142.50	5386.79	0.00	38362.91	0.00	0.00	3087.60	0.00	41450.51	9323.92	7.17
55	BHUSAWAL TPS	1470.00	2343.44	0.00	8370.65	0.00	15546.19	0.00	0.00	23916.84	10646.70	10.87
56	CHANDRAPUR(MAHARA SHTRA) STPS	2340.00	13516.26	0.00	6594.00	0.00	15060.00	0.00	0.00	21654.00	9404.58	1.51
57	KHAPARKHEDA TPS	1340.00	6244.38	0.00	660.00	0.00	15268.00	0.00	0.00	15928.00	10187.67	2.60
58	KORADI TPS	1040.00	3360.03	0.00	430.20	0.00	18862.50	0.00	0.00	19292.70	9501.70	5.46
59	NASIK TPS	880.00	4241.35	0.00	1326.00	0.00	22373.00	0.00	0.00	23699.00	10120.04	5.65
60	PARAS TPS	500.00	2852.64	0.00	2576.57	0.00	15199.75	0.00	0.00	17776.32	10300.13	6.42
61	PARLI TPS	1130.00	5117.89	0.00	6457.00	0.00	42468.00	0.00	0.00	48925.00	10274.87	9.82
	Sub Total (WR)	17382.50	89275.82	0.00	70349.13	0.00	185941.52	6581.25	0.00	262871.90	10020.26	2.95
62	Dr. N.TATA RAO TPS	1760.00	14155.37	0.00	0.00	0.00	6639.38	623.73	0.00	7263.11	10000.00	0.51
63	KAKATIYA TPS	500.00	2440.79	0.00	1760.62	0.00	4505.79	0.00	0.00	6266.41	10047.63	2.58
64	KOTHAGUDEM TPS	1720.00	4997.65	0.00	0.00	0.00	4367.00	1134.00	0.00	5501.00	10764.14	1.18
65	RAMAGUNDEM - B TPS	62.50	452.70	0.00	0.00	0.00	233.34	360.11	0.00	593.45	10624.77	1.39
66	RAYALASEEMA TPS	1050.00	8076.23	0.00	835.25	0.00	12553.00	0.00	0.00	13388.25	9648.07	1.60

67	BELLARY TPS	1000.00	3093.27	0.00	2892.00	0.00	6663.00	0.00	0.00	9555.00	10323.74	3.19
68	RAICHUR TPS*	1720.00	10533.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
69	ENNORE TPS	450.00	893.68	0.00	553.76	0.00	9370.92	0.00	0.00	9924.68	10498.95	11.66
70	METTUR TPS	840.00	6844.85	0.00	0.00	0.00	3596.50	201.07	0.00	3797.57	10104.00	0.56
71	NORTH CHENNAI TPS	630.00	4693.32	0.00	0.00	0.00	2905.19	533.54	0.00	3438.73	9662.69	0.71
72	TUTICORIN TPS	1050.00	7891.94	0.00	0.00	0.00	15114.22	406.90	0.00	15521.12	10017.86	1.97
	Sub Total (SR)	10782.50	64073.72	0.00	6041.63	0.00	65948.34	3259.35	0.00	75249.32	10102.57	1.19
73	BARAUNI TPS	310.00	166.74	0.00	352.00	0.00	4349.00	0.00	0.00	4701.00	10705.57	30.18
74	PATRATU TPS*	770.00	433.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
75	TENUGHAT TPS	420.00	2277.37	0.00	4674.00	0.00	0.00	0.00	0.00	4674.00	9359.00	1.92
76	IB VALLEY TPS	420.00	2950.14	0.00	2623.19	0.00	0.00	0.00	0.00	2623.19	10000.00	0.89
77	BAKRESWAR TPS	1050.00	7725.44	0.00	7723.00	0.00	0.00	0.00	0.00	7723.00	9435.00	0.94
78	BANDEL TPS	450.00	1862.13	0.00	0.00	0.00	12349.00	0.00	0.00	12349.00	9424.21	6.25
79	D.P.L. TPS	690.00	1772.79	0.00	1805.00	0.00	7028.00	3296.00	0.00	12129.00	9448.35	6.46
80	KOLAGHAT TPS	1260.00	7560.99	0.00	18782.09	0.00	0.00	0.00	0.00	18782.09	9335.61	2.32
81	SAGARDIGHI TPS	600.00	4078.03	0.00	8430.11	0.00	0.00	0.00	0.00	8430.11	9391.79	1.94
82	SANTALDIH TPS*	980.00	2625.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Sub Total (ER)	6950.00	31453.04	0.00	44389.39	0.00	23726.00	3296.00	0.00	71411.39	9503.58	2.16
	Total (SS)	48787.00	267452.78	403.62	151715.23	0.00	355780.98	18167.89	0.00	526067.72	9998.77	1.97
83	SABARMATI (C STATION)	60.00	403.35	300.00	0.00	0.00	0.00	2.00	0.00	302.00	10417.79	0.78
84	SABARMATI (D-F STATIONS)	340.00	2556.04	1702.58	0.00	0.00	0.00	13.44	0.00	1716.02	10418.48	0.70
85	DAHANU TPS	500.00	4450.63	0.00	384.98	0.00	0.00	0.00	0.00	384.98	10294.00	0.09
86	TROMBAY TPS	1400.00	7643.60	320398.95	0.00	0.00	0.00	0.00	0.00	320398.95	10500.00	44.01
	Sub Total (WR)	2300.00	15053.62	322401.53	384.98	0.00	0.00	15.44	0.00	322801.95	10499.24	22.51
87	BUDGE BUDGE TPS	750.00	5939.75	0.00	2329.30	0.00	0.00	0.00	0.00	2329.30	9718.00	0.38
88	NEW COSSIPORE TPS*	160.00	246.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
89	SOUTHERN REPL. TPS	135.00	1036.51	0.00	1100.39	0.00	0.00	0.00	0.00	1100.39	9600.00	1.02
90	TITAGARH TPS	240.00	1715.65	0.00	2014.51	0.00	0.00	0.00	0.00	2014.51	9645.00	1.13
	Sub Total (ER)	1285.00	8938.20	0.00	5444.20	0.00	0.00	0.00	0.00	5444.20	9667.14	0.59
	Total (PVT S)	3585.00	23991.82	322401.53	5829.18	0.00	0.00	15.44	0.00	328246.15	10485.44	14.35
PVT IPP SECTOR												
91	JALIPA KAPURDI TPP	540.00	1684.41	0.00	4113.00	0.00	0.00	0.00	0.00	4113.00	10280.00	2.51
92	ROSA TPP Ph-I*	1200.00	4289.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Sub Total (NR)	1740.00	5973.94	0.00	4113.00	0.00	0.00	0.00	0.00	4113.00	10280.00	0.71
93	OP JINDAL TPS	1000.00	8588.92	0.00	510.81	0.00	824.10	0.00	0.00	1334.91	10191.33	0.16
94	PATHADI TPP*	600.00	4012.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95	MUNDRA TPS	4620.00	14213.45	0.00	0.00	0.00	9636.51	19079.10	0.00	28715.61	10632.88	2.15
96	SURAT LIG. TPS	500.00	2928.72	0.00	0.00	0.00	4333.09	0.00	0.00	4333.09	9620.00	1.42
97	WARDHA WARORA TPP	540.00	2974.94	0.00	1258.31	0.00	4753.21	0.00	0.00	6011.52	9709.32	1.96

	Sub Total (WR)	7260.00	32718.42	0.00	1769.12	0.00	19546.91	19079.10	0.00	40395.13	10372.20	1.28
98	TORANGALLU TPS(SBU-I)	260.00	2193.70	0.00	253.78	0.00	258.95	0.00	0.00	512.73	9494.96	0.22
99	TORANGALLU TPS(SBU-II)	600.00	4204.80	0.00	646.72	0.00	4036.00	0.00	0.00	4682.72	9138.11	1.02
100	UDUPI TPP	1200.00	3455.95	0.00	990.46	0.00	4171.21	0.00	0.00	5161.67	9450.00	1.41
	Sub Total (SR)	2060.00	9854.45	0.00	1890.96	0.00	8466.16	0.00	0.00	10357.12	9311.21	0.98
101	JOJOBERA TPS	360.00	2404.69	0.00	2852.70	0.00	0.00	0.00	0.00	2852.70	9100.00	1.08
102	STERLITE TPP*	1800.00	6368.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Sub Total (ER)	2160.00	8772.81	0.00	2852.70	0.00	0.00	0.00	0.00	2852.70	9100.00	0.30
	Total (PVT IPP S)	13220.00	57319.62	0.00	10625.78	0.00	28013.07	19079.10	0.00	57717.95	10112.36	1.02
	Grand Total	102957.00	592641.00	322805.15	209398.17	0.00	502827.62	39101.22	0.00	1074132.17	10119.46	1.83
100	UDUPI TPP	1200.00	3455.95	0.00	990.46	0.00	4171.21	0.00	0.00	5161.67	9450.00	1.41
	Sub Total (SR)	2060.00	9854.45	0.00	1890.96	0.00	8466.16	0.00	0.00	10357.12	9311.21	0.98
101	JOJOBERA TPS	360.00	2404.69	0.00	2852.70	0.00	0.00	0.00	0.00	2852.70	9100.00	1.08
102	STERLITE TPP*	1800.00	6368.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Sub Total (ER)	2160.00	8772.81	0.00	2852.70	0.00	0.00	0.00	0.00	2852.70	9100.00	0.30
	Total (PVT IPP S)	13220.00	57319.62	0.00	10625.78	0.00	28013.07	19079.10	0.00	57717.95	10112.36	1.02
	Grand Total	102957.00	592641.00	322805.15	209398.17	0.00	502827.62	39101.22	0.00	1074132.17	10119.46	1.83

* Data not furnished by power station

NA	-	Not Available	KL	-	Kilo Litre	LSHS	-	Low Sulphur Heavy Stock	LDO	-	Liquid Diesel Oil
HPS	-	Heavy Petroleum Stock	FO	-	Furnaces Oil	HFO	-	Heavy Furnaces Oil	HSD	-	High Speed Diesel
HHS	-	Hot Heavy Stock	GCV	-	Gross Calorific Value	IC	-	Installed Capacity			

Note: 1. AI specific SF0C are based on 10,000 k.Cal/litre GCV.

2. Where ever data of GCV not furnished by stations the GCV has been taken are: LDO=1100, FO/HFO=10500, HSD=13000,

LSHS=10500, HPS=10500 k.Cal/kg and Specific Gravity taken are : LDO=0.835, FO/HFO=0.90, HSD=0.85, LSHS=0.95,

HPS: 0.95
Kg/lit.

SECTION-10

GAS TURBINE PLANTS

10.1 Generation performance of 207 GT (Gas/Naphtha) based units of 57 Gas Turbine Plants (25 MW & above) aggregating to 18265.35 MW was recorded by CEA during the year 2011-12.

10.2 DETAILS OF GAS TURBINE STATIONS AS ON 31-3-2012

Region-wise and state-wise details of gas turbine stations and units under Central, State and Private Sectors operating as on 31st March, 2012 are given at Annexure 10.1.

Sector-wise summary of these units are as under:

S. No.	Sector	No. of Stations	No. of units	Installed capacity (in MW)
1.	Central	13	57	6702.23
2.	State	22	88	4874.12
3.	Pvt. Utilities	2	5	280.00
4.	Pvt. IPPs	20	57	6409.00
	Total	57	207	18265.35

Sector-wise details of gas turbine stations indicating unit-wise capacity, make, and date of synchronization / commissioning and primary fuel used are indicated in Annexure 10.2.

10.3 Performance of Gas Turbine Stations during 2011-12

Month-wise generation performance:

The generation from Gas based plants had a negative growth rate (except November'11) with respect to corresponding months last year. The main reason for negative growth rate was gas shortage due to decrease output at Reliance KG.D-6 basin and decreased demand from gas based plants as there was increased generation from Thermal, Nuclear, Hydro based plants. During the year, the generation from gas based plants (including liq fuel, Diesel etc) was 93.22 BU in comparison to 99.97 BU in 2010-11. As such the average % PLF was also reduced from 66.14% during 2010-11 to 59.94% during 2011-12.

Comparison of month-wise energy generation of gas based plants in the country and their average PLF during the year 2011-12 with the energy

generation and PLF% during the corresponding months in the year 2010-11 and month wise growth rate is given below:

Month	2011-12			2010-11			Growth (%)
	Monitored Capacity (MW)	Generation* (BU)	PLF (%)	Monitored Capacity (MW)	Generation * (BU)	PLF (%)	
Apr	17651.85	8.54	67.16	17001	9.46	77.29	-9.73
May	17651.85	8.31	63.30	17001	9.17	72.52	-9.38
Jun	17651.85	7.94	62.46	17001	8.48	69.29	-6.37
Jul	17651.85	7.97	60.71	17299	8.17	63.50	-2.45
Aug	17651.85	7.72	58.78	17320	8.15	63.24	-5.28
Sep	17688.35	7.38	57.93	17320	7.66	61.43	-3.66
Oct	17688.35	8.57	65.12	17320	9.06	70.33	-5.41
Nov	17688.35	7.87	61.82	17570	7.43	58.70	5.92
Dec	17688.35	8.00	60.82	17330	8.38	65.00	-4.53
Jan	17688.35	7.28	55.31	17402	8.49	65.55	-14.25
Feb	18039.35	6.51	51.87	17402	7.42	63.45	-12.26
Mar	18289.35	7.37	54.15	17652	8.38	63.84	-12.05
Total		93.46	59.94		100.26	66.15	-6.78

Station-wise gas based generation performance:

Comparison of Station-wise energy generation from gas based plants in the country and their average PLF during the year 2011-12 with the energy generation and PLF% during the year 2010-11 is given below:

Sl. No	Name of the Station	Capacity (MW)	GENERATION (MU)				PLF%		% of previous year
			Actual generation 2010-11	2011-12		% of Target	Actual 2010-11	Actual 2011-12	
				Target	Actual				
CENTRAL SECTOR									
DVC									
1	MAITHON GT (Liq.)	90	0	0	0	0	0	0	0
	Total- DVC	90	0	0	0	0	0	0	0
NEEPCO.									
2	AGARTALA GT	84	644.1	611	666.1	109	87.53	90.28	103.4
3	KATHALGURI CCPP	291	1833.9	1725	1765.2	102.3	71.94	69.06	96.2
	Total- NEEPCO.	375	2478	2336	2431.3	104.08	75.43	73.81	98.12
NTPC Ltd.									
4	ANTA CCPP	419.33	2487.9	2846	2694.6	94.7	67.73	73.16	108.3
5	AURAIYA CCPP	663.36	4369.3	4267	3878.6	90.9	75.19	66.56	88.8
6	DADRI CCPP	829.78	5399.9	5386	5376.1	99.8	74.29	73.76	99.6
7	FARIDABAD CCPP	431.59	3155.4	2844	3067.7	107.9	83.46	80.92	97.2
8	GANDHAR CCPP	657.39	4058.1	4062	3684.1	90.7	70.47	63.8	90.8
9	KAWAS CCPP	656.2	3882.1	4063	3638.4	89.6	67.54	63.12	93.7
10	R. GANDHI	359.58	1902.8	2134	706.4	33.1	60.41	22.37	37.1

Sl. No.	Name of the Station	Capacity (MW)	GENERATION (MU)				PLF%		% of previous year
			Actual generation 2010-11	2011-12		% of Target	Actual 2010-11	Actual 2011-12	
				Target	Actual				
	CCPP (Liq.)								
	Total-NTPC Ltd.	4017.23	25255.5	25602	23046	90.02	71.77	65.31	91.25
RGPPL									
11	RATNAGIRI CCPP I	740	4148.4	3159	2950.5	93.4	63.99	45.39	71.1
12	RATNAGIRI CCPP II	740	3135.8	3159	4846.5	153.4	48.37	74.56	154.6
13	RATNAGIRI CCPP III	740	4592.6	3159	3822.1	121	70.85	58.8	83.2
	Total-RGPPL	2220	11876.8	9477	11619	122.6	61.07	59.58	97.83
	Total-CENTRAL SECTOR	6702.23	39610.4	37415	37096	99.15	67.47	63.01	93.65
STATE SECTOR									
APGPCL									
14	LAKWA GT	120	766.2	822	772	93.9	72.89	70.93	100.8
15	NAMRUP CCPP	95	508.7	555	565.7	101.9	61.13	67.79	111.2
GSECL									
16	DHUVARAN CCPP	218.62	891.4	1000	1008.7	100.9	46.54	52.53	113.2
17	UTRAN CCPP	518	2947.2	2900	2988	103	64.95	65.67	101.4
GSEGL									
18	HAZIRA CCPP	156.1	1022.8	1150	907.6	78.9	74.8	66.19	88.7
19	HAZIRA CCPP EXT	351	0	513	132.8	25.9	0	26.28	0
IPGPCL									
20	I.P. CCPP	270	1368.3	1549	1243.7	80.3	57.85	52.44	90.9
21	PRAGATI CCGT-III	750	6.1	1810	331.4	18.3	0.56	7.19	5441.4
22	PRAGATI CCPP	330.4	2335.8	2400	2560	106.7	80.7	88.21	109.6
JKPDC									
23	PAMPORE GPS (Liq.)	175	14.1	0	5.4	0	0.92	0.35	38.3
MAHAGENCO									
24	URAN CCPP	672	5587.4	4800	4668.8	97.3	93.81	79.09	83.6
P&ED, Pudu.									
25	KARAIKAL CCPP	32.5	195.4	257	251.5	97.8	68.65	88.08	128.7
RRVUNL									
26	DHOLPUR CCPP	330	1994.9	2100	2253.8	107.3	69.01	77.75	113
27	RAMGARH CCPP	113.8	301.1	489	536.8	109.8	30.21	53.7	178.3
TNGDCL									
28	BASIN BRIDGE GT (Liq.)	120	51.9	0	29.6	0	4.93	2.81	57
29	KOVIKALPAL CCPP	107	663.8	538	705.8	131.2	70.81	75.09	106.3
30	KUTTALAM CCPP	100	172.6	509	413.3	81.2	19.7	47.05	239.5
31	VALUTHUR CCPP	186.2	547.7	700	1114.6	159.2	33.58	68.14	203.5
TSECL									
32	BARAMURA GT	58.5	225.8	271	357.6	132	50.07	69.59	158.4
33	ROKHIA GT	90	443.5	424	419.1	98.8	56.25	53.01	94.5
WBPDC									
34	HALDIA GT (Liq.)	40	0	0	0	0	0	0	0
35	KASBA GT (Liq.)	40	0	0	0	0	0	0	0

Sl. No.	Name of the Station	Capacity (MW)	GENERATION (MU)				PLF%		% of previous year
			Actual generation 2010-11	2011-12		% of Target	Actual 2010-11	Actual 2011-12	
				Target	Actual				
	Total-STATE SECTOR	4874.12	20044.8	22787	21266	93.33	56.21	55.33	106.09
PVT UTILITY									
TATA PCL									
36	TROMBAY CCPP	180	1568.8	1513	1567.9	103.6	99.49	99.16	99.9
TOR. POWER									
37	VATWA CCPP	100	670.5	671	459.3	68.4	76.54	52.28	68.5
	Total- PVT UTILITY	280	2239.3	2184	2027.2	92.82	91.3	82.42	90.53
IPP									
ABAN POWR									
38	KARUPPUR CCPP	119.8	820.4	731	797.1	109	78.17	75.75	97.2
BSES(C)									
39	COCHIN CCPP (Liq.)	174	223	362	48.7	13.5	14.63	3.19	21.8
BSES(P)									
40	PEDDAPURAM CCPP	220	1427.4	1600	1318.8	82.4	74.06	68.24	92.4
ESSAR									
41	ESSAR CCPP	515	1443.7	1700	135.9	8	32	3	9.4
GAUTAMI									
42	GAUTAMI CCPP	464	3331.1	3300	2898.7	87.8	81.95	71.12	87
GIPCL									
43	BARODA CCPP	160	843.6	1120	668.7	59.7	60.18	47.58	79.3
GMR ENERG									
44	GMR Energy Ltd - Kakinada	220	960.5	0	1200	0	49.84	62.1	124.9
GTE CORP									
45	PEGUTHAN CCPP	655	3667.4	4300	3067.1	71.3	63.92	53.31	83.6
GVKP&IL									
46	JEGURUPADU CCPP	455.4	3094.2	3087	2833.5	91.8	77.56	70.83	91.6
KONA									
47	KONASEEMA CCPP	445	2350.5	3070	2266.2	73.8	66.44	57.98	96.4
KONDAPALI									
48	KONDAPALLI EXTN CCPP	366	2043.7	2441	2203.5	90.3	70.09	68.54	107.8
49	KONDAPALLI CCPP	350	2133.8	2202	2030.9	92.2	69.59	66.06	95.2
NDPL									
50	RITHALA CCPP	108	88.8	475	241.8	50.9	49.87	29.18	272.3
PENNA									
51	VALANTARVY CCPP	52.8	370.2	409	377.5	92.3	80.03	81.4	102
PPNPGCL									
52	P.NALLUR CCPP	330.5	2494.1	2500	1526.2	61	86.15	52.57	61.2
RELIANCE									
53	GOA CCPP (Liq.)	48	292.3	300	277.1	92.4	69.51	65.72	94.8
SPGL									
54	GODAVARI CCPP	208	1464.4	1600	1282.5	80.2	80.37	70.19	87.6
TOR. POW. (SUGEN)									
55	SUGEN	1147.5	8217	7818	7592.2	97.1	81.74	75.32	92.4

Sl. No.	Name of the Station	Capacity (MW)	GENERATION (MU)				PLF%		% of previous year
			Actual generation 2010-11	2011-12		% of Target	Actual 2010-11	Actual 2011-12	
				Target	Actual				
	CCPP								
VEMAGIRI									
56	VEMAGIRI CCPP	370	2815.6	2800	2066.8	73.8	86.87	63.59	73.4
	Total- IPP	6409	38081.4	39815	32833	82.46	70.09	58.89	86.22
	Total- Private	6689	40320.8	41999	34861	83	70.55	59.47	86.46
	Total- All India	18265.4	99975.9	102201	93223	91.22	66.15	59.94	93.25

Note: - 1. The total all India generation excludes generation of 241.59 MU from GIPCL Import.

