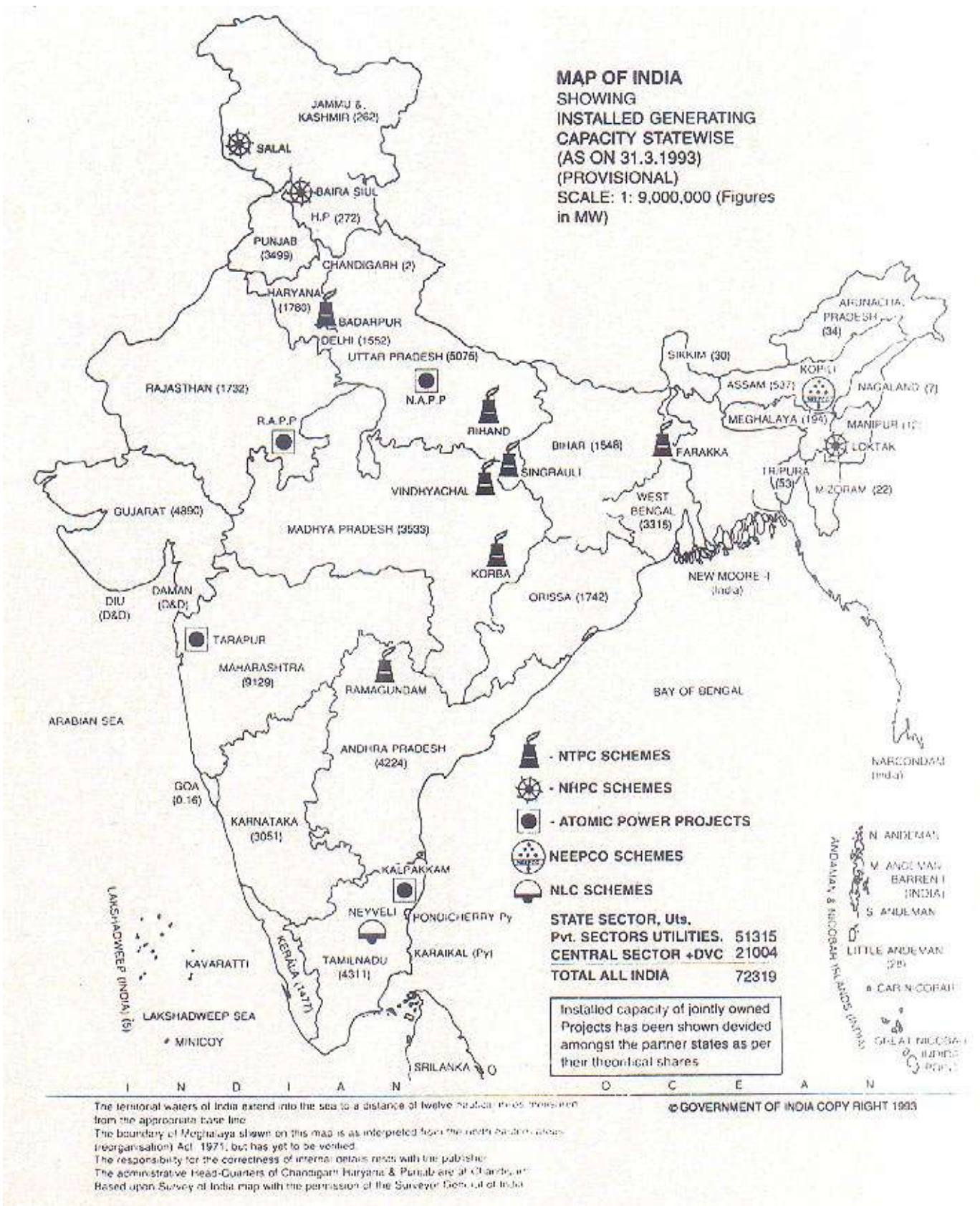
ANNUAL REPORT 1993-94



MINISTRY OF POWER
GOVERNMENT OF INDIA, NEW DELHI



Front Cover : HVDC Back-to-Back Link, Dadri

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1 MINISTRY OF POWER

ORGANISATION

1.1 The Ministry of Power started functioning independently with effect from the 2nd July 1992. Shri N.K.P. Salve and Shri P.V. Rangayya Naidu, took over as Minister and Minister of State for power on 18th January, 1993 respectively.

1.2 Shri R. Vasudevan has been the Secretary in the Ministry of power with effect from 14.07.1992. He is assisted by a Special Secretary, Six Joint Secretaries, including the Financial Adviser.

1.3 There are six wings in the Ministry of Power, each headed by a Joint Secretary. These are:

i) Administration, Hydel & Coordination;
ii) Thermal;
iii) Investment Promotion Cell;
iv) Planning & Energy Management;
v) Systems & Operation; and
vi) Finance.