2. The list excludes Lakwa ST U#8 Capacity 37.2MW commercial operation on 17-1-2012.

10.4 NEW UNITS SYNCHRONISED DURING 2011-12

Following 3 gas based units aggregating to 637.5 MW were synchronized during the year 2011-12:

Sl. No	Name of Gas Turbine Station	Unit details	Capacity (MW)	Organization	State	Make	Date of Synchronization	Type of fuel used
1	HAZIRA CCPP EXT	1	351	GSEGL	GUJARAT	BHEL/GE frame-6	18-Feb-12	NATURAL GAS
2	PRAGATI CCGT-III	3	250	IPGPCL	DELHI	BHEL/GE	29-Feb-12	NATURAL GAS
3	RITHALA CCPP	3	36.5	NDPL	DELHI	Mitsubishi	04-Sep-11	NATURAL GAS
4.	LAKWA ST	8	37.2	APGPCL	ASSAM	BHEL	17-JAN-12	NATURAL GAS

Four Units of Vijeswaran CCPP, which earlier were captive plants, were now included in Gas based Thermal stations. The unit wise details are given below:

Sl. No	Name of Gas Turbine Station	Unit details	Capacity (MW)	Organization	State	Make	Date of Synchronization	Type of fuel used
1.	VIJESWARAN CCPP	2	33	APGCL	ANDHRA PRADESH	GE/BHEL	02-03-91	Natural Gas
2.	VIJESWARAN CCPP	3	34	APGCL	ANDHRA PRADESH	GE/BHEL	01-04-98	Natural Gas
3.	VIJESWARAN CCPP	4	112	APGCL	ANDHRA PRADESH	BHEL/BHEL	01-04-97	Natural Gas
4.	VIJESWARAN CCPP	5	60	APGCL	ANDHRA PRADESH	GE/BHEL	01-04-98	Natural Gas

10.5 LOSS OF GENERATION DUE TO SHORTAGE OF GAS/ RECEIPT OF LOW SCHEDULE:

In the past, the gas turbine power projects in the country faced difficulty in sourcing the supply of gas matching with their requirements resulting in the under utilization of the installed capacity. Some of the gas based units, using liquid fuel have also reported less generation on account of receipt of low schedules from the beneficiaries. The estimated loss of generation (corresponding to 90% PLF) due to shortage of gas/ receipt of low schedules from the beneficiaries during the period 2005-06 to 2011-12 is given as under:

Year	Estimated Loss of Generation in BU
05-06	23.88
06-07	26.33
07-08	31.17
08-09	33.71
09-10	25.02
10-11	28.27
11-12	36.71

Annexure- 10.1**LIST OF REGION WISE/ STATE WISE GAS TURBINE STATIONS AS ON 31ST MARCH, 2012**

Region/State	Central Sector			State Sector			Private Utility			Private IPP's			Total		
	No. of Stations	No. of Units	Installed Capacity	No. of Stations	No. of Units	Installed Capacity	No. of Stations	No. of Units	Installed Capacity	No. of Stations	No. of Units	Installed capacity	No. of Stations	No. of Units	Installed Capacity
NORTHERN REGION															
DELHI	0	0	0	3	15	1350.4	0	0	0	1	3	108	4	18	1458.4
HARYANA	1	3	431.59	0	0	0	0	0	0	0	0	0	1	3	431.59
JAMMU AND KASHMIR	0	0	0	1	7	175	0	0	0	0	0	0	1	7	175
RAJASTHAN	1	4	419.33	2	7	443.8	0	0	0	0	0	0	3	11	863.13
UTTAR PRADESH	2	12	1493.14	0	0	0	0	0	0	0	0	0	2	12	1493.14
TOTAL NORTHERN REGION	4	19	2344.06	6	29	1969.2	0	0	0	1	3	108	11	51	4421.26
WESTERN REGION															
GOA	0	0	0	0	0	0	0	0	0	1	1	48	1	1	48
GUJARAT	2	10	1313.59	4	14	1243.72	1	3	100	4	10	2477.5	11	37	5134.81
MAHARASHTRA	3	9	2220	1	6	672	1	2	180	0	0	0	5	17	3072
TOTAL WESTERN REGION	5	19	3533.59	5	20	1915.72	2	5	280	5	11	2525.5	17	55	8254.81
SOUTHERN REGION															
ANDHRA PRADESH	0	0	0	0	0	0	0	0	0	10	34	3098.4	10	34	3098.4
KERALA	1	3	359.58	0	0	0	0	0	0	1	4	174	2	7	533.58
PUDUCHERRY	0	0	0	1	1	32.5	0	0	0	0	0	0	1	1	32.5
TAMIL NADU	0	0	0	4	11	513.2	0	0	0	3	5	503.1	7	16	1016.3
TOTAL SOUTHERN REGION	1	3	359.58	5	12	545.7	0	0	0	14	43	3775.5	20	58	4680.78
EASTERN REGION															
JHARKHAND	1	3	90	0	0	0	0	0	0	0	0	0	1	3	90
WEST BENGAL	0	0	0	2	4	80	0	0	0	0	0	0	2	4	80
TOTAL EASTERN REGION	1	3	90	2	4	80	0	0	0	0	0	0	3	7	170
NORTH EASTERN REGION															
ASSAM	1	9	291	2	13	215	0	0	0	0	0	0	3	22	506
TRIPURA	1	4	84	2	10	148.5	0	0	0	0	0	0	3	14	232.5
TOTAL NORTH EASTERN REGION	2	13	375	4	23	363.5	0	0	0	0	0	0	6	36	738.5
ALL INDIA TOTAL	13	57	6702.23	22	88	4874.12	2	5	280	20	57	6409	57	207	18265.35

Annexure - 10.2**SECTOR-WISE DETAILS OF GAS TURBINE STATIONS DURING 2011-12**

Sl. No	Sector/ Organisation/ Station	Location	Type of fuel used	Unit Detail	Capacity (MW)	Make	Date of Synchroniz ation
CENTRAL SECTOR							
DVC							
1	MAITHON GT (Liq.)	JHARKHAND	High Speed Diesel				
				GT-1	30	GE	08-03-89
				GT-2	30	GE	13-03-89
				GT-3	30	GE	20-03-89
	MAITHON GT (Liq.) NEEPCO.				90		
2	AGARTALA GT	TRIPURA	Natural Gas				
				GT-1	21	BHEL	05-02-98
				GT-2	21	BHEL	25-02-98
				GT-3	21	BHEL	29-03-98
				GT-4	21	BHEL	26-06-98
	AGARTALA GT				84		
3	KATHALGURI CCPP	ASSAM	Natural Gas				
				GT-1	33.5	MITS/MITS	18-03-95
				GT-2	33.5	MITS/MITS	22-03-95
				GT-3	33.5	MITS/MITS	30-06-95
				GT-4	33.5	BHEL	30-07-95
				GT-5	33.5	BHEL	02-03-96
				GT-6	33.5	BHEL	15-10-96
				GT-6	33.5	BHEL	15-10-96
				GT-7	30	BHEL	01-03-98
				GT-8	30	BHEL	28-03-98
				GT-9	30	BHEL	05-07-98
	KATHALGURI CCPP NTPC Ltd.				291		
4	ANTA CCPP	RAJASTHAN	Natural Gas				
				GT-1	88.71	ABB	20-01-89
				GT-2	88.71	ABB	06-03-89
				GT-3	88.71	ABB	04-05-89
				ST-4	153.2	ABB	05-03-90
	ANTA CCPP				419.33		
5	AURAIYA CCPP	UTTAR PRADESH	Natural Gas				
				GT-1	111.19	Mitsubishi, Japan	29-03-89
				GT-2	111.19	Mitsubishi, Japan	21-07-89
				GT-3	111.19	Mitsubishi, Japan	09-08-89
				GT-4	111.19	Mitsubishi, Japan	29-09-89
				ST-5	109.3	Mitsubishi, Japan	29-12-89
				ST-6	109.3	Mitsubishi, Japan	12-06-90

Annexure - 10.2**SECTOR-WISE DETAILS OF GAS TURBINE STATIONS DURING 2011-12**

Sl. No	Sector/ Organisation/ Station	Location	Type of fuel used	Unit Detail	Capacity (MW)	Make	Date of Synchroniz ation
	AURAIYA CCPP				663.36		
6	DADRI CCPP	UTTAR PRADESH	Natural Gas				
				GT-1	130.19	SIEMENS	21-02-92
				GT-2	130.19	SIEMENS	26-03-92
				GT-3	130.19	SIEMENS	06-06-92
				GT-4	130.19	SIEMENS	14-10-92
				ST-5	154.51	BHEL	26-02-94
				ST-6	154.51	BHEL	27-03-94
	DADRI CCPP				829.78		
7	FARIDABAD CCPP	HARYANA	Natural Gas				
				GT-1	137.76	SIEMENS	18-10-99
				GT-2	137.76	SIEMENS	18-10-99
				ST-3	156.07	BHEL	31-07-00
	FARIDABAD CCPP				431.59		
8	GANDHAR CCPP	GUJARAT	Natural Gas				
				GT-1	144.3	ABB	17-03-94
				GT-2	144.3	ABB	31-03-94
				GT-3	144.3	ABB	20-05-94
				ST-4	224.49	ABB	30-03-95
	GANDHAR CCPP				657.39		
9	KAWAS CCPP	GUJARAT	Natural Gas				
				GT-1	106	EGT	22-03-92
				GT-2	106	EGT	25-05-92
				GT-3	106	EGT	30-06-92
				GT-4	106	EGT	27-08-92
				ST-5	116.1	GEC-Alstom	23-02-93
				ST-6	116.1	GEC-Alstom	19-03-93
	KAWAS CCPP				656.2		
10	R. GANDHI CCPP (Liq.)	KERALA	Naptha				
				GT-1	115.2	BHEL/GE	02-11-98
				GT-2	115.2	BHEL/GE	28-02-99
				GT-3	129.18	BHEL/GE	30-10-99
	R. GANDHI CCPP (Liq.)				359.58		
	RGPPPL						
11	RATNAGIRI CCPP I	MAHARASHT RA	Natural Gas				
				GT-1	240	GE	12-11-98
				GT-2	240	GE	12-11-98
				GT-3	260	GE	12-11-98
	RATNAGIRI CCPP I				740		
12	RATNAGIRI CCPP II	MAHARASHT RA	Natural Gas				
				GT-1	240	GE	30-04-06
				GT-2	240	GE	14-05-06
				GT-3	260	GE	07-05-06
	RATNAGIRI CCPP II				740		
13	RATNAGIRI CCPP III	MAHARASHT RA	Natural Gas				

Annexure - 10.2**SECTOR-WISE DETAILS OF GAS TURBINE STATIONS DURING 2011-12**

Sl. No	Sector/ Organisation/ Station	Location	Type of fuel used	Unit Detail	Capacity (MW)	Make	Date of Synchroniz ation
				GT-1	240	GE	28-10-07
					GT-2	240	GE
	RATNAGIRI CCPP III				740		
	STATE SECTOR						
	APGPCL						
14	LAKWA GT	ASSAM	Natural Gas				
				GT-1	15	WH	27-04-81
				GT-2	15	MITA	02-08-81
				GT-3	15	WH	29-07-83
				GT-4	15	GE	06-10-86
				GT-5	20	GE	03-01-94
				GT-6	20	GE	21-07-94
				GT-7	20	GE	28-05-95
				ST-8	0	BHEL	17-01-12
	LAKWA GT				120		
15	NAMRUP CCPP	ASSAM	Natural Gas				
				GT-1	20	BHEL	01-04-87
				GT-2	21	BHEL	01-07-87
				GT-3	21	BHEL	01-07-87
				GT-4	11	BHEL	01-04-92
				ST-6	22	BHEL	27-03-85
	NAMRUP CCPP				95		
	GSECL						
16	DHUVARAN CCPP	GUJARAT	Natural Gas				
				GT-1	67.85	BHEL	04-06-03
				ST-2	38.77	BHEL	22-09-03
				GT-3	72	BHEL	17-03-06
				GT-4	40	BHEL	13-08-07
	DHUVARAN CCPP				218.62		
17	UTRAN CCPP	GUJARAT	Natural Gas				
				GT-1	33	GE	17-12-92
				GT-2	33	GE	28-12-92
				GT-3	33	GE	07-05-93
				ST-4	45	BHEL	17-07-93
				GT-5	240	ALSTOM	08-08-09
				ST-6	134	ALSTOM	10-10-09
	UTRAN CCPP				518		
	GSEGL						
18	HAZIRA CCPP	GUJARAT	Natural Gas				
				GT-1	52	ALSTOM	30-09-01
				GT-2	52	ALSTOM	30-09-01
				GT-3	52.1	ALSTOM	30-09-01
	HAZIRA CCPP				156.1		
19	HAZIRA CCPP EXT	GUJARAT	Natural Gas				
				GT-1	351	BHEL/GE	18-02-12

Annexure - 10.2**SECTOR-WISE DETAILS OF GAS TURBINE STATIONS DURING 2011-12**

Sl. No	Sector/ Organisation/ Station	Location	Type of fuel used	Unit Detail	Capacity (MW)	Make	Date of Synchroniz ation
	HAZIRA CCPP EXT				351		
	IPGPCL						
20	I.P.CCPP	DELHI	Natural Gas				
				GT-1	30	ALSTOM	28-05-86
				GT-2	30	ALSTOM	24-06-86
				GT-3	30	ALSTOM	31-07-86
				GT-4	30	ALSTOM	10-09-86
				GT-5	30	ALSTOM	15-11-86
				GT-6	30	ALSTOM	14-05-86
				ST-7	30	BHEL	29-03-95
				ST-8	30	BHEL	31-10-95
				ST-9	30	BHEL	26-03-96
21	PRAGATI CCGT-III	DELHI	Natural Gas				
				GT-1	250	BHEL/GE	24-10-10
				GT-2	250	BHEL/GE	17-02-11
				ST-3	250	BHEL/GE	29-02-12
	PRAGATI CCGT- III				750		
22	PRAGATI CCPP	DELHI	Natural Gas				
				GT-1	104.6	GE	15-03-02
				GT-2	104.6	GE	09-11-02
				ST-3	121.2	GE	31-01-03
	PRAGATI CCPP JK, PDD				330.4		
23	PAMPORE GPS (Liq.)	JAMMU AND KASHMIR	High Speed Diesel				
				GT-1	25	GE/BHEL	31-03-89
				GT-2	25	GE/BHEL	20-07-89
				GT-3	25	GE/BHEL	11-12-89
				GT-4	25	GE/BHEL	07-01-94
				GT-5	25	GE/BHEL	07-02-94
				GT-6	25	GE/BHEL	04-04-94
				GT-7	25	GE/BHEL	30-03-95
	PAMPORE GPS (Liq.)				175		
	MAHAGENCO						
24	URAN CCPP	MAHARASH TRA	Natural Gas				
				GT-5	108	KWU	01-04-86
				GT-6	108	KWU	01-04-86
				GT-7	108	KWU	01-04-86
				GT-8	108	KWU	01-04-86
				GT-9	120	SIEMENS,G ERMANY	16-03-94
				GT-10	120	SIEMENS,G ERMANY	28-10-94
	URAN CCPP P&ED, Pudu.				672		
25	KARAIKAL CCPP	PUDUCHERR Y	Natural Gas				
				GT-1	32.5	BHEL	02-07-99

Annexure - 10.2**SECTOR-WISE DETAILS OF GAS TURBINE STATIONS DURING 2011-12**

Sl. No	Sector/ Organisation/ Station	Location	Type of fuel used	Unit Detail	Capacity (MW)	Make	Date of Synchroniz ation
	KARAIKAL CCPP				32.5		
	RRVUNL						
26	DHOLPUR CCPP	RAJASTHAN	Natural Gas				
				GT-1	110	BHEL	29-03-07
				GT-2	110	BHEL	16-06-07
				ST-3	110	BHEL	27-12-07
	DHOLPUR CCPP				330		
27	RAMGARH CCPP	RAJASTHAN	Natural Gas				
				GT-1	3	Import by HAL BHEL	15-11-94
				GT-2	35.5	Import by HAL BHEL	12-01-96
				GT-3	37.5	Import by HAL BHEL	07-08-02
				ST-4	37.8	Import by HAL BHEL	31-03-03
	RAMGARH CCPP				113.8		
	TNGDCL						
28	BASIN BRIDGE GT (Liq.)	TAMIL NADU	Naptha				
				GT-1	30	SUMITOMO AND ABB	12-02-96
				GT-2	30	SUMITOMO AND ABB	25-02-96
				GT-3	30	BHEL	01-04-98
				GT-4	30	BHEL	01-04-98
	BASIN BRIDGE GT (Liq.)				120		
29	KOVIKALPAL CCPP	TAMIL NADU	Natural Gas				
				GT-1	107	GE	05-02-01
	KOVIKALPAL CCPP				107		
30	KUTTALAM CCPP	TAMIL NADU	Natural Gas				
				GT-1	63	GE	27-11-03
				GT-2	37	GE	24-03-04
	KUTTALAM CCPP				100		
	RRVUNL						
31	VALUTHUR CCPP	TAMIL NADU	Natural Gas				
				GT-1	60	ANSALDO ENERGIA	24-12-02
				ST-2	34	ANSALDO ENERGIA	06-05-08
				GT-3	59.8	BGR ENERGY SYSTEMS	13-03-03
				ST-4	32.4	BGR ENERGY SYSTEMS	31-08-08
	VALUTHUR CCPP				186.2		
	TSECL						

Annexure - 10.2**SECTOR-WISE DETAILS OF GAS TURBINE STATIONS DURING 2011-12**

Sl. No	Sector/ Organisation/ Station	Location	Type of fuel used	Unit Detail	Capacity (MW)	Make	Date of Synchroniz ation
32	BARAMURA GT	TRIPURA	Natural Gas				
				GT-4	37.5	BHEL	27-11-02
				GT-5	21	BHEL	03-08-10
	BARAMURA GT				58.5		
33	ROKHIA GT	TRIPURA	Natural Gas				
				GT-1	8	BHEL	21-03-90
				GT-2	8	BHEL	26-11-90
				GT-3	8	BHEL	16-07-95
				GT-4	8	BHEL	15-12-95
				GT-5	8	BHEL	02-03-97
				GT-6	8	BHEL	01-09-97
				GT-7	21	BHEL	11-07-02
				GT-8	21	BHEL	31-03-06
	ROKHIA GT WBPDC				90		
34	HALDIA GT (Liq.)	WEST BENGAL	High Speed Diesel				
				GT-1	20	John Brown, UK	04-10-79
	HALDIA GT (Liq.)				40		
35	KASBA GT (Liq.)	WEST BENGAL	Naptha				
				GT-1	20	John Brown, UK	01-04-91
				GT-2	20	John Brown UK	01-04-91
	KASBA GT (Liq.)				40		
	PRIVATE UTILITY TATA PCL						
36	TROMBAY CCPP	MAHARASHT RA	Natural Gas				
				GT-1	120	SIEMENS, GERMANY	29-07-93
				GT-2	60	SIEMENS, GERMANY	09-12-94
	TROMBAY CCPP TOR. POW. (AECO)				180		
37	VATWA CCPP						
				GT-1	33	BHEL	29-12-90
				GT-2	33	BHEL	26-06-91
				ST-3	34	BHEL	18-10-91
	VATWA CCPP IPP ABAN POWR				100		
38	KARUPPUR CCPP	TAMIL NADU	Natural Gas				
				GT-1	70	GE	18-02-05
				ST-2	49.8	SIEMENS	15-07-05
	KARUPPUR CCPP				119.8		

Annexure - 10.2**SECTOR-WISE DETAILS OF GAS TURBINE STATIONS DURING 2011-12**

Sl. No	Sector/ Organisation/ Station	Location	Type of fuel used	Unit Detail	Capacity (MW)	Make	Date of Synchroniz ation
	APGCL						
39	VIJESWARAN CCPP	ANDHRA PRADESH	Natural Gas				
				GT-2	33	GE/BHEL	02-03-91
				GT-3	34	GE/BHEL	01-04-98
				GT-4	112	BHEL/BHEL	01-04-97
				GT-5	60	GE/BHEL	01-04-98
	VIJESWARAN CCPP				0		
	BSES(C)						
40	COCHIN CCPP (Liq.)	KERALA	Naptha				
				GT-1	45	GE	06-06-99
				GT-2	45	GE	06-06-99
				ST-3	39	BHEL	06-06-99
				GT-4	45	GE	06-06-99
	COCHIN CCPP (Liq.)				174		
	BSES(P)						
41	PEDDAPURAM CCPP	ANDHRA PRADESH	Natural Gas				
				GT-1	142	ANSALDO ENERGIA	26-01-02
				ST-2	78	ANSALDO ENERGIA	12-09-02
	PEDDAPURAM CCPP				220		
	ESSAR						
42	ESSAR CCPP	GUJARAT	Natural Gas				
				GT-1	515	GE	10-08-95
	ESSAR CCPP				515		
	GAUTAMI						
43	GAUTAMI CCPP	ANDHRA PRADESH	Natural Gas				
				GT-1	145	ALSTOM	03-05-09
				GT-2	145	ALSTOM	03-05-09
				ST-3	174	ALSTOM	03-05-09
	GAUTAMI CCPP				464		
	GIPCL						
44	BARODA CCPP	GUJARAT	Natural Gas				
				GT-5	106	BHEL	26-08-97
				ST-6	54	BHEL	18-11-97
	BARODA CCPP				160		
	GMR ENERG						
45	GMR Energy Ltd - Kakinada	ANDHRA PRADESH					
				GT-1	42.5	HDEC	08-05-01
				GT-2	42.5	HDEC	08-05-01
				GT-3	42.5	HDEC	08-05-01
				GT-4	42.5	HDEC	08-05-01
				ST-5	50	ABB	08-05-01
	GMR Energy Ltd - Kakinada				220		