1.4 The Central Electricity Authority (CEA), constituted under the Electricity (Supply) Act, 1948, Advises the Ministry of Power on technical and economic matters. The construction and operation of generation and transmission projects in the Central Sector are entrusted to Central Sector Power Corporations, namely, the National Thermal Power Corporation (NTPC), the National Hydroelectric Power Corporation (NHPC), the North Eastern Electric Power Corporation (NEEPCO) and the Power Grid Corporation of India Limited (POWERGRID). The POWERGRID, which was incorporated on the 23rd October, 1989, is responsible for all the existing and future transmission projects in the Central Sector and also for the formation of the National Power Grid. There are two joint venture Power Corporations under the administrative control of Ministry of Power, namely, Nathpa Jhakri Power Corporation and Tehri Hydro Development Corporation, which are responsible for the execution of the Nathpa Jhakri Power Project and projects of the Tehri Hydro Power Complex, respectively. The Damodar Valley Corporation (DVC), constituted under the DVC Act, 1948, and the Bhakra Beas Management Board (BBMB), constituted under the Punjab Reorganisation Act, 1966, are also under the administrative control of the Ministry of Power. Programmes of rural electrification are within the purview of the Rural Electrification Corporation (REC). The Power Finance Corporation (PFC) provides term-finance to projects in the power sector.

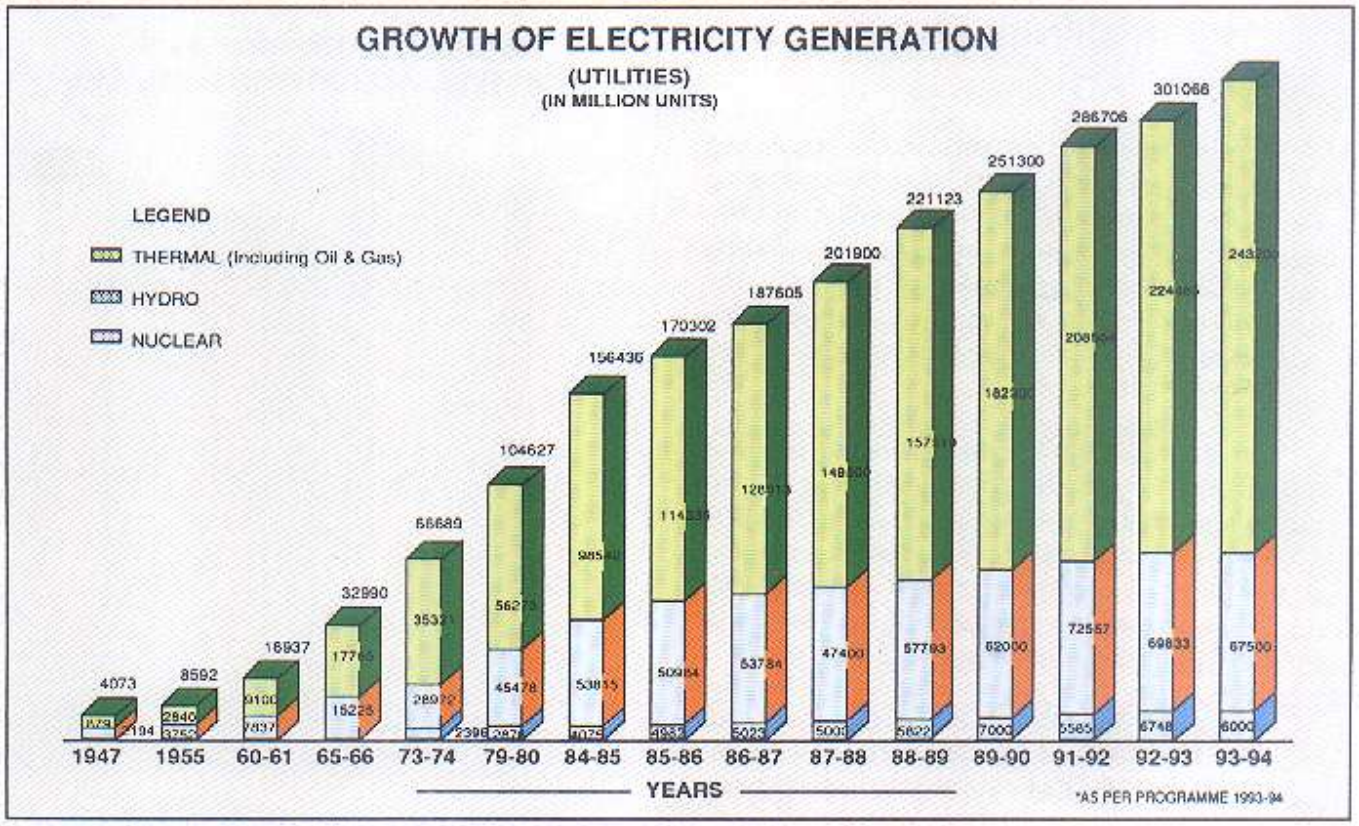
1.5 The Central Power Research Institute (CPRI), Set up in 1960, functions as a national laboratory for applied research in the field of electrical power engineering. The National Power Training Institute (NPTI), formerly known as the Power Engineers Training Society (PETS), set up in January, 1980, is functioning as an apex body for meeting the training needs of the power sector, training programmes of the State Electricity Boards/ Undertakings and supplements the same with its own training activity. The Energy Management Centre (EMC), was established by the Government of India in April, 1989 as a Society to act as a focal point for exchange of experience among energy in institutes within India and as a Centre for information, research and training activities in the energy field based on cooperation between India and the European Communities.