Annexure - 10.2**SECTOR-WISE DETAILS OF GAS TURBINE STATIONS DURING 2011-12**

Sl. No	Sector/ Organisation/ Station	Location	Type of fuel used	Unit Detail	Capacity (MW)	Make	Date of Synchroniz ation
	GTE CORP						
46	PEGUTHAN CCPP	GUJARAT	Natural Gas				
				GT-1	135	SIEMENS GERMANY	01-04-98
				GT-2	135	SIEMENS GERMANY	01-04-98
				GT-3	135	SIEMENS GERMANY	14-02-98
				ST-4	250	SIEMENS GERMANY	13-10-98
	PEGUTHAN CCPP				655		
	GVKP&IL						
47	JEGURUPADU CCPP	ANDHRA PRADESH	Natural Gas				
				GT-1	52.8	ALSTOM	04-07-96
				GT-2	52.8	ALSTOM	26-10-96
				GT-3	52.8	ALSTOM	11-12-96
				ST-4	77	ALSTOM	01-04-98
				GT-5	140	ALSTOM	09-10-05
				ST-6	80	ALSTOM	11-11-05
	JEGURUPADU CCPP				455.4		
48	KONASEEMA CCPP	ANDHRA PRADESH	Natural Gas				
				GT-1	140	L&T AND LMZE	01-05-09
				GT-2	140	L&T AND LMZE	01-05-09
				ST-3	165	LMZE	30-06-10
	KONASEEMA CCPP				445		
	KONDAPALI						
49	KONDAPALLI EXTN CCPP .	ANDHRA PRADESH	Natural Gas				
				GT-1	233	GE	05-12-09
				ST-2	133	GE	19-07-10
	KONDAPALLI EXTN CCPP .				366		
50	KONDAPALLI CCPP	ANDHRA PRADESH	Natural Gas				
				GT-1	112	GE	22-06-00
				GT-2	112	GE	22-06-00
				ST-3	126	GE	22-06-00
	KONDAPALLI CCPP				350		
	NDPL						
51	RITHALA CCPP	DELHI	Natural Gas				
				GT-1	35.75	GE Frame- 6	09-12-10
				GT-2	35.75	GE Frame- 6	04-10-10
				ST-3	36.5	Mitsubishi HI	04-09-11
	RI THALA CCPP				108		

Annexure - 10.2**SECTOR-WISE DETAILS OF GAS TURBINE STATIONS DURING 2011-12**

Sl. No	Sector/ Organisation/ Station	Location	Type of fuel used	Unit Detail	Capacity (MW)	Make	Date of Synchroniz ation
52	VALANTARVY CCPP	TAMIL NADU	Natural Gas				
				GT-1	38	BHEL- GE/Fr6B	30-09-04
				ST-2	14.8	Siemens	30-11-04
	VALANTARVY CCPP				52.8		
	PPNPGCL						
53	P.NALLUR CCPP	TAMIL NADU	Natural Gas				
				GT-1	330.5	Mitsubishi HI	22-02-01
	P.NALLUR CCPP				330.5		
	RELIANCE						
54	GOA CCPP (Liq.)	GOA	Naptha				
				GT-1	48	GE/BHEL	14-08-99
	GOA CCPP (Liq.)				48		
	SPGL						
55	GODAVARI CCPP	ANDHRA PRADESH	Natural Gas				
				GT-1	47	SIEMENS	09-01-97
				GT-2	47	SIEMENS	01-04-98
				GT-3	47	SIEMENS	01-04-98
				ST-4	67	PARSONS	31-03-98
	GODAVARI CCPP				208		
	TOR. POW. (SUGEN)						
56	SUGEN CCPP	GUJARAT	Natural Gas				
				GT-1	382.5	SIEMENS	04-02-09
				GT-2	382.5	SIEMENS	07-05-09
				GT-3	382.5	SIEMENS	08-06-09
	SUGEN CCPP				1147.5		
	VEMAGIRI						
57	VEMAGIRI CCPP	ANDHRA PRADESH	Natural Gas				
				GT-1	233	CEC,USA	13-01-06
				ST-2	137	ALSTOM	08-06-06
	VEMAGIRI CCPP				370		
	TOTAL ALL INDIA				18265.4		

Note: 1. The total all India generation excludes generation of 241.59 MU from GIPCL Import and 0.00 MU from Namrup ST (Gas fired steam turbine unit of capacity 24 MW).

2. The list exclude generation from Lakwa ST U#8 Capacity 37.2MW and Vijeshwaran U#2(33MW), U#3 (34MW), U#4 (112MW), U#5 (60MW)

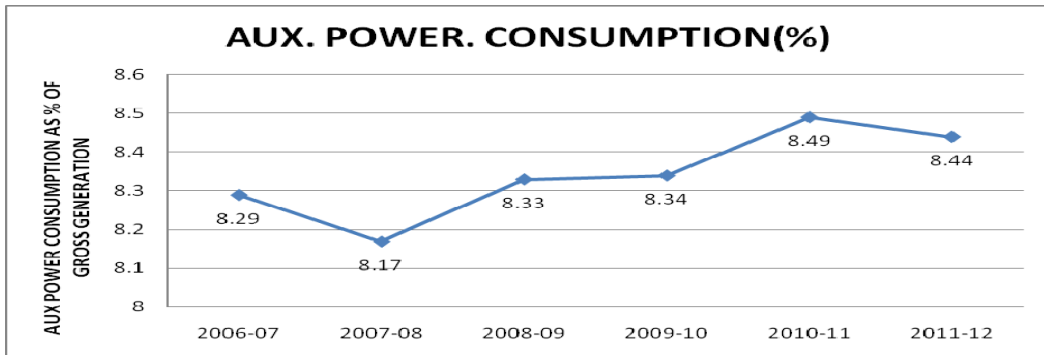
SECTION -11

AUXILIARY POWER CONSUMPTION IN THERMAL POWER STATIONS

Auxiliary power consumption by the thermal stations comprises the power consumption by all the unit auxiliaries as well as the common station requirement such as station lighting, air conditioning etc. The All India average auxiliary power consumption by the thermal stations during 2011-12 reduced to 8.44% with 8.49% during 2010-11.

The auxiliary power consumption by thermal power stations as percentage of gross generation from 2007-08 onwards is shown below:

ALL INDIA AUX. POWER CONSUMPTION AS % OF GROSS GENERATION



11.1 REGION-WISE AUXILIARY POWER CONSUMPTION

The region-wise auxiliary power consumption as percentage of gross generation from 2007-08 onwards is shown below: -

REGION	% AGE AUXILIARY POWER CONSUMPTION				
	2007-08	2008-09	2009-10	2010-11	2011-12
NORTHERN	8.57	8.79	8.60	8.75	8.52
WESTERN	7.95	8.00	8.23	8.53	8.72
SOUTHERN	8.19	8.06	7.77	7.84	8.17
EASTERN	7.98	8.53	8.84	8.78	8.16
ALL-INDIA	8.17	8.33	8.34	8.49	8.44

11.2 SECTOR-WISE AUXILIARY POWER CONSUMPTION

During 2011-12, Sector-wise auxiliary power consumption have gone upwards in Private IPPs sectors. While the auxiliary consumption of central sector utilities (6.75%) and of Pvt. Utilities were below the national average of 8.5%, it was above the national average for State Sector utilities (9.62%) and Pvt. IPPs (10.16%). The Sector-wise auxiliary power consumption as percentage of gross generation from 2007-08 onwards is shown below: -

REGION	% AGE AUXILIARY POWER CONSUMPTION				
	2007-08	2008-09	2009-10	2010-11	2011-12
Central Sector	7.15	7.09	7.12	7.14	6.75
State Sector	9.17	9.43	9.40	9.68	9.62
Private Utilities	6.94	7.53	7.30	7.58	7.62
Private IPPs	-	-	9.44	9.51	10.16
ALL-INDIA	8.17	8.33	8.34	8.49	8.44

Note: Pvt. IPPs were reviewed from 2009-10 onwards.

11.3 STATIONWISE AUXILIARY POWER CONSUMPTION

Following 43 Stations aggregating to capacity 41860 MW were having auxiliary power consumption below National Average of 8.44 % as per details given below:

Sl. No.	STATION	CAPACITY (MW)	UTILITY	SECTOR	% AUX. CONSUMPTION
1	RAJIV GANDHI TPS	1200	HPGCL	STATE	3.12
2	SIPAT STPS	1660	NTPC Ltd.	CENTRAL	3.24
3	SIMHADRI	1500	NTPC Ltd.	CENTRAL	5.06
4	TALCHER STPS	3000	NTPC Ltd.	CENTRAL	5.42
5	TROMBAY TPS	1400	TATA PCL	PVT	5.47
6	VINDHYACHAL STPS	3260	NTPC Ltd.	CENTRAL	5.55
7	DADRI (NCTPP)	1820	NTPC Ltd.	CENTRAL	5.68
8	RAMAGUNDEM STPS	2600	NTPC Ltd.	CENTRAL	5.74
9	KORBA STPS	2600	NTPC Ltd.	CENTRAL	5.77
10	RIHAND STPS	2000	NTPC Ltd.	CENTRAL	5.97
11	BELLARY TPS	500	KPCL	STATE	6.14
12	MAITHON RB TPP	525	MPL	IPP	6.27
13	FARAKKA STPS	1600	NTPC Ltd.	CENTRAL	6.29
14	SINGRAULI STPS	2000	NTPC Ltd.	CENTRAL	6.51
15	CHANDRAPURA(DVC) TPS	890	DVC	CENTRAL	6.61
16	PARAS TPS	null	MAHAGENCO	STATE	6.66
17	INDIRA GANDHI STPP	500	APCPL	CENTRAL	6.79
18	DSPM TPS	500	CSPGCL	STATE	6.82
19	TORANGALLU TPS(SBU-I)	260	JSWEL	IPP	7.13
20	KAHALGAON TPS	2340	NTPC Ltd.	CENTRAL	7.33
21	KOTHAGUDEM TPS (NEW)	1000	APGENCO	STATE	7.39
22	UDUPI TPP	600	UPCL	IPP	7.54
23	KAKATIYA TPS	500	APGENCO	STATE	7.56
24	NEYVELI TPS-II	1470	NLC	CENTRAL	7.57
25	NEYVELI (EXT) TPS	420	NLC	CENTRAL	7.61
26	UNCHAHAHAR TPS	1050	NTPC Ltd.	CENTRAL	7.64
27	GH TPS (LEH.MOH.)	920	PSPCL	STATE	7.78
28	Dr. N.TATA RAO TPS	1760	APGENCO	STATE	7.87
29	TUTICORIN TPS	1050	TNGDCL	STATE	7.95
30	TORANGALLU TPS(SBU-II)	600	JSWEL	IPP	7.98
31	NEYVELI TPS(Z)	250	ST-CMSECP	IPP	8.00
32	METTUR TPS	840	TNGDCL	STATE	8.00
33	ROSA TPP Ph-I	900	RPSCL	IPP	8.22
34	BADARPUR TPS	705	NTPC Ltd.	CENTRAL	8.23
35	BAKRESWAR TPS	1050	WBPDCL	STATE	8.24
36	BUDGE BUDGE TPS	750	CESC	PVT	8.25
37	ANPARA TPS	1630	UPRVUNL	STATE	8.31

Sl. No.	STATION	CAPACITY (MW)	UTILITY	SECTOR	% AUX. CONSUMPTION
38	BARSINGSAR LIGNITE	250	NLC	CENTRAL	8.32
39	NORTH CHENNAI TPS	630	TNGDCL	STATE	8.34
40	TITAGARH TPS	240	CESC	PVT	8.34
41	KOTHAGUDEM TPS	720	APGENCO	STATE	8.36
42	RAMAGUNDEM - B TPS	62	APGENCO	STATE	8.39
43	ROPAR TPS	1260	PSPCL	STATE	8.43

- 18 Central Sector Stations (13 from NTPC and 3 from NLC one each of DVC and APCPL), 16 State Sector Stations (5 of APGENCO, 3 of TNGDCL and 2 of PSPCL and one each of CSPGCL, KPCL, MAHAGENCO, HPGCL, WBPDC and UPRVUNL), 3 Pvt Utilities Stations (2 of CESC and 1 of Tata PCL) and 6 IPPs (2 of JSW Energy Ltd. and one each of MPL, RPSCL, UPCL and ST-CMSECP) achieved better auxiliary consumption as compared with the national average.
- Lowest auxiliary power consumption (3.12%) was achieved by the Rajeev Gandhi Station (STATE SECTOR) of HPGCL followed by Sipat STPS of NTPC (3.24%).

Details of thermal power stations having auxiliary consumption above National Average of 8.44% were as under:

Auxiliary Consumption (%)	No of Stations	Station Names
More than 15%	10	JSW RATNAGIRI TPP, ENNORE TPS, BARAUNI TPS, OBRA TPS, AKRIMOTA LIG TPS, PATRATU TPS, SURAT LIG. TPS, NEVELI TPS-I, CHHABRA TPP, GIRAL TPS
More than 12% but < or =15%	8	NEW COSSIPORE TPS, RAICHUR TPS, PANKI TPS, RAJGHAT TPS, WARDHA WARORA TPP, HARDUAGANJ TPS, KUTCH LIG. TPS, MUZAFFARPUR TPS
More than 11% but < or =12%	12	BHUSAWAL TPS, GND TPS(BHATINDA), SIKKA REP. TPS, JALIPA KAPURDI TPP, BANDEL TPS, YAMUNA NAGAR TPS, PARICHHA TPS, BOKARO `B` TPS, SAGARDIGHI TPS, PARLI TPS, KORBA-II, KORADI TPS
More than 10% but < or =11%	11	PARAS TPS, SANJAY GANDHI TPS, PATHADI TPP, KOLAGHAT TPS, MEJIA TPS, IB VALLEY TPS, PANIPAT TPS, TANDA TPS, NASIK TPS, DURGAPUR TPS, SATPURA TPS
More than 9% but < or =10%	17	SABARMATI (D-F STATIONS), TENUGHAT TPS, SABARMATI (C STATION), OP JINDAL TPS, SOUTHERN REPL. TPS, MUNDRA TPS, KOTA TPS, AMARKANTAK EXT TPS, KORBA-III, KORBA-WEST TPS, CHANDRAPUR(MAHARASHTRA) STPS, KHAPARKHEDA TPS, RAYALASEEMA TPS, SANTALDIH TPS, TALCHER (OLD) TPS, KATGHORA TPP, JOJOBERA TPS
More than National Average but < or =9%	7	WANAKBORI TPS, DAHANU TPS, STERLITE TPP, SURATGARH TPS, BHILAI TPS, UKAI TPS, GANDHI NAGAR TPS

Details of Station wise auxiliary power consumption from 2007-08 onwards are given at the Annex. 11.1.

11.4 CAPACITY GROUPWISE AUXILIARY POWER CONSUMPTION

490-600 MW capacity group units registered minimum auxiliary power consumption (6.45%) followed by 25-99 MW (12.21%) capacity group units. For units of capacity below 100 MW, it was maximum. Capacity group wise auxiliary power consumption from 2008-09 onwards is given below:

CAPACITY GROUP (in MW)	% AGE AUXILIARY POWER CONSUMPTION			
	2008-09	2009-10	2010-11	2011-12
660-800	-	-	-	8.08
490-600	6.18	6.37	6.50	6.45
300-330	10.41	9.73	9.54	10.45
250-250	9.14	8.50	8.78	9.10
210-210	8.84	8.88	9.00	8.91
195-200	7.72	7.78	8.15	8.30
100-150	10.88	10.78	11.00	11.41
25-99	10.82	10.86	10.98	12.21
ALL INDIA	8.33	8.34	8.49	8.44

11.5 MAKE - WISE AUXILIARY POWER CONSUMPTION

Auxiliary power consumption of BHEL/BHEL make units was minimum (8.29%). Make wise auxiliary power consumption from 2007-08 onwards are as under.

MAKE	% AGE AUXILIARY POWER CONSUMPTION				
	2007-08	2008-09	2009-10	2010-11	2011-12
BHEL/BHEL	8.06	8.14	8.17	8.32	8.29
ABL / BHEL	9.90	10.13	9.80	10.34	10.48
RUSSIA/RUSSIA	8.15	8.21	8.06	8.25	9.97
CHINA/CHINA	NA	10.41	9.79	9.69	10.12
OTHER MAKES	8.44	8.78	8.82	8.42	7.77

Annexure- 11.1

Sheet _ of 5

STATIONWISE AUXILIARY POWER CONSUMPTION IN THERMAL POWER STATIONS FROM 2007-08 TO 2011-12

STATION'S NAME	% AGE AUXILIARY POWER CONSUMPTION				
	2007-08	2008-09	2009-10	2010-11 ^s	2011-12
I. CENTRAL SECTOR					
BADARPUR TPS	9.23	9.18	8.37	9.09	8.23
SINGRAULI STPS	6.96	7.08	7.16	10.75	6.51
RIHAND STPS	6.57	6.42	6.56	11.51	5.97
UNCHAHAHAR TPS	8.04	7.97	7.94	10.81	7.64
DADRI (NCTPP)	7.23	7.34	7.26	10.68	5.68
TANDA TPS	10.76	11.76	11.31	13.86	10.65
KORBA STPS	6.07	5.86	6.18	13.86	5.77
SIPAT STPS	NA	5.04	5.61	12.33	3.24
VINDHYACHAL STPS	6.23	6.15	5.98	7.31	5.55
RAMAGUNDEM STPS	6.19	5.84	5.67	9.28	5.74
SIMHADRI	5.92	5.28	5.45	8.75	5.06
KAHALGAON TPS	8.18	7.49	7.97	8.34	7.33
TALCHER (OLD) TPS	9.92	9.91	10.44	8.34	9.9
TALCHER STPS	5.34	5.56	5.72	8.61	5.42
FARAKKA STPS	6.73	6.97	7.37	7.22	6.29
NTPC Ltd. TOTAL	6.67	6.57	6.62	6.60	6.03
CHANDRAPURA(DVC) TPS	10.12	9.44	9.27	8.38	6.61
DURGAPUR TPS	10.62	10.06	10.49	6.99	10.78
BOKARO `B` TPS	10.42	11.35	10.71	11.48	11.65
MEJIA TPS	10.04	10.80	10.86	6.30	10.23
DVC TOTAL	10.22	10.61	10.54	5.48	9.89
MUZAFFARPUR TPS	-	15.32	13.76	6.11	14.32
K.B.U.N.L TOTAL	-	15.32	13.76	5.74	14.32
BARSINGSAR LIGNITE	0.0	0.0	0.0	0.0	8.32
NEYVELI TPS- I	11.76	12.02	11.44	5.43	21.71
NEYVELI TPS-II	8.81	9.05	8.66	7.57	7.57
NEYVELI (EXT) TPS	8.64	8.44	8.84	10.50	7.61
NLC TOTAL	9.40	9.60	9.34	5.85	10.65
BHILAI TPS	-	-	7.77	6.62	8.89
NSPCL TOTAL	-	-	7.77	6.67	8.89
CENTRAL TOTAL	7.15	7.09	7.12	7.14	6.75
INDIRA GANDHI STPP	500	0.0	0.0	0.0	6.79
APCPL TOTAL	500	0.0	0.0	0.0	6.79
II. STATE SECTOR					
KOTHAGUEM TPS	9.32	9.32	8.96	8.85	8.36
KOTHAGUEM TPS (NEW)	NA	10.30	8.45	8.57	7.39

STATION'S NAME	% AGE AUXILIARY POWER CONSUMPTION				
	2007-08	2008-09	2009-10	2010-11 ^s	2011-12
Dr. N.TATA RAO TPS	8.83	8.65	8.41	7.73	7.87
RAMAGUNDEM - B TPS	9.89	9.81	10.01	9.40	8.39
KAKATIYA TPS	-	-	-	6.62	7.56
RAYALASEEMA TPS	9.88	9.04	9.00	9.66	9.80
APGENCO TOTAL	9.23	9.13	8.69	8.46	8.29
CHANDRAPUR(ASSAM) TPS*	0.00	0.00	0.00	0.00	0.0
APGPCL TOTAL	1.89	0.00	0.00	0.00	0.0
BARAUNI TPS	9.40	11.77	14.20	16.95	15.49
BSEB TOTAL	8.64	11.77	14.20	16.95	15.49
KORBA-II	10.79	11.29	11.38	11.78	11.79
KORBA-III	8.49	9.71	10.34	9.64	9.64
DSPM TPS	8.58	7.20	7.74	7.55	6.82
KORBA-WEST TPS	9.09	8.75	8.77	8.64	9.65
CSPGCL TOTAL	9.22	8.71	8.93	8.72	9.19
D.P.L. TPS*	10.70	11.66	13.29	14.10	0.0
DPL TOTAL	10.70	11.66	13.29	14.10	0.0
AKRIMOTA LIG TPS	15.53	16.10	14.07	15.92	17.43
GMDCL TOTAL	15.53	16.10	14.07	15.92	17.43
UKAI TPS	8.80	8.49	7.60	9.56	8.96
GANDHI NAGAR TPS	9.94	9.64	9.20	9.63	8.99
WANAKBORI TPS	8.28	7.05	8.35	8.42	8.49
SIKKA REP. TPS	10.20	10.89	10.36	11.37	11.27
KUTCH LIG. TPS	11.03	12.03	12.33	13.88	14.23
GSECL TOTAL	9.06	8.54	8.81	9.43	9.19
PANIPAT TPS	9.70	9.54	9.76	10.22	10.56
YAMUNA NAGAR TPS	-	8.62	9.29	9.67	11.55
RAJIV GANDHI TPS	0.0	0.0	0.0	0.0	3.12
HPGCL TOTAL	10.03	9.54	9.87	10.06	9.91
RAJGHAT TPS	13.09	13.49	14.02	11.74	12.58
IPGPCL TOTAL	13.34	13.97	14.60	11.74	12.58
PATRATU TPS	11.75	12.33	12.75	12.56	19.93
JSEB TOTAL	11.75	12.33	12.75	12.56	19.93
RAICHUR TPS	8.73	8.60	8.74	9.68	12.08
BELLARY TPS	-	7.32	5.46	5.70	6.14
KPCL TOTAL	8.73	8.47	8.03	8.73	10.74
NASIK TPS	8.90	9.68	9.69	10.37	10.69
KORADI TPS	10.10	10.97	12.62	12.94	11.96
KHAPARKHEDA TPS	8.72	9.00	9.19	9.73	9.69
PARAS TPS	8.89	13.45	10.80	10.55	10.11
BHUSAWAL TPS	10.08	10.88	10.58	12.07	11.07
PARLI TPS	10.12	11.96	12.31	11.44	11.72
CHANDRAPUR(MAHARASHTRA) STPS	7.40	7.95	8.43	10.03	9.65
MAHAGENCO TOTAL	8.71	9.55	9.93	10.72	10.39
SATPURA TPS	8.80	9.59	10.23	10.12	10.87

STATION'S NAME	% AGE AUXILIARY POWER CONSUMPTION				
	2007-08	2008-09	2009-10	2010-11 ^s	2011-12
AMARKANTAK EXT TPS	11.54	12.53	8.83	9.92	9.63
SANJAY GANDHI TPS	9.79	8.21	8.67	8.18	10.18
MPPGCL TOTAL	9.45	9.16	9.31	9.14	10.34
IB VALLEY TPS	9.33	10.35	10.07	10.47	10.42
OPGC TOTAL	9.33	10.35	10.07	10.47	10.42
GND TPS(BHATINDA)	10.31	11.06	10.94	11.51	11.1
GH TPS (LEH.MOH.)	8.25	7.12	6.43	7.98	7.78
ROPAR TPS	8.35	8.34	8.14	8.11	8.43
PSPCL TOTAL	8.69	8.39	7.88	8.39	8.44
KOTA TPS	9.34	9.37	9.78	9.64	9.59
SURATGARH TPS	9.12	10.17	9.14	9.29	8.79
GIRAL TPS	8.64	19.30	18.60	19.37	25.5
CHHABRA TPP	-	-	-	11.56	21.71
RRVUNL TOTAL	9.21	10.00	9.61	9.70	10.44
ENNORE TPS	11.05	14.57	14.32	15.62	15.22
TUTICORIN TPS	7.99	7.94	8.09	8.29	7.95
METTUR TPS	8.12	8.09	7.64	8.45	8.0
NORTH CHENNAI TPS	8.90	8.67	8.89	8.87	8.34
TNGDCL TOTAL	8.52	8.76	8.61	9.01	8.38
TENUGHAT TPS	10.48	8.83	9.94	10.42	9.12
TVNL TOTAL	10.48	8.83	9.94	10.42	9.12
OBRA TPS	10.96	12.13	11.59	14.01	17.04
PANKI TPS	13.27	12.42	12.81	13.63	12.34
HARDUAGANJ TPS	15.09	16.06	14.79	15.27	13.34
PARICHHA TPS	9.19	12.45	12.42	12.96	11.64
ANPARA TPS	8.60	8.65	8.07	7.87	8.31
UPRVUNL TOTAL	9.74	10.50	10.06	10.45	10.96
BANDEL TPS	8.59	9.97	10.25	10.79	11.51
SANTALDIH TPS	11.89	11.60	12.52	10.34	9.9
KOLAGHAT TPS	9.96	10.36	10.33	10.44	10.21
BAKRESWAR TPS	7.48	9.75	10.36	10.66	8.24
SAGARDIGHI TPS	-	12.57	11.68	11.55	11.69
WBPDC TOTAL	9.21	10.48	10.68	10.73	9.89
STATE TOTAL	9.17	9.43	9.40	9.68	9.62
III. PVT UTILITY					
NEW COSSIPORE TPS	9.07	9.55	10.29	10.68	12.03
TITAGARH TPS	8.41	8.60	8.32	8.11	8.34
SOUTHERN REPL. TPS	8.85	8.94	9.07	9.30	9.22
BUDGE BUDGE TPS	8.03	7.99	8.27	8.60	8.25
CESC TOTAL	NA	8.36	8.50	8.67	8.48
DAHANU TPS	8.24	9.01	8.80	8.62	8.64
RIL (DAHANU) TOTAL	8.24	9.01	8.80	8.62	8.64
TROMBAY TPS	4.30	4.39	4.79	4.96	5.47
TATA PCL TOTAL	4.30	4.39	4.79	4.96	5.47

STATION'S NAME	% AGE AUXILIARY POWER CONSUMPTION				
	2007-08	2008-09	2009-10	2010-11 ^{\$}	2011-12
SABARMATI (C STATION)	9.35	9.77	9.20	10.09	9.12
SABARMATI (D-F STATIONS)	8.72	8.55	9.03	9.80	9.03
TOR. POW. (AECO) TOTAL	8.83	8.72	9.05	9.83	9.04
PVT TOTAL	6.94	7.53	7.30	7.58	7.62
IV. PRIVATE IPPS					
MUNDRA TPS	-	-	9.23	9.88	9.40
APL TOTAL	-	-	9.23	9.88	9.40
KHAMBARKHERA TPS	0.0	0.0	0.0	0.0	6.13
BEPL TOTAL	0.0	0.0	0.0	0.0	6.13
SURAT LIG. TPS	-	-	11.83	16.41	20.73
GIPCL TOTAL	-	-	11.83	16.41	20.73
OP JINDAL TPS	-	-	8.53	8.26	9.12
JPL TOTAL	-	-	8.53	8.26	9.12
JSW RATNAGIRI TPP	-	-	NA	8.40	15.06
TORANGALLU TPS(SBU-I)	-	-	6.39	7.09	7.13
TORANGALLU TPS(SBU-II)	-	-	-	7.63	7.98
JSWEL TOTAL	-	-	6.39	7.55	11.3
PATHADI TPP	-	-	NA	11.45	10.20
LANCO TOTAL	-	-	NA	11.45	10.2
MAITHON RB TPP	0.0	0.0	0.0	0.0	6.27
MPL TOTAL	0.0	0.0	0.0	0.0	6.27
ROSA TPP Ph-I	-	-	NA	9.71	8.22
RPSCL TOTAL	-	-	NA	9.71	8.22
JALIPA KAPURDI TPP	-	-	16.47	14.52	11.29
RWPL (JSW) TOTAL	-	-	16.47	14.52	11.29
STERLITE TPP	0.0	0.0	0.0	0.0	8.72
SEL TOTAL	0.0	0.0	0.0	0.0	8.72
NEYVELI TPS(Z)	-	-	7.72	7.99	8.00
ST-CMSECP TOTAL	-	-	7.72	7.99	8.00
JOJOBERA TPS	-	-	11.16	10.16	10.00
TATA PCL TOTAL	-	-	11.16	10.16	10.0
UDUPI TPP	0.0	0.0	0.0	0.0	7.54
UPCL TOTAL	0.0	0.0	0.0	0.0	7.54
KATGHORA TPP	0.0	0.0	0.0	0.0	9.98
VESPL TOTAL	0.0	0.0	0.0	0.0	9.98
WARDHA WARORA TPP	-	-	-	9.71	13.04
WPCL TOTAL	-	-	-	9.71	13.04
IPP TOTAL	-	-	9.44	9.51	10.16
PRIVATE TOTAL	6.94	7.53	8.28	8.75	9.46
IV. ALL INDIA	8.17	8.33	8.34	8.49	8.44

^{\$}- Aux power consumption of new units considered from the date of stabilization.

- IPPs and Bhilai TPS were considered in the review from 2009-10 onwards.

* There was NIL generation by this station during that particular year.

SECTION-12

STATION OPERATION UNDER DISTURBED GRID/ FREQUENCY CONDITIONS

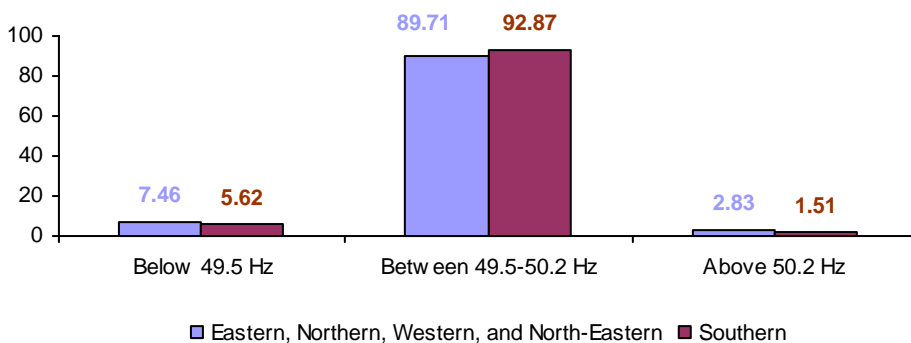
12.1 In a process towards formation of National Grid, the Northern, Western, Eastern and North Eastern systems (NEW) are already running in synchronous mode of operation since 26th August,2006. The Southern Region is also in process of integration to NEW Grid.

12.2 The percentage of time during which the two power systems of the country operated below 49.5 Hz, between 49.5 to 50.2 Hz (IEGC Band) and above 50.2 Hz. and the maximum & minimum frequencies in the two grids during the year 2011-12 are as follows:

Region	% of time the frequency was			Max. Frequency		Min. Frequency	
	Below 49.5	Between 49.5 - 50.2	Above 50.2	Monthly Average (Hz)	Inst. (Hz)	Monthly Average (Hz)	Inst. (Hz)
	(Hz)	(Hz)	(Hz)				
Eastern, Northern, Western, and North-Eastern (NEW)	7.46	89.71	2.83	50.64	50.95	48.87	48.57
Southern (SR)	5.62	92.87	1.51	50.73	50.99	48.91	48.77

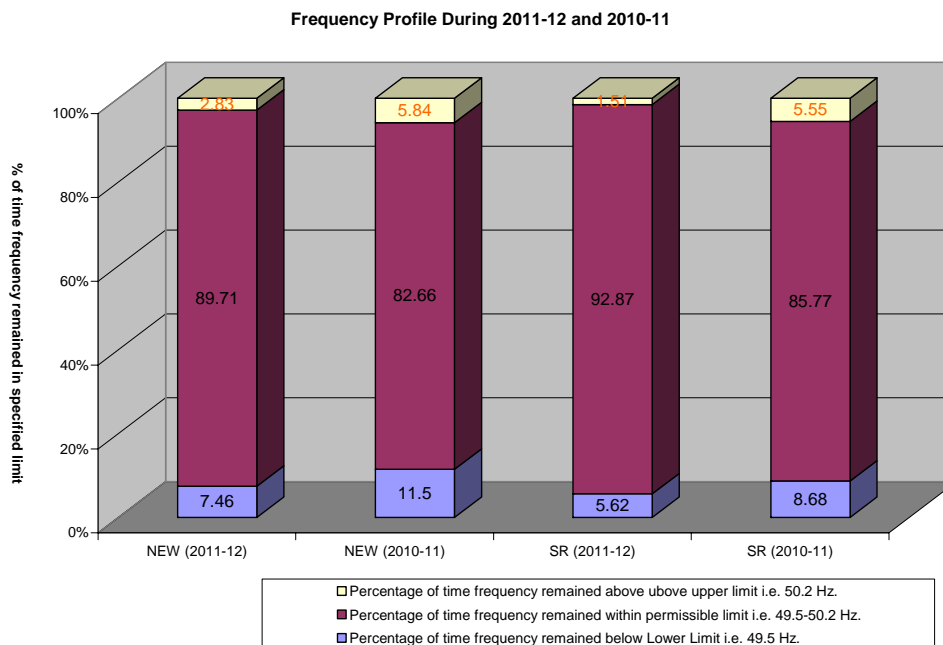
The month-wise details of operating frequency profile for the different regions/ power systems during 2011-12 are shown in **Annex-12.1**.

FREQUENCY PROFILE DURING FINANCIAL YEAR 2011-12



12.3 The details of grid frequency during year 2011-12 and 2010-11 are given in Annexure- 12.1. From the figures it is evident that there was marked improvement in grid frequency during the year 2011-12 as compared to previous year. In the chart given below, it is clearly seen that the frequency remained more percentage of time within the permissible limit of 49.5-50.2 Hz. as compared to that during 2010-11. This was mainly due to regulatory measures like action against

overdrawing utilities by CERC, better grid monitoring by load dispatch centers and State utilities, increase in generation capacity, strengthening of transmission system and development of market facilitating arrangement of power by States through traders and Power Exchanges instead of over dependence on Unscheduled Interchange.



12.4 The Grid Incident/Disturbance of any kind (Major/Minor) affects the reliable operation of grid and consequently affects generation and availability of power to consumers. The clause 11 of Central Electricity Authority (Grid Standards) Regulation 2010, effective from 26.06.2010, have categorized the Grid Incidents and Grid Disturbance as follows :

(A) Categorization of Grid Incidents in increasing order of severity:-

Category GI-1- Tripping of one or more power system elements of the grid like a generator, transmission line, transformer, shunt reactors, series capacitor and static VAR compensator, which requires re-scheduling of generation or load, without total loss of supply at a sub-station or loss of integrity of the grid at 220 KV in the case of North-Eastern Region;

Category GI-2- Tripping of one or more power system elements of the grid like a generator, transmission line, transformer, shunt reactor, series capacitor and static VAR Compensator, which requires re-scheduling of generation or load, without total loss of supply at a sub-station or loss of integrity of the grid at 400 kV and above (220 kV and above in the case of North-Eastern Region).

(B) Categorization of Grid Disturbance in increasing order of severity :-

Category GD-1- When less than ten per cent of the antecedent generation or load in a regional grid is lost;

- Category GD-2-** when ten per cent to less than twenty percent of the antecedent generation or load in a regional grid is lost.
- Category GD-3-** When twenty percent to less than thirty percent of the antecedent generation or load in a regional grid is lost;
- Category GD-4-** When thirty percent to less than forty percent of the antecedent generation or load in regional grid is lost;
- Category GD- 5--** When forty percent or more of the antecedent generation or load in a regional grid is lost.

Explanation : For the purpose of categorization of grid disturbances, percentage Loss of generation or load, which ever is higher shall be considered.

12.5 There were no major grid disturbances during 2011-12 in the country except a grid disturbance of category GD-5 in North-Eastern Region on 20.06.2011, the details of which is given below. During 2011-12 there were total numbers of 136 grid disturbances of different category. Out of this 134 numbers grid disturbances were of category GD-1, 1 number of category GD-2 and 1 number of category GD-5. There were no Grid Disturbance in the country of category GD-3 and GD-4 during 2011-12.

Details of grid Disturbance in the Country of Category GD-3 and above during 2011-12

S.No	Date	Time	Details of Generation Loss/Load loss	Category	Cause (s)
1.	22.06.2011	Occurrence time (17.14 hrs) Restoration time (19:29 hrs)	Generation Loss 1276 MW (3.282 MU) Load Loss 1162 MW (6.512 MU)	GD-5	As reported by ERLDC, all the available 400 KV lines between Binaguri & Purnea tripped at 1714 hrs causing failure of NER grid along with part of North Bangal of ER

FREQUENCY PROFILE (MONTHLY) DURING 2011-12 vis-à-vis 2010-11

Month	Year 2011-12					Year 2010-2011				
	Below 49.5 Hz	Between 49.5-50.2 Hz	Above 50.2 Hz	Max. Freq	Min. Freq	Below 49.5 Hz	Between 49.5-50.2 Hz	Above 50.2 Hz	Max. Freq	Min. Freq
Northern / Western / Eastern and North- Eastern Regions										
April	6.98	91.73	1.29	50.65	48.81	80.11	19.67	0.22	50.51	48.56
May	3.17	92.11	4.72	50.95	49.00	18.10	79.17	2.73	50.80	48.76
June	4.61	90.75	4.64	50.60	48.82	5.74	89.83	4.43	50.76	48.82
July	4.81	93.32	1.87	50.40	49.14	7.77	87.81	4.42	50.72	48.70
August	3.88	91.64	4.48	50.89	48.78	7.91	87.50	4.59	50.73	48.73
September	6.23	88.06	5.71	50.66	48.80	1.83	85.89	12.28	50.79	48.76
October	23.11	76.09	0.80	50.63	48.57	0.95	93.14	5.91	50.60	49.09
November	10.59	88.90	0.51	50.58	48.75	0.48	87.37	12.15	50.71	49.12
December	16.00	83.24	0.76	50.42	48.82	2.02	88.94	9.04	50.68	48.94
January	5.32	89.81	4.87	50.84	48.99	5.20	89.43	5.37	50.61	48.89
February	2.71	95.46	1.83	50.49	49.05	4.49	88.89	6.62	50.67	49.08
March	2.15	95.35	2.50	50.61	48.96	3.41	94.22	2.37	50.64	49.00
Average	7.46	89.71	2.83	50.64	48.87	11.50	82.66	5.84	50.69	48.87

Southern Region

April	19.72	78.47	1.81	50.86	48.81	57.91	41.54	0.56	50.56	48.57
May	5.93	91.71	2.36	50.87	48.83	2.98	91.23	5.79	50.88	48.58
June	2.05	95.97	1.98	50.84	48.77	5.75	88.33	5.92	50.67	48.56
July	1.38	97.24	1.38	50.39	49.29	1.46	94.49	4.05	50.69	48.92
August	0.28	96.24	3.48	50.65	49.34	3.73	91.03	5.24	50.54	48.70
September	4.91	91.74	3.35	50.74	48.81	1.64	90.74	7.62	50.57	48.84
October	8.52	90.93	0.55	50.52	48.80	0.21	92.62	7.17	50.66	49.24
November	5.55	93.60	0.85	50.62	48.81	0.64	83.56	15.80	50.97	48.88
December	2.89	95.99	1.12	50.70	48.93	0.78	89.57	9.65	50.97	48.96
January	2.87	96.41	0.72	50.79	48.87	1.43	95.01	3.56	50.99	49.22
February	5.29	94.34	0.37	50.99	48.81	8.40	90.68	0.92	50.93	48.83
March	8.07	91.75	0.18	50.79	48.84	19.22	80.40	0.38	50.82	48.81
Average	5.62	92.87	1.51	50.73	48.91	8.68	85.77	5.55	50.77	48.84

SECTION-13

STATION HEAT RATE OF COAL/LIGNITE BASED THERMAL POWER STATIONS

13.1 The heat rate of a conventional fossil-fuel based power plant is a measure of how efficiently it converts the chemical energy contained in the fuel into electrical energy. This conversion is accomplished in four major steps. First, the chemical energy in the fuel is converted into thermal energy, then the thermal energy is converted into kinetic energy, then the kinetic energy is converted in mechanical energy, and finally the mechanical energy is converted to electrical energy. In each of these sub-processes, some energy is lost to the environment. Some of the fuel is not burnt completely, some of the thermal energy is lost out of the stack and rejected to the cooling water, some of the kinetic and mechanical energy produces heat instead of electricity, and lastly some of the electricity that is produced is used by these sub-processes. The heat rate of a power plant is the amount of chemical energy that must be supplied to produce one unit of electrical energy. If a power plant converted 100% of the chemical energy in the fuel into electricity, the plant would have a heat rate of 860 kcal/kWh. Alternatively, the required input divided by the actual output, is the reciprocal of the efficiency. Chemical energy is usually measured in kilocalories (kcal) (or sometimes kilojoules, kJ) and electrical energy is usually measured in kilowatt-hours (kWh), the unit of heat rate is normally kcal/kWh (or kJ/kWh).

The Station Heat Rate (SHR) is an important index for assessing the efficiency of a thermal power station. It should be the endeavor of any station to operate the unit as near to their Design Heat Rate. Station heat rate improvement also helps in reducing pollution from Thermal Power Stations.

Heat rate improvement is a continuing process. It must become part of the normal work activities and it must be considered along with, and at par with, reliability, safety, environmental concern, etc., when operating the unit, scheduling maintenance, and all other routine activities. The responsibility of heat rate improvement cannot be assigned to one individual or organization but requires the active involvement of all the plant staff. Heat rate improvement must have the full support of the plant management.

CEA had devised a proforma to monitor various parameters of efficiency of Thermal Power Stations in the country. Data related to Station Heat Rate (SHR) parameters have been received from 74 Thermal Power Stations during 2011-12, which have been compiled, analyzed and compared with their design SHR. The analysis of station heat rate so carried out has been highlighted in the Annexure 13.1. The analysis of station heat rate parameters has been carried out for different categories such as: range of SHR deviation of (0-5%), (>5-10%), (>10-20%) and more than 20%. The stations having SHR value under 10% variation category are considered as good performing stations and stations having greater than 10% variation are considered as poorly operating ones. All the stations analyzed are using coal as primary fuel and oil as secondary fuel for flame stabilization/starting purposes except Akrimota, Neyveli, Surat Lignite and Kutch Lignite which are lignite based Thermal Power Stations. The analysis has been carried out on the Station basis.

Page 2 of 6

The following assumptions have been made for the analysis of Station Heat Rate:

- a) Analysis of only those power stations has been carried out where data of at least 9 months operation was available.
- b) Design Station Heat Rate has been evaluated based on design data of turbine heat rate and boiler efficiency as submitted by TPSs and compared with their Operating Station Heat Rate.
- c) The data related to various parameters of station heat rate such as generation, fuel consumption, calorific values of fuels, etc. has been taken from TPS authorities Generating Companies/ Utilities on monthly basis.
- d) Weighted average of Gross Calorific Value (GCV) of coal and oil has been computed yearly for calculating heat rate for the year.

13.2 METHODS:

There are two methods for heat rate evaluation of thermal power stations based on the determination of efficiency of the Boiler i.e. Indirect Method and Direct Method.

13.2.1 INDIRECT METHOD:

Indirect method of Heat Rate Measurement is an instantaneous method which is used for short duration and not possible throughout the year. It is a very complex method and basically a loss based method of measurement of Heat Rate. This method is generally adopted during the Energy Audit Studies.

13.2.2 DIRECT METHOD:

Direct Method of Heat Rate Assessment is suitable for long duration in which averaging gives almost actual Heat Rate because coal consumption measurement is fairly accurate if taken over a month/Year. Therefore, this method is employed at almost all stations as per the standard practice.

The methodology adopted by CEA for assessment of station heat rate is based on Direct Method and the same is given in brief as follows:

Step 1:

All design data such as Turbine Heat Rate, Boiler Efficiency and basic history of Thermal Power Station has been collected from Station authorities and Unit Heat Rate (UHR) is evaluated with respect to unit capacities at 100% PLF.

Step 2

Operating parameters such as gross generation, total coal consumption, coal average G.C.V, Specific Oil Consumption and Oil GCV have been collected from Thermal Power Station authorities on a monthly basis. Thereafter, Operating Station Heat Rate for each month is calculated. Weighted Sp. Coal Consumption, weighted Sp. Oil Consumption, weighted GCV of coal and weighted GCV of oil are computed on an yearly basis for calculating annual SHR.

Step3

Operating SHR thus calculated is then compared with respect to design Station Heat Rate and percentage deviation is found to give an idea of performance of the station as a whole as per Step 2.

13.3 SALIENT FEATURES OF THE GROSS STATION HEAT RATE DATA ANALYSIS:

The Operating Heat Rate of Thermal Power Stations during 2011-12, their deviation from the design values and their improvement / deterioration over the preceding year 2010-11 is given in the **Annexure 13.1**. The main highlights of the outcomes for the year 2011-12 and a comparative analysis with respect to the preceding year are given below:

Page 3 of 6

(a) ALL INDIA STATION HEAT RATE

Year	No. of Stations analyzed	Capacity (MW)	Weighted Average Design SHR (kcal/kWh)	Weighted average Operating SHR (kcal/kWh)	% Operating SHR Deviation with respect to Design SHR	% improvement (-) / deterioration (+) in Operating Station Heat Rate over preceding year
2010-11	73	66527.8	2331.78	2579.4	10.62	(-) 1.38 (wrt 2009-10)
2011-12	74	72366.10	2335.0	2603.2	11.49	(+) 0.92* (wrt 2010-11)

No. of Stations considered for 2010-11 and 201-12 are different

The above table indicates that the estimated weighted average operating SHR on All India basis are 2579.4 kcal/kWh and 2603.2 kcal/kWh for the year 2010-11 and 2011-12 respectively.

(b) REGION WISE STATION HEAT RATE(Excluding NTPC Stations)

Region	Year	Weighted Average Design SHR (kcal/kWh)	Weighted average Operating SHR (kcal/kWh)	% Operating SHR Deviation with respect to Design SHR (kcal/kWh)
Northern	2010-11	2331.1	2639.5	13.14
	2011-12	2327.4	2580.5	10.88
Western	2010-11	2349.2	2831.7	20.54
	2011-12	2341.8	2689.8	14.86
Southern	2010-11	2378.4	2600.8	9.35
	2011-12	2360.5	2600.8	10.18
Eastern	2010-11	2390.0	2785.8	16.56
	2011-12	2383.9	2686.1	12.68

No. of Stations considered for 2010-11 and 2011-12 are different

(c) The number of power stations, whose Operating SHR deviation with respect to design heat rate falls in the range of 0-5%, >5-10%, >10-20% & more than 20% are given in the following table for the year 2011-12

S. No.	Particulars	2011-12
1.	Total Stations analyzed	74
2.	No. of Stations in the range of SHR deviation (0-5%)	16
3.	No. of stations in the range of SHR deviation (>5-10%)	20
4.	No. of stations in the range of SHR deviation (>10-20%)	24
5.	No. of stations with SHR deviation of more than 20%	14

(d) From enclosed **Annexure 13.1** (excluding NTPC Stations), it is observed that Trombay, Dr. Narla Tata Rao Vijaywada, Dahanu, Torangallu-II, Titagarh, Torangallu-I, Rayalseema and IB Valley have been assessed as the best stations for the year 2011-12 with SHR deviations of 1.39%, 2.10%, 2.49%, 2.89%, 3.20%, 3.38%, 3.55% and 3.64% respectively with respect to their Design Station Heat Rate.

(e) In all about 14 stations out of analyzed 74 stations during 2011-12 are operating at very poor SHR with variation of more than 20%. These stations need closer monitoring. All station authorities have been advised to have an Energy Efficiency Monitoring Cell for improving the efficiency of the Power Station through regular vigilance on energy/heat lost from various equipment / processes.

**STATION WISE OPERATING STATION HEAT RATE FOR THE YEAR 2011-12 AND ITS DEVIATION
(with respect to DESIGN AND LAST YEAR)**

S. No.	Name of Station	Capacity (MW)	Design Heat Rate (kcal/kWh)	2011-12	2010-11	%Deviation with respect to Design Heat Rate	% improvement (-) / deterioration (+) in Operating Heat Rate over the preceding year
				Operating Heat Rate. (kcal/kWh)	Operating Heat Rate. (kcal/kWh)		
NORTHERN REGION							
1	RAJGHAT	135.0	2580.35	3073	3233.88	19.09	(-) 4.97
2	PANIPAT	1367.80	2344.06	2751	2795.17	17.36	(-) 1.58
3	BHATINDA	440.0	2503.05	2914	2963.62	16.42	(-) 1.67
4	LEHRA MOHABAT	920.0	2222.36	2400	2417.0	7.99	(-) 0.7
5	ROPAR	1260.0	2277.42	2533	2621.09	11.22	(-) 3.36
6	KOTA	1240.0	2398.91	2497	2495.04	4.09	0.08
7	SURATGARH	1500.0	2260.14	2507	2491.95	10.92	0.60
8	HARDUAGANJ	415.0	2456.36	3899	4969.96	58.73	(-) 21.55
	NORTHERN	7277.8	2327.4	2580.5	2639.5	10.88	(-) 2.24
WESTERN REGION							
9	BHUSAWAL	420.0	2366.5	2801	2869.93	18.36	(-) 2.4
10	CHANDRAPUR	2340.0	2277.93	2643	2763.44	16.03	(-) 4.36
11	DAHANU	500.0	2226.5	2282	2282.43	2.49	(-) 0.02
12	KHAPERKHEDA	840.0	2254.45	2605	2660.96	18.03	(-) 2.1
13	KORADI	1040.0	2431.51	2845	3342.96	17.01	(-) 14.9
14	NASIK	630.0	2366.5	2856	2907.33	20.68	(-) 1.77
15	PARLI	630.0	2366.6	3038	3081.54	28.37	(-) 1.41
16	NEW PARLI	500.0	2266.0	2651	2563.45	16.99	3.42
17	PARAS- EXT.	500.0	2265.65	2547	2663.51	12.42	(-) 4.37
18	TROMBAY	750.0	2345.41	2378	2426.14	1.39	(-) 1.98
19	AKRIMOTA	250.0	2361.16	2861	2520.21	21.17	13.52
20	GANDHI NAGAR	870.0	2335.95	2647	2819	13.32	(-) 6.1
21	KUTCH LIGNITE	290.0	3061.06	3498	3531.91	14.27	(-) 0.96
22	WANAKBORI	1470.0	2343.72	2608	2656.97	11.28	(-) 1.84
23	SIKKA	240.0	2388.69	3091.8	3072.04	29.43	NA
24	TORRENT (SABARMATI)	400.0	2502.35	2671	NA	6.74	NA
25	MUNDRA (ADANI POWER)	2640.0	2213.27	2332	NA	5.36	NA
26	AMAR KANTAK	450.0	2335.4	2894	2971.94	23.92	(-) 2.62

**STATION WISE OPERATING STATION HEAT RATE FOR THE YEAR 2011-12 AND ITS DEVIATION
(with respect to DESIGN AND LAST YEAR)**

S. No.	Name of Station	Capacity (MW)	Design Heat Rate (kcal/kWh)	2011-12	2010-11	%Deviation with respect to Design Heat Rate	% improvement (-) / deterioration (+) in Operating Heat Rate over the preceding year
				Operating Heat Rate. (kcal/kWh)	Operating Heat Rate. (kcal/kWh)		
27	SATPURA	1142.5	2437.66	3742	3863.45	53.51	(-) 3.14
28	KORBA EAST	440.0	2496.64	2994	3186.30	19.92	(-) 6.04
29	KORBA EAST(DSPM)	500.0	2233.97	2482	2449.13	11.10	1.34
30	KORBA WEST	840.0	2398.0	2802	2527.52	16.85	10.86
31	SURAT LIGNITE	500.0	2429.9	2625	2580.55	8.03	1.72
32	BHILAI (NSPCL)	500.0	2246.29	2349	NA	4.57	NA
33	SANJAY GANDHI BIRSINGPUR	1340.0	2422.24	2839.4	2917.95	17.22	(-) 2.69
	WESTERN	20022.5	2341.8	2689.8	2831.7	14.86	(-) 5.01
SOUTHERN REGION							
34	KOTHAGUNDEM	720.0	2502.16	2695	2633.77	7.71	2.32
35	K'GUEDEM(New),	1000.0	2217.62	2346	2275.44	5.79	3.10
36	RAYALSEEMA	1050.0	2221.2	2300	2284.56	3.55	0.68
37	Dr.N.Tata Rao VIJAYWADA	1760.0	2269.25	2316.83	2317.51	2.10	(-) 0.03
38	ENNORE	450.0	2587.43	3846	3502.80	48.64	9.8
39	MEETTUR	840.0	2386.02	2630	2503.15	10.23	5.07
40	NEYVELI-Expansion	420.0	2476.43	2745	2750.17	10.85	(-) 0.19
41	NEYVELI-I	600.0	2739.29	3958	3939.72	44.49	0.46
42	NEYVELI -II	1470.0	2589.58	2879	2831.45	11.18	1.68
43	NORTH CHENNAI	630.0	2348.05	2485	2532.99	5.83	(-) 1.89
44	TUTICORIN	1050.0	2343.94	2657	2616.51	13.36	1.55
45	KAKATIYA	500.0	2159.14	2272	NA	5.23	NA
46	RAICHUR	1720.0	2283.0	2630	2621.54	15.20	0.32
47	TORANGALLU- I	260.0	2203.03	2277.4	2317.38	3.38	(-) 1.73
48	TORANGALLU-II	600.0	2154.06	2216.26	2179.4	2.89	1.69
	SOUTHERN	13070.0	2360.5	2600.8	2600.8	10.18	0.00
EASTERN REGION							
49	IB Valley	420.0	2350.37	2436	2436.88	3.64	(-) 0.04

**STATION WISE OPERATING STATION HEAT RATE FOR THE YEAR 2011-12 AND ITS DEVIATION
(with respect to DESIGN AND LAST YEAR)**

S. No.	Name of Station	Capacity (MW)	Design Heat Rate (kcal/kWh)	2011-12	2010-11	%Deviation with respect to Design Heat Rate	% improvement (-) / deterioration (+) in Operating Heat Rate over the preceding year
				Operating Heat Rate. (kcal/kWh)	Operating Heat Rate. (kcal/kWh)		
50	BUDGE BUDGE	750.0	2307.51	2462	2486.85	6.70	(-) 1.0
51	BOKARO'B'	630.0	2492.44	3199	2879.96	28.35	11.08
52	CHANDRAPURA DVC	390.0	2317.24	2946	3029.72	27.13	(-) 2.76
53	DURGAPUR,DVC	350.0	2395.59	2901	2910.93	21.10	(-) 0.34
54	BARAUNI	220.0	2495.36	4131	4179.0	65.55	(-) 1.15
55	JOJOBERA	427.5	2344.29	2648	2677.77	12.96	(-) 1.11
56	TITAGARH	240.0	2715.12	2802	2916.13	3.20	(-) 3.91
57	NEW COSSIPORE	100.0	3127.0	5757	5332.77	84.11	7.96
58	SOUTHERN GEN.	135.0	2797.66	2903	2874.87	3.77	0.98
59	MEJIA (DVC)	1840.0	2269.0	2490.0	NA	9.74	NA
	EASTERN	5502.5	2383.9	2686.1	2785.8	12.68	(-) 3.58
	NTPC STATIONS*	27035.0	2288.7	2410.7	2398.5	5.33	0.51
	ALL INDIA	72366.10	2335.0	2603.2	2579.4	11.49	0.92

NOTE :

- (1) *Number. of Stations considered for 2010-11 and 2011-12 are different*
- (2) NA – Data Not Available
- (3) For all Stations oil consumption has been calculated on the basis of common GCV of 10000 Kcal/Litre
- (4) *NTPC has submitted data for 15 thermal power stations (viz: Rihand, Vindhyachal, Tanda, Korba, Unchahar, Simhadri, Farakka, Dadri, Talcher, Talcher STPS, Ramagundam, Singrauli, Badarpur, Sipat and Kahalgaon)
- (5) This analysis is based on the performance data as available to CEA. The stations which are not indicated in this list have either not submitted data or submitted incomplete data

SECTION-14

ENVIRONMENTAL ASPECTS IN POWER SECTOR

14.1 INTRODUCTION

Impact on environment can occur during both construction and operation of a Thermal Power Plant (TPP). During construction, impacts are caused primarily during site preparation activities such as leveling, excavation, earth moving, de-watering, dredging and / or impounding streams and other water bodies, developing areas for other purposes, vehicular movement & transportation and erection of equipment. On the other hand, during operation of a TPP, local and regional air quality, ground water, crops, native vegetation, buildings & monuments, aquatic ecosystem of certain lakes, forest ecosystem, existing community infrastructure such as schools, police, fire protection, medical facilities, demographic patterns, local social and cultural values, living patterns of the residents, local traffic etc. get affected.

Many of the adverse impacts of a TPP can be foreseen and minimized through judicious siting and are amenable to technological control providing necessary preventive and control measures, and finally through effective environmental management of the operating plants.

14.2 ENVIRONMENT CONCERNS OF THERMAL POWER STATIONS

14.2.1 Air Pollution

Particulate matters, SO₂, NO_x, and CO₂ are emitted from the combustion of fuels in a thermal power plant. If released uncontrolled, these can affect humans, vegetation, buildings and monuments, aquatic & forest ecosystem etc. Large amount of CO₂ emissions are attributed to climate change. The emission of large quantities of SO₂ and NO_x from a TPP may result in Acid-rain problems.

14.2.2 Waste water Discharge

The largest wastewater streams from a TPP are cooling water blow down, which can be either recycled or discharged. If discharged to a surface water body, then its chemical quality gets affected. Associated waste-heat can impact ambient water temperature which in turn can radically alter aquatic plant and animal communities. Other effluents from a TPP, like waste water from de-mineralized backwash and resin regenerator wastewater, ash transport water, and runoff from coal piles, ash piles and site, trace metals, acids and other chemicals in various combinations in the effluents, oil spills etc. have a negative impact on water quality.

14.2.3 Ash handling and disposal

Ash disposal can have adverse impacts on the environment due to land use diversion, resettlement, water resources allocation and air pollution. Construction of large ash disposal areas results in resettlement issues, loss of agriculture/grazing land/ habitat. When the ash gets dried in the absence of water or vegetation cover, fugitive dust from ash pond pollutes the air thereby increasing local concentration of respirable particulate. Once-through slurry disposal systems place additional strain on scarce fresh water resources.

14.2.4 Land Degradation

The thermal power stations are generally located on the non-forest land and do not involve much Resettlement and Rehabilitation problems. However its effects due to stack emission etc, on flora and fauna, agricultural and other land have to be studied for any adverse effects. Large land requirement for ash disposal and hazardous elements percolation to ground water through ash disposal in ash ponds are the serious effects of thermal power stations.

14.2.5 Noise Pollution

Some areas inside the plant will have noisy equipment such as crushers, belt conveyors, fans, pumps, milling plant, compressors, boiler, turbine etc. Various measures to reduce the noise generation and exposure of workers to high noise levels in the plant area include silencers of fans, compressors, steam safety valves etc., using noise absorbent materials, providing noise barriers for various areas, noise proof control rooms. Provision of green belt around the plant will further reduce noise levels.

14.3 ENVIRONMENTAL CLEARANCE PROCESS

The implementation of power projects requires clearance from Ministry of Environment and Forests. The Environment Impact Assessment (EIA) Notification 1994 states that expansion or modernization or setting up a new power project shall be undertaken after getting environmental clearance from the Ministry of Environment and Forest (MOEF).

The above EIA Notification sets out procedure for clearance of projects. For site specific projects, such as hydro electric and pit head thermal power stations, the site clearance is to be obtained first from MOEF for initiation of any surveys and investigations. Thereafter State Pollution Control Board (SPCB) conducts Public Hearing, issues NOC and forwards the minutes of meeting to MOEF. Thereafter, for such site specific projects Environment Impact Assessment Reports are to be submitted by the proponents to MOEF for clearance. The reports shall be evaluated and assessed by the Impact Assessment Agency and placed before a Committee of Experts. If needed, visits are made to the projects on recommendations of the Committee of Experts. MOEF further processes the proposal for clearance/rejection of the project. The cases rejected for non furnishing of complete information may be reopened on the receipt of complete information. The clearance granted is valid for a period of five years for commencement of the construction/operation.

14.4 MONITORING OF ENVIRONMENTAL STATUS OF EXISTING TPPs

CEA has also been actively engaged in the collecting and compiling of environmental data of existing thermal power stations in the country. Monthly environmental data reports in respect of Stack emission, Ambient Air Quality (AAQ) and effluent discharges are received from the thermal power stations; analyzed and remedial measures are suggested wherever required. The matter regarding Suspended Particulate Matter (SPM) levels exceeding the prescribed norms is being constantly pursued with the power station authorities and they are being advised to make all-out efforts to bring down the SPM emissions.

Monthly environmental data received from 80 coal / lignite based Thermal Power Stations comprising 362 units of various sizes were compiled and analysed during 2011-12. Out of these, 260 units complied with the notified norms of SPM emission at stack, 76 units were operating at high SPM emission (150 mg/ Nm³ to 350 mg/ Nm³) and 26 units were operating at very high SPM emission level (>350 mg/ Nm³).

Unitwise SPM emission at stack of coal/lignite based thermal power plants for the period 2007-08 to 2011-12 are given at Annex. 14.1

The matter regarding SPM levels exceeding the prescribed norms is being constantly pursued with the concerned TPS authorities and they are being requested to make all out efforts to bring down the SPM emissions.

Some of the measures taken by the TPSs to reduce SPM emissions are as follows: -

- 1) Retrofitting of ESPs
- 2) Installation of AFGC System (Ammonia injection at ESP inlet)
- 3) Providing gas-tight isolators in ESP for online maintenance of ESP
- 4) Installation of micro-processor based EPIC-II Controllers
- 5) Installation of DFGC system (Injection of ammonia and Sulphur Trioxide at ESP inlet)
- 6) Use of Indian coal blended with imported coal to reduce the percentage of ash content.

14.5 Carbon Dioxide Emission from Power Sector

Thermal Power Plants are one of the major contributors of Carbon dioxide emissions. CEA is estimating the amount of CO₂ emissions from grid connected power stations. The total amount of CO₂ emission from grid connected power stations in the year 2010-11 has been estimated at 597.5 million tones. The average CO₂ emission rate is 0.79 kgCO₂/kWh in the year 2010-11.

14.6 Environment Management Award for Coal/Lignite based Thermal Power Stations

A category of award has been introduced w.e.f. the year 2008-09 to promote best strategy and management of environmental issues by coal/lignite based thermal power stations. The scheme was prepared and circulated to all the coal/lignite based TPSs requesting them to furnish information on various environmental parameters such as CO₂ emission, SPM emissions at stack, Fly Ash Utilization and Effluent Discharge etc. The Environment Management Award for the year 2010-11 was given to Neyveli Thermal Power Station –I Expansion.

14.7 OTHER ISSUES

14.7.1 Coal Washing/Beneficiation

A number of studies have been conducted in the past to quantify the economics of using beneficiated coal in Indian power stations. These studies have indicated in quantitative terms the benefits of using washed coal both in terms of O&M as well as capital cost of the project. Certain categories of thermal plants are required to use beneficiated coal containing ash not more than 34% w.e.f. June 2001, vide MOEF Notification dated 19th September, 1997. These plants include the thermal plants located beyond one thousand Kilometer from pit heads and thermal plants located in urban areas or sensitive areas.

14.7.2 Fly Ash Utilization

The Coal fired thermal power stations produce enormous quantities of ash. Our coals are typically high ash coals and the ash content of coals supplied to majority of power stations is of the order of 36 to 44 %. The ash has traditionally been disposed off in the ash ponds which have the potential of polluting the surface and ground water unless adequate care is taken. In order to check the percolation of heavy metals to the ground water, ash pond lining is being provided wherever necessary. The fly ash, collected in the dry form, could be beneficially used for brick making, coal mines backfilling, road construction activities and cement manufacturing. MOEF's notification dated 14-09-99 in respect of Fly ash utilization and amended with a notification dated 27-08-2003, stipulate the steps to be taken by coal/lignite based thermal power plants to ensure 100 % utilization of ash generated by it. The notifications also stipulate to use ash and ash products in construction activities of roads, buildings, flyover embankments etc.

14.7.3 Flue Gas Desulphurization (FGD) Plant

The MOEF insists on making space provision for Flue Gas Desulphurization (FGD) Plant in the designs of thermal power units of 500 MW and above capacity and also at stations with capacity of 1500 to 2000 MW to facilitate their retrofitting at a later stage in case the need for such plant is established. In sensitive areas the installation of FGD may be insisted upon even for stations with smaller installation.

14.8 REGULATORY MEASURES

14.8.1 Air (Prevention & Control of Pollution) Act, 1981.

In India, Air (Prevention & Control of Pollution) Act was enacted in 1981 with amendments in 1987 for prevention, control and abatement of air pollution and it came into force with effect from May 91. The act provides for Central as well as State Boards with such powers and functions as necessary to control the quality of Air. National ambient air quality standards by Central Pollution Control Board have been issued vide Gazette Notification of April 1994. For wider dispersal of SO₂, different stack heights have been stipulated for different capacity units.

14.8.2 Environment (Protection) Act 1986

Environment (Protection) Act 1986 came into force w.e.f. 19.11.86 and provides for protection, improvement of environment and for matters connected therewith. It empowers the Central Govt. to take all such measures as deemed necessary for protecting and meeting quality of environment and preventing, controlling and abating environmental pollution. Environment Protection Act 1986 provides for stringent punishment for any violation of Act. As per Sec. 15 of the Act, whosoever fails to comply or contravenes any of the provisions of this Act, may be punished with imprisonment which may extend up to five years or with fine extending up to Rs. one lakh or both. In case the failure continues for more than one year, the imprisonment may be extended to seven years.

14.9 EMISSION/EFFLUENTS STANDARDS

The standards for emissions/effluent notified by the CPCB/MOEF are as under:

14.9.1 Suspended Particulate Matter (SPM)

The bulk of the ash produced from the combustion of coal / lignite in the thermal power station and carried by the flue gases should be trapped by the ESP's or bag filters and only a small quantity should escape through stacks. The ESP's of such designs and efficiency are to be provided to limit the SPM in the stack emissions below the prescribed norms. The standards for SPM levels as notified by MOEF are given at Annex – 14.2

14.9.2 Sulphur Dioxide Emissions

The non-coking coal available in the country earmarked for power generation generally contains low level of sulphur up to 0.50% except for the coal available in the North Eastern region of the country. At present there is no prescribed limit for sulphur dioxide in stack emission. However, minimum stack height limits for power stations as notified by MOEF are given at Annex – 14.2. The National Air quality Standards prescribed by CPCB stipulate the limits of SO_x in the ambient air. These standards are given at Annex – 14.5.

14.9.3 Nitrogen Oxide Emissions

The formation of Nitrogen oxide depends on the temperature and residence time of gases in the combustion chamber at that temperature. The formation of Nitrogen oxide can be reduced by providing low nitrogen oxide burners. No norms for the nitrogen oxide emission at stack have been notified by MOEF for coal/lignite fired thermal power stations. Norms for Gas/Naphtha based power plant are given at Annex – 14.6

The levels of Nitrogen dioxide in the ambient air are prescribed by the AAQ standards which would limit the concentration of nitrogen oxide in air by regulating NO_x producing industries in an area. These standards are given at Annex – 14.5

14.9.4 Effluent Discharge

The process of power generation produces liquid effluents. The standards for limiting liquid effluents discharge from power stations have been prescribed in the EPA Notification dated 19th Nov. 1986 as reproduced at Annex – 14.3 & 14.6

14.9.5 National Ambient Air Quality Standards

The Ministry of Environment & Forests has revised the National Ambient Air Quality Standards in November 2009. A copy of the Notification is enclosed at Annexure 14.5. As per the revised norms, the standards for residential areas have been extended to industrial areas as well. The latest notification also includes limits for Benzene, Ozone, Benzopyrene, Aresenic, Nickel and Ammonia, which were not covered in the National Ambient Air Quality Standards Notification of 1994.

SUSPENDED PARTICULATE MATTER (SPM) EMISSIONS AT STACKS OF VARIOUS UNITS OF THERMAL POWER PLANTS

STACK EMISSIONS: Suspended Particulate Matter (mg/Nm³)

S. No.	Name of TPS	Unit No.	Cap. (MW)	2007-08	2008-09	2009-10	2010-2011	2011-12
A. NORTHERN REGION								
1	IP STATION	2	62.5	44-49	44-49	43-49	Closed	Closed
		3	62.5	49	44-49	37-47	Closed	Closed
		4	62.5	41-49	44-50	40-48	closed	Closed
		5	60	49	48-50	48-49	closed	Closed
Power Station closed in Nov.2009								
2	RAJGHAT	1	67.5	129-138	131-141	125-147	124-146	115-144
		2	67.5	129-136	132-138	130-142	114-142	123-137
3	BADARPUR	1	95	84-120	104-137	112-135	83-129	87-105
		2	95	83-133	108-144	97-140	95-124	86-121
		3	95	97-143	106-141	109-143	111-138	105-120
		4	210	95-141	115-143	99-139	99-141	96-128
4	FARIDABAD	1	55	127-146	172-834	227-295	Closed	Closed
		2	55	119-142	*	-	Closed	Closed
		3	55	116-137	135-291	181-253	N.A.	Closed
U-2 phased out in 2008-09 & U-1 phased out in Sept. 2009								
5	PANIPAT	1	110	149-570	126-147	224-2175	144-1495	142-1127
		2	110	149-570	126-147	224-2175	Not in Op.	142-1127
		3	110	264-729	141-298	299-773	139-723	140-204
		4	110	264-729	141-298	299-773	Not in Op.	140-204
		5	210	61-70	80-110	116-2778	147-1913	139-148
		6	210	72-95	87-133	188-3247	141-2915	142-149
		7	250	34-125	72-112	73-1514	432-3275	145-251
		8	250	37-132	117-162	208-2395	142-2124	141-191
2009-10 values based on only 4 monthly reports (June'09, Aug'09, Feb'10 & Mar'10)								
6	YAMUNA NAGAR	1	300	-	58-186	65-140	98-148	84-98
		2	300	-	108-314	80-138	132-148	92-128
7	ROPAR	1	210	65-127	56-108	67-120	97-114	70-104
		2	210	84-131	79-127	67-109	98-104	79-98
		3	210	52-137	79-123	69-126	96-107	73-111
		4	210	77-138	80-142	77-128	91-125	76-107
		5	210	79-144	73-114	66-116	96-110	86-108
		6	210	104-151	70-128	74-124	97-119	78-104
8	BATHINDA	1	110	103-149	76-145	120-147	113-139	90-147
		2	110	118-147	100-146	137-148	93-144	115-144
		3	110	137-149	128-146	134-147	Under R&M	Under R&M
		4	110	141-148	137-149	141-148	140-147	144-148
9	LEHRA MOHABBAT	1	210	44-121	36-149	51-156	66-159	90-130
		2	210	36-140	36-141	47-133	81-161	103-155
		3	250	-	43-151	103-162	56-148	73-144
		4	250	-	63-140	78-158	60-146	55-132
10	KOTA	1	110	56-131	47-134	59-131	52-143	53-136
		2	110	99-128	77-147	45-137	104-145	72-135
		3	210	98-130	82-135	49-133	79-139	73-132
		4	210	68-131	58-137	62-135	80-145	66-135
		5	210	45-112	45-85	34-95	50-117	57-110
		6	195	49-92	54-78	47-76	40-91	65-98
		7	195	-	-	31-44	36-48	37-43

Annexure – 14.1

**SUSPENDED PARTICULATE MATTER (SPM) EMISSIONS AT STACKS OF VARIOUS UNITS OF
THERMAL POWER PLANTS**

STACK EMISSIONS: Suspended Particulate Matter (mg/Nm³)

S. No.	Name of TPS	Unit No.	Cap. (MW)	2007-08	2008-09	2009-10	2010-2011	2011-12
11	SURATGARH	1	250	73-88	66-112	83-142	92-148	55-109
		2	250	73-85	59-89	93-121	67-106	61-121
		3	250	71-83	59-80	69-82	54-143	52-148
		4	250	51-88	65-77	68-114	60-90	59-91
		5	250	61-99	52-98	52-110	53-100	60-84
		6	250	-	-	-	77-99	51-69
12	PANKI	3	105	140-167	140-164	142-147	121-141	110-149
		4	105	125-167	121-167	140-147	132-148	134-147
13	PARICHA	1	110	169-458	148-192	145-180	151-241	151-162
		2	110	146-459	144-188	143-193	180-253	-
		3	210	137-172	141-160	141-163	143-180	140-148
		4	210	139-164	137-145	141-159	143-205	141-147
14	ANPARA	1	210	144-236	137-236	143-248	166-254	148-198
		2	210	141-361	140-225	145-205	144-242	145-215
		3	210	141-260	133-242	153-226	181-244	149-231
		4	500	143-469	144-484	149-212	140-224	147-210
		5	500	143-531	142-268	162-238	145-239	150-262
15	OBRA	9	200	980-4986	1160-1660	U/R&M	U/R&M	141-173
		10	200	688-3069	1060-1860	1680-2802	Not in Op.	4872-7573
		11	200	980-1630	1080-2840	2710-3460	Not in Op.	4541-5856
		12	200	1120-2680	810-2630	1480-3216	Not in Op.	4053-6225
		13	200	610-1690	780-2210	1840-2860	Not in Op.	4980-7832
16	SINGRAULI	1	200	109-132	119-131	119-131	121-129	121-129
		2	200	108-131	117-133	120-130	124-131	124-131
		3	200	104-135	120-130	118-134	122-132	124-130
		4	200	121-134	115-134	118-129	123-131	123-131
		5	200	93-132	119-130	122-131	121-131	124-129
		6	500	108-133	121-135	121-134	129-138	124-135
		7	500	126-140	131-139	124-141	128-138	125-134
17	RIHAND	1	500	128-144	110-149	132-148	127-146	140-149
		2	500	108-147	117-145	131-147	129-149	140-149
		3	500	49-98	55-84	66-94	68-91	60-89
		4	500	65-101	56-96	33-95	70-96	62-92
18	TANDA	1	110	68-135	115-134	104-139	68-124	87-114
		2	110	78-145	115-143	128-143	113-141	93-143
		3	110	100-144	121-148	114-139	89-131	96-135
		4	110	105-146	124-147	126-143	106-137	102-133
19	DADRI	1	210	80-105	81-136	83-120	95-126	89-130
		2	210	80-120	80-131	83-126	81-120	91-114
		3	210	82-109	85-130	80-119	86-119	84-122
		4	210	85-120	91-125	85-124	89-117	81-123
		5	490	-	-	-	-	78-92
		6	490	-	-	-	-	83-94
20	UNCHAHR	1	210	131-143	137-148	132-148	143-146	135-149
		2	210	136-145	136-147	136-146	143-146	145-149
		3	210	89-135	112-143	112-139	113-137	105-136
		4	210	83-127	85-146	111-147	94-130	77-128
		5	210	25-94	30-84	40-107	25-63	28-63

Annexure – 14.1

**SUSPENDED PARTICULATE MATTER (SPM) EMISSIONS AT STACKS OF VARIOUS UNITS OF
THERMAL POWER PLANTS
STACK EMISSIONS: Suspended Particulate Matter (mg/Nm³)**

S. No.	Name of TPS	Unit No.	Cap. (MW)	2007-08	2008-09	2009-2010	2010-2011	2011-12
B. WESTERN REGION								
21	DHUVARAN	1	63.5	-	-	-	Closed	Closed
		2	63.5	-	-	-	Closed	Closed
		3	63.5	-	-	-	Closed	Closed
		4	63.5	78-85	-	-	Closed	Closed
		5	140	72-93	84-114	82-112	-	11-13
		6	140	69-114	79-112	56-92	-	8-10
22	UKAI	1	120	U/R&M	116-128	106-146	122-205	95-299
		2	120	86-149	145-253	U/R&M	138-205	93-288
		3	200	88-234	132-183	123-168	130-173	132-284
		4	200	130-186	136-177	142-295	136-196	148-299
		5	210	74-145	72-158	100-221	102-146	112-226
23	GANDHINAGAR	1	120	42-148	50-120	44-110	63-105	56-124
		2	120	41-153	49-142	61-146	83-103	56-88
		3	210	119-218	90-279	110-192	82-125	82-143
		4	210	109-234	109-289	104-148	78-125	72-123
		5	210	64-116	38-117	61-102	56-105	67-117
24	WANAKBORI	1	210	252-513	247-360	200-342	209-329	210-275
		2	210	277-427	252-304	163-253	159-260	180-259
		3	210	284-507	234-365	181-290	93-126	192-251
		4	210	269-500	284-341	176-303	144-248	161-273
		5	210	196-312	206-258	148-237	179-239	110-239
		6	210	250-353	220-277	152-269	248-301	178-250
		7	210	109-144	82-116	92-136	51-133	60-129
25	SIKKA RPL	1	120	97-169	130-171	129-149	128-143	82-285
		2	120	94-156	134-162	144-165	108-146	80-148
26	KUTCH LIGNITE	1	70	110-173	90-182	98-215	132-318	175-984
		2	70	110-415	145-390	245-975	168-452	136-594
		3	70	159-368	168-452	86-139	126-296	116-216
		4	75	-	-	69-86	138-142	134-159
27	SABARMATI	1	30	-	-	-	-	29-98
		2	30	-	-	-	-	29-98
		3	120	56-145	23-118	31-99	63-82	60-87
		4	110	21-129	24-96	30-95	45-69	36-86
		5	110	33-105	23-124	54-98	38-81	54-92
28	SATPURA	1	62.5	144-243	140-240	132-210	138-212	140-168
		2	62.5	140-171	142-239	137-212	142-160	142-177
		3	62.5	143-174	142-170	140-165	140-150	146-210
		4	62.5	146-189	140-190	130-190	144-182	140-154
		5	62.5	140-160	140-156	140-170	138-150	142-167
		6	200	541-722	540-689	512-744	376-518	183-524
		7	210	603-779	578-836	510-694	398-598	205-518
		8	210	517-823	510-592	522-602	365-618	420-546
		9	210	513-734	562-763	480-780	345-562	283-540
29	KORBA(E)	1	40	177-343	126-190	143-145	146-287	147-148
		2	40	179-341	136-182	142-146	138-142	
		3	40	176-341	136-183	142-144	147-282	
		4	40	189-343	129-184	139-144	146-296	
		5	120	136-145	115-145	140-146	146-283	141-147
		6	120	130-138	132-138	133-142	142-146	
Unit 1 to 4=Stack-I & Unit 5&6= Stack-II								
30	Dr. Shyama Prasad Mukherjee TPS	1	250	-	-	75-86	65-71	44-72
		2	250	-	-	68-80	66-75	45-72
31	KORBA(W), HASDEO TPS	1	210	101-128	113-132	131-138	122-150	121-139
		2	210	115-129	128-142	130-143	124-153	124-139

Annexure – 14.1

SUSPENDED PARTICULATE MATTER (SPM) EMISSIONS AT STACKS OF VARIOUS UNITS OF THERMAL POWER PLANTS

STACK EMISSIONS: Suspended Particulate Matter (mg/Nm³)

S. No.	Name of TPS	Unit No.	Cap. (MW)	2007-08	2008-09	2009-2010	2010-2011	2011-12
		3	210	152-166	138-185	73-146	118-152	126-142
		4	210	170-174	132-172	95-158	127-154	128-144
32	AMARKANTAK	1	30	140-165	146-400	-	Closed	Closed
		2	20	140-165	151-410	-	Closed	Closed
		3	120	145-153	140-230	126-160	NA	119-148
		4	120	145-153	140-255	132-154	NA	119-148
		5	210	-	-	82-100	NA	67-98
		U-1&2 closed since 1.4.2009 Unit 3&4=PH-I and Unit5=PH-II						
33	SANJAY GANDHI BIRSINGHPUR	1	210	105-148	108-139	134-144	134-148	136-148
		2	210	95-148	94-134	120-145	131-148	140-148
		3	210	85-138	94-142	108-145	128-146	135-145
		4	210	94-133	102-141	130-145	132-144	133-145
		5	500	-	82-95	43-89	49-84	78-93
34	KORBA STPS	1	200	122-147	117-136	112-132	113-123	117-123
		2	200	125-145	118-136	114-133	115-127	118-127
		3	200	124-142	115-131	107-131	110-122	115-123
		4	500	120-146	114-137	119-134	121-129	123-139
		5	500	115-142	111-135	119-135	121-126	124-136
		6	500	114-138	112-128	116-133	127-130	122-136
		7	500	-	-	-	-	42-48
35	VINDHYACHAL	1	210	138-149	142-148	140-148	132-141	132-143
		2	210	135-147	133-148	138-147	140-145	138-144
		3	210	142-149	137-148	134-147	134-145	128-142
		4	210	136-147	136-149	140-148	133-144	135-144
		5	210	132-147	141-147	137-147	136-144	130-144
		6	210	139-148	138-148	141-148	131-143	131-142
		7	500	90-98	92-96	91-98	86-96	84-90
		8	500	92-98	91-98	89-97	82-96	88-92
		9	500	91-97	78-91	84-93	82-92	81-90
		10	500	90-95	74-94	84-92	86-92	81-91
36	OP Jindal STPP	1	250	-	30-43	32-43	38-44	31-42
		2	250	-	34-42	30-43	38-44	36-41
		3	250	-	31-42	32-43	39-44	33-42
		4	250	-	38-44	30-46	38-45	39-45
37	NASIK	1	140	103-155	138-147	143-146	143-147	Closed
		2	140	121-153	141-148	140-147	143-147	Closed
		3	210	60-128	68-92	63-99	64-80	55-88
		4	210	135-309	222-672	169-296	231-278	176-320
		5	210	187-382	215-657	249-348	229-281	206-286
Unit 1 & 2 Closed on 01-07-2011								
38	KORADI	1	115	127-186	148-380	305-496	269-689	-
		2	115	125-236	176-442	294-649	310-638	-
		3	115	132-396	147-465	337-543	327-720	-
		4	115	134-143	199-425	304-538	304-755	-
		5	200	80-148	90-366	69-140	85-414	258-377
		6	210	129-711	70-615	69-142	142-323	329-609
		7	210	371-892	285-489	150-516	232-713	143-320
39	KHAPERKHERA	1	210	125-142	135-145	129-141	131-138	125-144
		2	210	117-146	120-142	129-142	128-135	106-140
		3	210	115-134	116-137	125-134	102-129	102-135
		4	210	110-129	90-138	105-131	121-134	115-140
40	PARAS	2	58	110-148	145-166	110-201	119-139	-
		3	250	-	107-147	81-121	71-95	78-106
		4	250	-	-	-	79-83	77-88
41	BHUSAWAL	1	58	136-150	138-145	141-152	148-151	-
		2	210	250-443	245-327	288-325	310-370	203-471

Annexure – 14.1

**SUSPENDED PARTICULATE MATTER (SPM) EMISSIONS AT STACKS OF VARIOUS UNITS OF
THERMAL POWER PLANTS
STACK EMISSIONS: Suspended Particulate Matter (mg/Nm³)**

S. No.	Name of TPS	Unit No.	Cap. (MW)	2007-08	2008-09	2009-2010	2010-2011	2011-12
		3	210	133-150	139-161	143-334	140-321	139-436
42	PARLI	1	30	156-177	153-175	145-173	183-225	-
		2	30	153-176	156-174	144-169	155-220	-
		3	210	299-744	322-665	284-517	276-820	231-535
		4	210	185-376	193-289	194-264	154-306	153-293
		5	210	147-299	120-274	143-308	136-288	138-336
		6	250	-	-	83-149	84-134	77-117
		7	250	-	-	-	78-113	72-111
43	CHANDRAPUR	1	210	120-183	132-147	141-160	121-163	148-173
		2	210	135-194	141-168	145-178	144-170	124-170
		3	210	115-146	94-138	86-124	129-145	119-149
		4	210	120-145	96-141	97-142	99-146	98-146
		5	500	127-145	124-146	115-148	138-145	108-150
		6	500	139-148	137-148	137-149	132-145	110-149
		7	500	136-147	137-149	111-149	142-148	114-149
44	TROMBAY	4	150	-	-	-	-	-
		5	500	-	-	-	-	44-83
		6	500	34-77	47-67	31-80	21-78	21-25
		8	250	-	-	-	-	11-56
45	DAHANU (REL)	1	250	26-45	27-44	35-47	37-47	40-48
		2	250	25-49	33-49	37-46	34-46	39-47
46	SIPAT (NTPC)	1	660	-	-	-	-	45-47*
		4	500	-	-	-	-	40-49
		5	500	-	-	-	-	30-49
*Based on data for three months i.e Nov ,Dec, 2011 & Feb, 2012								
C. SOUTHERN REGION								
47	KOTHAGUDEM	1	60	90-115	82-114	76-98	65-96	60-110
		2	60	96-321	74-114	58-98	65-105	58-108
		3	60	109-189	138-184	140-184	140-200	138-190
		4	60	83-112	74-96	65-113	80-109	60-96
		5	105	84-127	68-98	64-98	83-112	83-112
		6	105	92-122	72-108	69-104	71-120	65-108
		7	110	99-290	90-136	89-110	63-116	102-114
		8	110	108-132	96-118	91-114	85-122	96-114
		9	250	-	94-112	100-113	102-112	111-141
		10	250	-	97-112	98-112	104-115	114-214
		11	500	-	-	-	-	114-214
48	VIJAYAWADA	1	210	106-141	101-118	100-144	107-202	104-209
		2	210	91-104	99-135	100-139	108-252	113-253
		3	210	80-130	105-152	93-140	109-187	88-220
		4	210	82-280	105-152	72-148	98-237	104-182
		5	210	72-113	91-113	93-144	85-138	102-305
		6	210	100-145	102-150	104-146	112-207	121-196
		7	500	-	-	-	-	56-106
49	R'GUNDAM B	1	62.5	102-110	122-352	122-340	NA	132-234
50	RAYALSEEMA	1	210	89-112	86-112	54-112	89-110	95-110
		2	210	83-111	94-113	90-114	93-109	92-113
		3	210	59-112	57-105	44-103	36-69	37-78
		4	210	-	54-97	37-93	28-72	40-76
		5	210	-	-	-	-	71-97
51	R'GUNDAM STPS	1	200	83-108	81-107	85-103	NA	88-102
		2	200	90-112	90-107	89-109	NA	90-102
		3	200	86-107	90-104	92-110	NA	92-103
		4	500	94-110	87-112	107-112	NA	102-109
		5	500	96-114	96-113	106-113	NA	105-110
		6	500	92-111	91-110	106-112	NA	105-110

Annexure – 14.1

**SUSPENDED PARTICULATE MATTER (SPM) EMISSIONS AT STACKS OF VARIOUS UNITS OF
THERMAL POWER PLANTS
STACK EMISSIONS: Suspended Particulate Matter (mg/Nm³)**

S. No.	Name of TPS	Unit No.	Cap. (MW)	2007-08	2008-09	2009-2010	2010-2011	2011-12
		7	500	44-69	52-89	45-88	NA	63-86
52	SIMHADRI	1	500	70-114	75-101	58-111	63-86	58-98
		2	500	65-104	61-101	48-99	79-112	86-113
53	RAICHUR	1	210	71-142	76-148	90-126	59-124	64-110
		2	210	90-145	68-150	92-131	94-127	73-120
		3	210	68-143	55-144	98-148	92-132	90-138
		4	210	46-135	64-150	84-145	100-140	43-122
		5	210	62-145	73-148	74-148	75-138	94-115
		6	210	64-168	55-146	110-148	102-143	104-121
		7	210	33-108	38-137	52-101	64-120	91-126
54	BELLARY	1	500	-	-	95-138	NA	94-110
55	ENNORE	1	60	143-168	139-143	73-146	121-142	140-148
		2	60	145-170	137-143	120-124	124-142	142-148
		3	110	145-172	137-142	89-145	138-141	-
		4	110	146-165	138-147	125-147	128-145	141-148*
		5	110	144-170	140-143	129-147	138-145	141-149
*Based on data available for April to Sep., 2011								
56	TUTICORIN	1	210	756-1195	952-1195	475-1571	197-700	114-808
		2	210	216-335	193-298	194-790	139-755	434-1567
		3	210	148-393	196-712	703-2501	1382-5499	7731-7654
		4	210	146-476	144-307	143-481	470-1263	602-4946
		5	210	148-225	141-198	150-506	204-829	420-2071
57	METTUR	1	210	84-239	50-196	52-147	108-281	46-243
		2	210	61-356	46-301	79-148	74-289	83-289
		3	210	81-237	26-242	49-143	83-280	43-143
		4	210	78-294	80-194	77-175	122-278	115-257
58	NORTH CHENNAI	1	210	75-99	82-128	112-135	95-125	108-130
		2	210	82-98	79-120	111-125	102-131	109-136
		3	210	80-109	94-122	118-129	110-138	115-140
59	NEYVELI--I	1	50	56-74	41-90	56-81	55-81	38-68
		2	50	-	-	-	-	-
		3	50	53-78	51-97	46-66	57-83	36-80
		4	50	50-69	43-74	49-71	54-69	38-69
		5	50	-	-	-	-	-
		6	50	53-72	54-81	53-68	52-81	43-71
		7	100	44-88	43-74	49-70	47-98	38-70
		8	100	52-78	52-68	47-68	55-71	37-75
		9	100	54-71	54-74	46-92	51-76	36-90
60	NEYVELI-II	1	210	85-91	62-94	51-88	76-96	42-92
		2	210	47-92	61-98	66-77	46-64	41-86
		3	210	53-94	67-91	40-92	35-49	31-94
		4	210	36-51	60-67	39-52	42-100	40-81
		5	210	39-61	49-51	30-52	40-82	35-86
		6	210	29-66	36-61	24-97	37-39	34-40
		7	210	36-69	57-64	35-63	-	37-93
61	NEYVELI FST EXT	1	210	22-53	23-42	26-63	25-41	22-69
		2	210	20-55	22-48	29-48	27-57	24-64
D. EASTERN REGION								
62	TENUGHAT	1	210	-	96-98	92-213	95-99	92-96*
		2	210	89-96	93-98	96-169	184-92	85-90**
*Based on data for Aug. to Dec., 2011, ** Based on data for Sep. To Dec., 2011.								
63	IB VALLEY	1	210	145-149	124-148	128-205	136-148	137-230
		2	210	145-149	137-147	127-144	129-146	135-173
64	DURGAPUR (DPL)	1	30	87-201	140-182	-	-	-
		2	30	61-256	178-271	108-204	-	-
		3	70	39-228	58-251	136-273	69-256	78-314

Annexure – 14.1

SUSPENDED PARTICULATE MATTER (SPM) EMISSIONS AT STACKS OF VARIOUS UNITS OF THERMAL POWER PLANTS
STACK EMISSIONS: Suspended Particulate Matter (mg/Nm³)

S. No.	Name of TPS	Unit No.	Cap. (MW)	2007-08	2008-09	2009-2010	2010-2011	2011-12
		4	75	41-284	67-205	45-265	84-207	119-347
		5	75	60-284	106-241	138-383	193-268	250-406
		6	110	-	85-284	185-250	266-722	291-405*
		7	300	-	-	-	62-104	73-98**
Unit 1 & 2 Decommissioned on 1/4/2011 * Based on data for May, Jul & Sep, 2011, **Based on data for Sep 2011 to Feb 2012.								
65	BANDEL	1	60	14-138	37-158	20-195	31-304	98-310
		2	60	81-148	58-190	32-131	47-333	102-325
		3	60	15-189	29-144	36-101	52-292	74-340
		4	60	32-148	42-173	38-309	40-317	91-305
		5	210	25-146	40-147	51-145	40-364	50-153
66	SANTALDIH	1	120	47-146	18-191	139-270	-	*
		2	120	17-170	66-180	144-296	-	
		3	120	24-144	134-210	-	-	
		4	120	40-170	106-158	-	-	
		5	250	-	-	25-71	32-48	33-124
*U-1 to 4 decommissioned w.e.f 07-10-2008 to 18-12-2009								
67	KOLAGHAT	1	210	51-140	97-130	139-834	144-152	112-145
		2	210	56-144	87-140	137-643	138-306	82-333
		3	210	46-145	92-139	139-617	142-179	132-189
		4	210	118-147	128-149	118-279	132-322	136-321
		5	210	129-149	125-149	146-560	130-146	137-356
		6	210	118-147	133-147	142-777	128-233	139-425
U 1 to 6, Based on data for six months i.e May, June, Aug to Oct and Dec, 2011								
68	BAKRESWAR	1	210	18-63	24-44	12-143	26-136	33-77
		2	210	16-45	19-49	14-125	29-134	37-127
		3	210	18-50	28-91	14-65	22-75	25-116
		4	210	-	-	27-90	31-122	29-64
		5	210	-	-	26-62	25-91	26-58
69	SAGARDIGHI	1	300	-	-	18-29	52-89	19-144
		2	300	-	-	15-95	36-130	22-324
70	BOKARO 'B' (DVC)	1	210	NA	162-381	148-230	134-227	126-566
		2	210	NA	172-289	127-220	140-219	136-860
		3	210	NA	182-275	135-212	135-200	139-734
71	DURGAPUR (DVC)	3	140	34-142	109-146	65-148	111-492	83-155
		4	210	42-142	48-146	55-144	100-658	143-536
72	MEJIA (DVC)	1	210	37-142	67-145	88-112	12-86	59-144
		2	210	71-138	54-159	109-140	30-190	42-143
		3	210	121-149	121-147	118-146	13-130	91-143
		4	210	62-137	51-128	88-127	24-130	42-105
		5	250	-	55-81	21-82	32-81	45-126
		6	250	-	45-56	28-129	18-142	25-144
U 1 to 6, Based on data for six months i.e April, 2011 to Dec, 2011								
73	NEW COSSIPORE	1	20	85-136	48-123	24-120	37-129	38-138
		2	20	85-136	48-123	24-120	55-135	38-138
		3	45	27-137	30-130	31-126	29-129	32-93
		4	45	31-136	13-138	33-131	55-135	42-93
74	TITAGARH	1	60	19-67	14-62	12-47	21-74	23-40
		2	60	12-78	17-55	16-49	26-65	24-39
		3	60	19-62	12-61	18-49	23-74	32-47
		4	60	11-54	19-91	13-41	23-74	25-39
75	SOUTHERN REPL	1	67.5	54-87	31-97	52-108	23-72	45-115
		2	67.5	50-118	36-97	54-100	39-95	37-113
76	BUDGE BUDGE	1	250	21-41	21-57	29-63	33-104	30-65
		2	250	28-85	35-92	31-106	28-68	31-75
		3	250	-	-	-	24-46	22-49

Annexure – 14.1

**SUSPENDED PARTICULATE MATTER (SPM) EMISSIONS AT STACKS OF VARIOUS UNITS OF
THERMAL POWER PLANTS
STACK EMISSIONS: Suspended Particulate Matter (mg/Nm³)**

S. No.	Name of TPS	Unit No.	Cap. (MW)	2007-08	2008-09	2009-2010	2010-2011	2011-12
77	FARAKKA	1	200	34-92	57-94	63-92	56-92	53-96
		2	200	47-85	61-108	68-94	61-91	44-95
		3	200	48-82	57-90	61-99	63-104	51-110
		4	500	49-112	75-96	72-97	40-118	39-125
		5	500	65-92	63-129	67-118	54-126	23-134
78	KAHALGAON	1	210	133-145	136-143	137-146	133-146	131-144
		2	210	138-148	140-147	141-147	131-147	134-139
		3	210	142-160	143-149	142-148	138-147	129-143
		4	210	143-149	144-149	140-147	137-147	133-142
		5	500	-	-	47-98	41-47	37-49
		6	500	-	-	42-97	38-47	37-48
		7	500	-	-	-	40-46	38-48
79	TALCHER	1	60	115-129	103-129	112-131	111-129	106-131
		2	60	115-131	107-129	100-131	114-127	107-129
		3	60	111-134	97-127	115-140	121-131	117-132
		4	60	117-136	109-132	85-127	104-130	124-132
		5	110	140-148	142-147	143-185	116-145	135-145
		6	110	141-147	142-148	143-186	123-145	133-145
80	TALCHER STPS	1	500	109-118	107-138	108-120	107-117	62-329
		2	500	109-117	108-132	107-122	106-122	79-446
		3	500	57-80	55-108	72-109	53-129	52-305
		4	500	43-74	49-130	68-115	51-131	48-124
		5	500	42-72	49-133	51-95	41-138	41-134
		6	500	44-75	53-97	62-99	46-139	65-123
81	CHANDRAPURA (DVC)	1	130	-	-	-	21-131	94-165
		2	130	-	-	-	19-131	106-145
		3	130	-	-	-	121-133	74-131
		7	250	-	-	-	-	88-124
		8	250	-	-	-	-	96-122
U 4 to 6 Closed, U 7 & 8 Based on data for Dec,2011 to March,2012								
82	MUZAFFARPUR	1	110	-	-	-	-	130-275
		2	110	-	-	-	-	

THERMAL POWER PLANTS: EMISSION STANDARDS**NOTIFICATION**

MOEF vide Notification of 19th May 1993 issued as amendment rules to environment (Protection) Act 1986. The particulate matter emission limits for thermal power stations are as follows: -

1.	Generation capacity 62.5 MW or more	150 mg/Nm ³
2.	Generation capacity less than 62.5 MW and plant Commissioned prior to 1.1.82	350 mg/Nm ³
3.	Units located in protected area irrespective of generation capacity.	150 mg/Nm ³

THERMAL POWER PLANTS: STACK HEIGHT/LIMITS

Generation Capacity	Stack Height (Meters)
500 MW and above	275
200 MW/210 MW and above to less than 500 MW	220
Less than 200 MW/210 MW	$H = 14 Q^{0.3}$ where Q is emission rate of SO ₂ in kg/hr, and H is Stack height in meters.

Source: EPA Notification [G.S.R. 742(E), dt. 30th Aug; 1990]

Annexure-14.3

THERMAL POWER PLANT: STANDARDS FOR LIQUID EFFLUENTS

Source	Parameter	Concentration not to exceed, mg/l (except for pH & Temp.)
Condenser Cooling Water (once through higher cooling system)	PH Temperature	6.5 to 8.5 please refer to Annex-14.4
Boiler Blow down	Free available Chlorine Suspended solids Oil & grease Copper (Total) Iron (Total)	0.5 100 20 1.0 1.0
Cooling Tower 60 Blow down	Free available Chlorine Zinc Chromium (Total) Phosphate Other corrosion inhibiting material	0.5 1.0 0.2 5.0 Limit to be established on case by case basis by Central Board in case of Union Territories and State Boards in case of States
As pond effluent	pH Suspended solids Oil & grease	6.5 to 8.5 100 20

Source: EPA Notification [S.O. 844(E), dt 19th Nov; 1986]

Annexure-14.4

TEMPERATURE LIMIT FOR DISCHARGE OF CONDENSER COOLING WATER FROM THERMAL POWER PLANT**A. New thermal power plants commissioned after June 1, 1999.**

New thermal power plants, which will be using water from rivers/lakes/reservoirs, shall install cooling towers irrespective of location and capacity. Thermal power plants which will use sea water for cooling purposes, the condition below will apply.

B. New projects in coastal areas using seawater.

The thermal power plants using seawater should adopt suitable system to reduce water temperature at the final discharge point so that the resultant rise in the temperature of receiving water does not exceed 7°C over and above the ambient temperature of the receiving water bodies.

C. Existing thermal power plants.

Rise in temperature of condenser cooling water from inlet to the outlet of condenser shall not be more than 10°C.

D. Guidelines for discharge point:

1. The discharge point shall preferably be located at the bottom of the water body at midstream for proper dispersion of thermal discharge.
2. In case of discharge of cooling water into sea, proper marine outfall shall be designed to achieve the prescribed standards. The point of discharge may be selected in consultation with concerned State Authorities/NIO.
3. No cooling water discharge shall be permitted in estuaries or near ecologically sensitive areas such as mangroves, coral reefs/spanning and breeding grounds of aquatic flora and fauna.

Source: EPA Notification [GSR 7, dated Dec. 22, 1998]

Annexure –14.5

Ministry of Environment & Forest
NOTIFICATION
New Delhi, the 16th November, 2009
NATIONAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Time Weighted Average	Concentration in Ambient Air		Method of measurement
		Industrial, Residential, Rural and Other Area	Ecologically Sensitive Area (notified by Central Govt.)	
Sulphur Dioxide (SO ₂), (µg/m ³)	* Annual	50	20	- Improved West & Gacke
	** 24 hours	80	80	- Ultraviolet fluorescence
Nitrogen Dioxide (NO ₂), (µg/m ³)	* Annual	40	30	- Modified Jacob & Hochheiser (Na Arsenite)
	** 24 hour	80	80	- Chemiluminescence
Particulate Matter (size less than 10µm) or PM ₁₀ µg/m ³	* Annual	60	60	- Gravimetric
	** 24 hour	100	100	- TOEM - Beta attenuation
Particulate Matter (size less than 2.5µm) or PM _{2.5} µg/m ³	* Annual	40	40	- Gravimetric
	** 24 hour	60	60	- TOEM - Beta attenuation
Ozone (O ₃) µg/m ³	** 8 hours	100	100	- UV photometric
	** 1 hour	180	180	- Chemiluminescence - Chemical Method
Lead (Pb) µg/m ³	* Annual	0.50	0.50	- AAS/ICP method after sampling on EPM 2000 or equivalent filter paper
	** 24 hour	1.0	1.0	- ED-XRF using Teflon filter
Carbon Monoxide (CO) mg/m ³	** 8 hours	02	02	- Non Dispersive Infra Red (NDIR) Spectroscopy
	** 1 hour	04	04	
Ammonia (NH ₃) µg/m ³	* Annual	100	100	- Chemiluminescence
	** 24 hour	400	400	- Indophenol blue method
Benzene (C ₆ H ₆) µg/m ³	Annual*	05	05	- Gas chromatography based continuous analyzer -Absorption and Desorption followed by GC analysis
Benzopyrene (BaP) – particulate phase only, ng/m ³	Annual*	01	01	- Solvent extraction followed by HPLC/GC analysis
Arsenic (As), ng/m ³	Annual*	06	06	- AAS/ICP method after sampling on EPM 2000 or equivalent filter paper
Nickel (Ni), ng/m ³	Annual*	20	20	- AAS/ICP method after sampling on EPM 2000 or equivalent filter paper

* Annual arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform intervals.

** 24 hourly or 08 hourly or 01 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive days of monitoring.

Annexure –14.6

**ENVIRONMENTAL STANDARDS FOR GAS / NAPHTHA
BASED THERMAL POWER PLANTS**

(i) Limit for emission of NOx

- (a) For existing units - 150 ppm (v/v) at 15% excess oxygen.
- (b) For new units with effect from 1-6-99.

Total generation of gas turbine	Limit for Stack NOx emission (v/v), at 15% excess oxygen)
(a) 400 MW and above	(i) 50 ppm for the units burning natural gas. (ii) 100 ppm for the units burning naphtha
(b) Less than 400 MW but up to 100 MW	(i) 75 ppm for the units burning natural gas (ii) 100 ppm for the units burning naphtha
(c) Less than 100 MW	100 ppm for units burning natural gas or naphtha as fuel
(d) For the plants burning gas in a conventional boiler.	100 ppm

(ii) **Stack height** H in m should be calculated using the formula $H = 14 Q^{0.3}$, where Q is the emission of SO₂ in kg/hr, subject to a minimum of 30 mts.

(iii) Liquid waste discharge limit

Parameter	Maximum limit of concentration (mg/l except for pH and temperature)
pH	6.5-8.5
Temperature	As applicable for other thermal power plants (please refer to Annex-14.4)
Free available chlorine	0.50
Suspended solids	100.0
Oil & grease	20.00
Copper (total)	1.00
Iron (total)	1.00
Zinc	1.00
Chromium (total)	0.20
Phosphate	5.00

Source: EPA Notification [GSR 7, dt. Dec. 22, 1998]

SECTION-15

ENERGY CONSERVATION AND EFFICIENCY IMPROVEMENT OF THERMAL POWER STATIONS

15.1 The strategy developed to make power available to all includes promotion of energy efficiency and its conservation in the country, which has been found to be the least-cost option to bridge the gap between demand and supply. Measures to conserve energy are being continuously devised and implemented on both the supply side and the end-use (Demand) side.

15.2. Indo-German Energy Efficiency Programme:

1. A project "**Power Plant Optimization Component: Improvement in the availability and efficiency of Power Plants**" under Indo–German Efficiency programme (IGEN) is being implemented jointly by M/s **GIZ** (Deutsche Gesellschaft für Internationale Zusammenarbeit) and CEA with the objective **to promote energy efficiency and its conservation through improvement in the availability and efficiency of Power Plants**. Implementation agreement between Ministry of Power and M/s GIZ was signed in November, 2006. Under the programme the work of mapping of 85 units at 47 nos. thermal power stations all over the country has been completed in association with GIZ.

The proposed activities for thermal power plant optimization component under Phase II of Indo German Energy Programme (IGEN Programme) (October, 2009 – September, 2013) were finalized. The implementation agreement between GIZ, BEE and CEA was signed on 1st November, 2010 during the 4th Indo-German Energy Forum (IGEN) meeting held in New Delhi.

Activities under IGEN Phase II Programme are as follows:

- (a) To support 15 Thermal Power Generating Utilities in various States for their plant efficiency improvement using diagnostic tools and giving them Epsilon software.
- (b) To introduce the model power plant concept in 4 thermal power stations;
- (c) Human resource development to improve knowledge on critical areas such as boiler, turbine, auxiliaries and C&I; and

Under human resource development programme for enhancing the expertise in critical areas such as boiler, turbine, auxiliaries, instrumentation and control, super-critical units, O&M, online optimization and fault diagnostic through conduct of study-cum-familiarisation tour to Germany/Europe upto two weeks are being organized. GIZ has proposed three study-cum-familiarisation tours to Germany/Europe for 51 power plant engineers of thermal generating utilities and CEA. The first batch consisting of 15 engineers from various states power utilities and CEA has already completed two week study tour in Germany from 10th to 21th October, 2011 and the other two batches will proceed in the year 2012. The main focus of these study tours will be on the following topics:

- (i) Operation and Maintenance
- (ii) Modernisation and Retrofit
- (iii) Online and off-line Monitoring Programme
- (iv) Supercritical power plant and Equipments
- (v) Coal Blending Technology

15.3. **Excellence Enhancement Centre for Indian Power Sector:**

In order to deal with the complex operational problem arising from the operating power stations and to deal with the enhancement of efficiency at the operating power stations, it was proposed that a common platform should be made available where latest state of the art technologies, problems and remedial actions can be shared effectively among power utilities and professionals. Under the Indo-German Energy Forum an "Excellence Enhancement Centre for Indian Power Sector" (EEC) was set up in order to initiate a mind-setting process towards a spirit to excellence and leadership.

EEC has already been registered as a society under societies Registration Act XXI 1860 applicable to NCT with the following objectives:

- a) Provide a common platform to share best practices in all areas of power sector and providing broad based expertise.
- b) To raise awareness for the need of excellence.
- c) Provides a platform for interaction amongst the power industries and power plant operators for technological development.
- d) Provide common solutions and joint action plans for mitigating problems associated with power sector in consultation with top experts of power sector.
- e) Disseminate the best practices at the power stations.
- f) Translate, print, publish and circulate appropriate material for dissemination of useful knowledge through magazines, pamphlets or other printed mode for the development and advancement of excellence in power sector.

The constitution of the Governing Body of the EEC is as follows:

- (i) Chairperson, CEA – President
- (ii) Member (Planning), CEA – Vice-President
- (iii) Director General, BEE – Member
- (iv) Chief Engineer (C&E), CEA – Member Secretary
- (v) Secretary, CBIP – Member and Treasurer
- (v) Director Technical, NTPC
- (vi) Director (IGEN), GIZ
- (vii) A nominee of VGB

The activities of the Centre will focus on three fields: -

- Technology
- Personnel skill
- Processes

EEC has since been operationalised after the signing of Implementation Agreement by CEA, BEE and GIZ on September 8, 2011. EEC was officially launched by Minister of States for Power on February 2, 2012 at New Delhi. The office of EEC has already been setup in New Delhi.

SECTION-16

RENOVATION AND MODERNISATION OF THERMAL POWER PLANTS

16.1 INTRODUCTION

India is a power deficit country, putting immense pressure on the existing power plants to deliver higher level of performance. Renovation and Modernisation (R&M) and Life Extension (LE) of an existing old power station provides an opportunity to get additional generation at low cost and short gestation period. Besides generation improvement, it results in improvement of environmental emissions and improvement in availability, safety and reliability.

16.2 HISTORY OF R&M PROGRAMME:

16.2.1 PHASE-I R&M PROGRAMME

The roving teams comprising engineers from CEA, BHEL, ILK and Keltron visited various thermal power stations and assisted SEBs in identifying areas of attention and formulation of R&M Schemes during early eighties. Thirty four (34 Nos.) of thermal power stations were covered under the Phase-I R&M Programme. The approval to the Scheme of R&M of Thermal Power Stations in the country was accorded in the year 1984 under Central Loan Assistance.

The entire programme starting from the concept stage was coordinated by the Central Electricity Authority. The Central Loan Assistance (CLA) was also managed by CEA till the formation of PFC in March, 1988. The programme was successfully completed during the 7th Plan and much more benefits than the anticipated were achieved. The R&M works relating to environmental improvement in the power plants were accorded high priority and about 47% of the total investment was made on environmental pollution control measures. The main features of the Programme are as under:

i)	Number of thermal power stations covered	34
ii)	Number of thermal units covered	163
iii)	Total capacity involved	13570 MW
iv)	Average PLF of 163 units before R&M Programme	46%
v)	Anticipated PLF after completion	53%
vi)	PLF achieved after completion	56%
vii)	Anticipated additional generation after completion	7000 MU/ annum
viii)	Actual additional generation achieved after completion	10000 MU/Annum
ix)	Year of completion	1990-91
x)	Total expenditure incurred	Rs.1066 Crores
	a) Central Loan Assistance	Rs.402 Crores
	b) State Plan Resources	Rs.664 Crores

16.2.2 PHASE - II R&M PROGRAMME

In view of the encouraging results achieved from the Phase-I programme, the Phase-II programme for R&M of 44 nos. of thermal power stations was taken up in the year 1990-91 Power Finance Corporation (PFC) was assigned to provide loan assistance to the State Electricity Boards for R&M works. All the schemes were identified by the Roving teams comprising of engineers from CEA, BHEL and concerned utilities. An expenditure of Rs.862 crores was incurred and an additional generation of 5000 MU/ year has been achieved. Also, the Life Extension (LE) works on 4 units (300 MW) of Neyveli Thermal Power Station were completed.

The salient features of the Programme are as under:

i)	Number of thermal power stations covered	44
ii)	Number of thermal units covered	198
iii)	Total capacity involved	20870 MW
iv)	Expenditure incurred	Rs. 862 Crores
v)	Total additional generation achieved after completion.	5000 MU/annum
vi)	Capacity taken up for Life Extension Works	300 MW

16.2.3 R&M /LIFE EXTENSION PROGRAMME (LEP) DURING 9th PLAN

16.2.3.1 Some of the pending R&M works of the 8th Plan and the additional works subsequently identified were covered under 9th Plan Programme. The R&M programme covered 127 units at 29 stations. The R&M works have been completed.

The economic designed life of the thermal power units is considered to be 25 years. 25 Nos. of thermal units which had already completed their designed life of 25 years were also taken up for life extension works based on RLA studies during the 9th Plan. The LE works on all the 25 units have been completed.

16.2.3.2 THE SALIENT FEATURES OF THE PROGRAMME ARE AS UNDER:-

Sl. No.	Particulars	R&M	LEP
i)	Number of thermal power stations covered	29	7
ii)	Number of thermal units	127	25
iii)	Estimated Cost	Rs.913 Crores	Rs.1700 Crores
iv)	Total capacity involved	17306 MW	1685 MW
v)	Expected capacity after LEP	-	1731 MW
vi)	Average PLF of the units before R&M/LEP programme	61.75%	47.8%
vii)	Average PLF of the units after R&M/LEP programme	68.00 %	79.7%
viii)	Actual additional generation achieved/ annum	9475 MU	5028 MU
ix)	Total expenditure incurred	Rs. 850 Crores	Rs.1560 Crores

16.2.4 R&M/LIFE EXTENSION PROGRAMME DURING 10TH PLAN

16.2.4.1 R&M works on 57 units (14270MW) at an estimated cost of Rs. 977 crore were identified for sustenance of their performance for completion during the plan. The works on 14 units (2460 MW) had been completed and for balance units major activities have been completed. 106 old thermal units (10413 MW) were identified for Life Extension works. Based on subsequent techno-economic examination, the Life Extension works on 45 units (3201 MW) were not found techno-economically viable. LE works on 11 units (985 MW) i.e. unit-6,7&8 of Kothagudem TPS, unit-1&2 of Ennore, unit-1,4,5 & 6 of Korba (East) TPS and unit-1&2 of Bathinda had been completed & 23 units (2253 MW) had been transferred to Partnership-in-Excellence (PIE) programme. Remaining 27 units (3974 MW) were slipped beyond 10th Plan.

16.2.4.2 THE SALIENT FEATURES OF THE PROGRAMME ARE AS UNDER:-

Sl. No.	Particulars	R&M (not involving LE works)	R&M(Life Extension Programme)
i)	Number of thermal power stations identified	13	32
ii)	Number of thermal units	57(14270 MW)	106 (10413 MW)
iii)	Number of units not found to be techno-economical viable	-	45 (3200 MW)
iv)	Number of units transferred to "PIE" Programme	-	23 (2253 MW)
v)	Estimated Cost	Rs.977 Crores	Rs.9200 Crores
vi)	Works completed	14 units (2460 MW)	11 units (985 MW before LEP) (1040 MW after LEP)
vii)	Average PLF of the units before R&M Programme	82 %	61.34 %
viii)	PLF after completion (Actual)	sustenance	81.65 %
ix)	Actual additional generation achieved/annum	sustenance	2146 MU/annum
x)	Total expenditure incurred	Rs. 214 Crores	Rs.950 Crores

16.3 R&M/LIFE EXTENSION PROGRAMME DURING 11TH PLAN (2007-08 to 2011-12)

16.3.1 The Sector wise break up of units identified for LE / R&M works during 11th plan is furnished as under :-

Sl No.	Particulars of works	State Sector		Central Sector		Total (State sector + Central Sector)	
		No. of units	Capacity (MW)	No. of units	Capacity (MW)	No. of units	Capacity (MW)
1.	LE works	33	4524	20	2794	53	7318
2.	R&M works	27	6015	49	12950	76	18965
	Total	60	10539	69	15744	129	26283

16.3.2 Achievement of LE Programme during 11th Plan (2007-08 to 2011-12)

During 11th Plan, LE works have been completed in 13 units comprising 10 units in the state sector and 3 units of NTPC in the central sector out of total 53 units planned for 11th plan. Sector wise details of units where LE works have been completed are furnished as under:-

State Sector (10 Nos. of units)

Obra TPS Unit – 1 (40 MW)
 Obra TPS Unit – 2 (40 MW)
 Obra TPS Unit – 6 (94 MW)
 Obra TPS Unit – 9 (200 MW)
 Haduaganj TPS Unit – 5 (60 MW)
 Panipat TPS Unit – 1 (110 MW)
 Ukai TPS Unit – 1 (120 MW)
 Ukai TPS Unit – 2 (120 MW)
 Amarkantak TPS Unit – 2 (120 MW)
 Amarkantak TPS Unit-1 (120 MW)

Central Sector (3 Nos. of units)

Anta CCGT (NTPC) GT – Units 1 to 3 (3x89 MW)

Sub total (LE) - 13 Units (1291 MW)

16.3.3 Achievement of R&M Programme during 11th Plan (2007-08 to 2011-12)

During 11th Plan, R&M works have been completed in 59 nos. of units comprising 20 nos. of units and 39 nos. of units in the state and central sector respectively as against total 76 nos. of units planned for the 11th plan. Sector wise details of units where R&M works have been completed are furnished as under: -

State Sector (20 Nos. of units)

Ropar TPS Unit – 1 to 6 (6x210 MW)
 Koradi TPS Unit – 5 to 7 (1x200 + 2x210 MW)
 Chandrapur TPS Unit – 1 to 6 (4x210 + 2x500 MW)
 Parli TPS Unit – 3 to 5 (3x210 MW)
 Rajghat TPS Unit - 1 & 2 (2x67.5 MW)

Central Sector

a) DVC (2 Nos. of units)

Durgapur TPS (DVC) Unit 3 & 4 (130 MW + 210 MW)

b) NTPC (37 nos. of units)

Korba STPS Unit – 1 to 6 (3x200 + 3x500 MW)
 Vindhyachal STPS Unit – 1 to 6 (6x210 MW)
 Ramagundem STPS Unit – 1 to 6 (3x200 + 3x500 MW)
 Farakka STPS St-I, Unit – 1 to 3 (3x200 MW)
 Tanda TPS Unit – 1, 3 & 4 (3x110 MW)
 Talcher TPS , Unit – 5 & 6 (2x110 MW) *
 Singrauli STPS Unit 1 to 7 (5x200 + 2x500 MW)
 Unchahar TPS St. – 1, Unit 1 & 2 (2x210 MW)
 Rihand St – 1, Unit 1 & 2 (2x500 MW)

Sub total (R&M) - 59 Units (14855 MW)

Total (LE and R&M) - 72 Units (16146 MW)

16.3.4 THE SALIENT FEATURES OF THE PROGRAMME ARE AS UNDER:-

Sl. No.	Particulars	R&M	LE
i)	Number of thermal power stations identified	59	13
ii)	Number of thermal units	76 (18965 MW)	53(7318 MW)
v)	Estimated Cost	Rs 4487 crore	Rs 12433 crore
vi)	Works completed	59(14855 MW)	13(1291 MW)
vii)	Average PLF of the units before R&M Programme	85 %	42.3%
viii)	PLF after completion (Actual)	sustenance	some units are under stabilisation
ix)	Actual additional generation achieved/ annum	sustenance	1800 MU/annum
x)	Total expenditure incurred *	Rs. 1409 Crores	Rs. 1430 Crores

* figures are tentative

16.4 TENTATIVE R&M/LE TARGET FOR THE 12TH PLAN:

Break-up of revised tentative LE and R&M works of 29367 MW, on account of slippage from 11th Plan, to be taken up during 12th Plan in terms of Central/State sector-wise is furnished below :

S.No.	Particulars	Revised Tentative LE/R&M works during 12 th Plan on account of slippage from 11 th Plan		Total (State Sector + Central Sector)
		State Sector	Central Sector	
		No. of units & capacity (MW)	No. of units & capacity (MW)	
1	2	3	4	5
1.	LE	38 (6820)	32 (5246)	70 (12066)
2.	R&M	20(4150)	45 (13151)	65 (17301)
Total		58 (10970)	77 (18397)	135 (29367)

16.5 EXTERNAL CO-OPERATION FOR R&M OF TPS

The KfW-Germany has financed Energy Efficiency R&M programme of old thermal units of 210 MW at three thermal power stations in India. Similarly the World Bank has financed the Coal Fired Rehabilitation Programme – India for demonstration of Energy Efficiency Rehabilitation & Modernization of Coal Fired Generating Units. In addition, KfW has financed the project for Standardization of the Tendering Procedures and Preparation of Model Contract for the R&M of Fossil Fuel Based Power Plants in India. Also, METI (Ministry of Economy, Trade and Industry) and MOP have agreed to extend their cooperation in sharing of technical expertise as well as in actual implementation of mutually agreed techno-economical R&M solutions.

16.5.1 Energy Efficiency R&M Programme funded by KfW Bank-Germany

Under EE R&M, KfW Bank has provided a grant of Euro 1.3 million for preparation of feasibility reports/DPR to identify & finalize the scope of works for R&M/LE for the following seven units.

- i) Bokaro 'B' TPS, U-1, 2 & 3 (3x210MW) of DVC.
- ii) Kolaghat TPS, U-1, 2 & 3 (3x210MW) of WBPDC.
- iii) Nasik TPS, U-3 (210MW) of Mahagenco.

KfW Development Bank –Germany has also provided a soft loan of Euro 90 million for the implementation of Energy Efficiency R&M at two units one each at Nasik TPS and KolaghatTPS.

M/s Evonik Energy Services GmbH, Germany have been selected as consultant through ICB route to prepare feasibility study/DPR for the above seven (07) units at three power stations. The implementation of R&M/LE works based on the Detailed Project Report (DPRs) would be taken up by the concerned utilities.

a) Nasik TPS :

The DPR for Unit-3 (210 MW) was prepared by M/s Evonik and submitted to Mahagenco. The DPR was approved by MERC and Mahagenco.

b) Kolaghat TPS :

The final DPRs for Unit-1,2 & 3 (3x210 MW) of Kolaghat TPS were prepared by M/s Evonik and submitted to WBPDC. DPRs were accepted by WBPDC.

c) Bokaro 'B' TPS

The Feasibility Reports for unit 1,2&3 of Bokaro 'B' TPS were submitted. After discussion between CEA, DVC and M/s Evonik, the scope of R&M works were finalized. The DPRs for Unit-1,2&3 (3x210 MW) of Bokaro 'B' TPS have been prepared by M/s Evonik in March,2012 and sent to DVC for their examinations/acceptance. The same is awaited.

16.5.2 Coal Fired Generation Rehabilitation Project funded by World Bank

The World Bank has financed the project "Coal-Fired Generation Rehabilitation Project-India" for demonstrating Energy Efficiency Rehabilitation & Modernization (EE R&M) at coal fired generating units. The project has two components: -

Component - 1. Energy Efficiency R&M at Pilot Projects

This component would fund Energy Efficient R&M of 640 MW capacity comprising Bandel TPS Unit-5(210 MW) of WBPDC, Koradi TPS Unit-6 (210 MW) of Mahagenco and Panipat TPS Unit-3&4 (2x110 MW) of HPGCL. The World Bank has earmarked US \$ 180 million of IBRD loan and US \$ 37.9 million of GEF grants for the Component-1.

Component - 2. Technical Assistance to CEA and Utilities

The Technical Assistance component of the project is aimed at providing support in implementation of EE R&M pilots, developing a pipeline of EE R&M interventions, addressing barriers to EE R&M projects and strengthening institutional capacities of implementing agencies for improved operation and maintenance practices. The World Bank has earmarked USD 7.5 millions GEF Grant for the Component -2.

A. Pilot R&M Projects funded by World Bank

i) Bandel TPS, U-5 (210 MW) of WBPDC

WBPDC invited fresh single stage bids for BTG Package in September 2010. The last date for submission of bids was 22.03.2011. The bids were received from M/s Doosan Heavy Industries and Construction Company (DHIC) and Consortium of NASL (India), ASSpZO.O(Poland) & APIL (India). After evaluation, M/s DHIC emerged the successful bidder. LOA was placed to M/s DHIC on 12.01.2012. Contract was signed on 29.02.2012. For CHP, AHP & Electrical packages, the finalization of Technical & Commercial specification is in process.

ii) Koradi TPS, U-6 (210MW) of Mahagenco

For BTG packages NIT was floated on 7th August, 2010 with last date for submission as 15th Feb.,2011. Bids were received from BHEL, M/s Doosan, M/s NASL & M/s Dongang. Mahagenco carried out 1st stage evaluation and is in the process of obtaining No Objection from World Bank

For Electrical Package, LOA has been issued to ABB on 19.03.2012.

NIT for BOP Package was published on June 9, 2011 and bids were opened on December 22, 2011. The Technical evaluation for the 1st stage of bidding is in progress.

iii) Panipat TPS, U-3 & 4 (2x110MW) of HPGCL

M/s Energo Engineering (Projects Design Consultant) submitted the DPRs for both units in June,2011 and RLA/EA reports in August, 2011.A review meeting was held on 28.12.2011 at PTPS, Panipat to review the Inception report, RLA reports and Energy Audit Report submitted by the consultant. After discussion these reports accepted by the PTPS. The HPGCL is in the process of reviewing the DPRs. The acceptance of DPRs by HPGCL is awaited.

B. Technical Assistance to CEA

The World Bank is providing technical assistance of US \$ 1.1 million as a part of GEF grant to CEA under "Coal Fired Generation Rehabilitation Project-India" for addressing the barriers to Energy Efficient R&M of coal fired generating units in India. The project is being implemented by CEA through appointment of consultants for carrying out the studies.

The appointment of various consultants for carrying out the studies is under progress and the present status is as under:

Sl. No.	Consultancy services	Status (31.03.2012)
1	Implementation Support Consultancy	The ISC was appointed on 28.10.2010 and is assisting CEA in implementing the project.
2	Study on Reduction of Barriers to R&M intervention in thermal power station in India	The negotiations with the consultant M/s Mercados Energy Market India have been completed and the Contract Document to be signed has been finalized. The contract is likely to be signed in 1st week of April,2012.
3	Study on Developing Markets for implementation of R&M in thermal power stations in India	M/s Mercados Energy Market India has been selected for negotiations. The negotiated draft contract is likely to be signed in 1st week of May, 2012.
4	Review of Experience from Pilot R&M projects	Proposals have been received from the short listed consultants on 25.01.2012. The "No Objection" to the Technical Evaluation Report is awaited from World Bank.
5	Review of Institutional Capacity and capacity strengthening interventions in CEA	Proposals have been received from the short listed consultants on 20.03.2012. The Technical Evaluation of the proposals is under progress.

16.5.3 Development of the Tendering Procedures and Model Contract for the R&M of Fossil Fuel Based Power Plants in India."

A Task Force on "Development of Tender Procedure and Model Contracts for the Renovation & Modernization (R&M) of Fossil Fuel Based Power Plants" under the chairmanship of Member (Thermal),CEA was constituted vide MoP letter no. 5/33/2009-S.Th. dated 29/10/2009 comprising the members from various power utilities. The assignment is to be completed in two phases as under:

Phase-I Task

The objective of Phase-I activity is an assessment of tendering procedures currently being followed by public utilities in India and a review of documents used for standard

R&M projects as well as the documents which have already been developed for Energy Efficiency R&M projects financed particularly by World Bank. The Phase –I activity has been completed by M/s Evonik Energy Services India, they submitted the report in September, 2009.

Phase-II Task

The main objective of Phase-II activity is the preparation of the model documents/templates for R&M Projects in consultation with task force, power utilities & financing agencies. MoP has nominated CEA as " Project Executing Agency". M/s Lahmeyer International (India) Ltd. has been selected for carrying out the Phase –II Activity following the ICB route. The consulting contract has been signed between CEA and M/s Lahmeyer International (India) Pvt. Ltd. on 16.03.2012.

16.5.4 Japan-India co-operation for Pre- Primary study of Efficiency and Environmental improvement of Coal fired stations.

A MOU between Central Electricity Authority and Japan Coal Energy Centre (JCOAL) for preliminary study of Efficiency and Environment improvement study in coal fired power plants was signed during the meeting of India-Japan high level Energy Dialogues held in New Delhi on 30.4.2010. Under the MOU, JCOAL had short listed four candidate coal fired power plants viz. Ukai and Wanakbori TPS (GSECL), Ramagundem STPS (NTPC) and Vijaywada TPS (APGENCO) for pre – primary studies. JCOAL visited these stations along with experts and the final report was submitted on 6th May, 2011.

After Pre-Primary Studies, JCOAL have finalized 3 units viz., Vijaywada TPS Unit-1 (210 MW) of APGENCO, Wanakbori TPS Unit-1 (200 MW) of GSECL and Kahelgaon STPS Unit- (210 MW)of NTPC for detailed study.

2nd Phase MOU between CEA and JCOAL need to be signed for further detailed studies at these units.

16.5.5 Financial Assistance by World Bank under GEF facility as Grant for 12TH Plan

During the 12th Five Year Plan, World Bank has made available GEF Grant for various studies viz. Project Design, Environment Audit & Due Diligence analysis (EA DDA) and Rapid Social Assessment (RSA) for carrying out LE works at various thermal units of Mahagenco. The units of Mahagenco for above mentioned studies include Bhusawal TPS,Units-2&3(2x210MW), Chandrapur TPS,Unts-1&2 (2x210MW) and Parli TPS,Unit-3(210MW).