1.6 To deal with the matters relating to private sector participation in power generation, supply and distribution, an Investment Promotion Cell has been set up in the Ministry of Power.

FUNCTIONS

1.7 'Electricity' is a concurrent subject at Entry No. 38 in the List III of Seventh Schedule of the Constitution of India. The Primary responsibility of the Ministry of Power pertains to the development of electrical energy in the Country. The Ministry is concerned with perspective planning, development, regulation and conservation of the country's electric power resources and formulating and promoting national programmes in the field of power, processing projects for investment decision, monitoring of the projects, training and manpower development and the administration and enactment of legislation in regard to power generation, transmission and distribution.

1.8 The Ministry of Power is also responsible for the administration of the Electricity (Supply) Act, 1948 and the Indian Electricity Act, 1910 and to undertake such amendments to these Acts, as may be necessary from time to time, in conformity with the Government's policy objectives.



An illuminated view of Ramagundam STPS



2. POWER GENERATION - HIGHLIGHTS

2.1 The total energy generation in the country during 1992-93 was 301.06 Billion Units (BUs) showing an increase of 5.0% over the generation in 1991-92. The increase in thermal generation during 1992-93 over the previous year was 7.6%. The hydro generation was, however, less by 3.8% during 1992-93 over the last year due to less favourable monsoon.

2.2 For the year 1993-94, the generation target of 316.700 BUs has been fixed, comprising 243.200 BUs thermal, 6.00 BUs nuclear and 67.500 BUs hydro power. This envisaged an increase of about 5.2% over the generation achieved during 1992-93. The actual generation during the year (up to December 1993) has been 237.76 BUs which is 7.4% more than the generation during the corresponding period of the previous year and 0.7% more than target. The actual generation during the period, as compared with the target is given below :

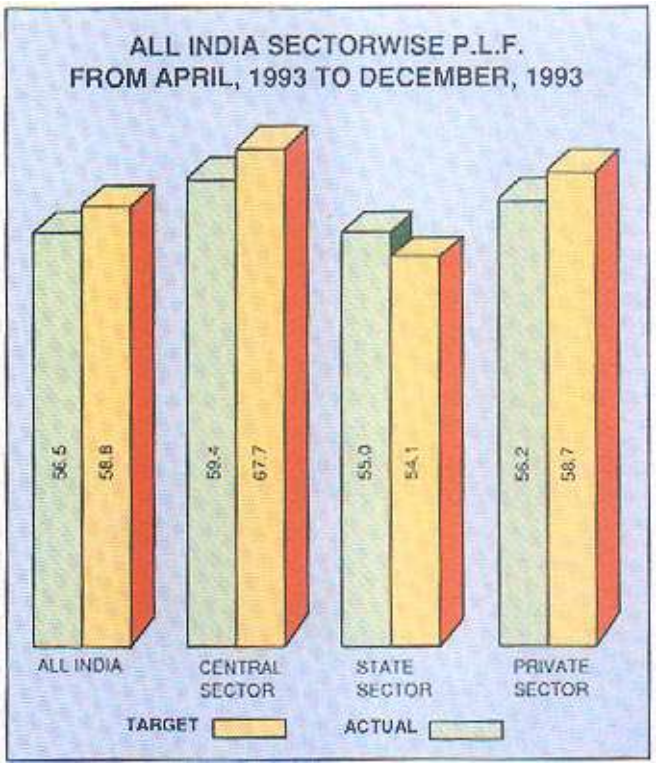
April to December, 1993

(Figures in Million Units)

	Target April-Dec. '93	Actual April-Dec. '93	% of Prog	%age of the corresponding period/last year
Thermal	178106	178461	100.2	109.9
Nuclear	4575	4239	92.7	88.5
Hydro	53550	55067	102.8	101.5
Total	236231	237767	100.7	107.4

PLANT LOAD FACTOR (PLF) OF THERMAL STATIONS

2.3 Thermal capacity, at present constitutes about 70% of the total installed capacity in the country, and contributes about 74% of the total power generation. At the beginning of the 6th Five Year Plan, the performance of the thermal power stations was unsatisfactory with the All India average PLF of 44.3% only. To improve their performance, a number of measures were taken to achieve the optimum utilisation of the existing thermal units. At the beginning of 7th Five Year Plan i.e. 1985-86, the All India average PLF improved to 52.4% and further increased to 56.5% in 1987-88 (which was the highest achieved in any year). During 1992-93 the PLF was 57.1% which is the highest ever achieved. During the period April, 1993 to November, 1993, the All India PLF has been 58.1%. During this period, the following State Electricity Boards/Corporations achieved PLF higher than the All India average of 58.1% :



Sl. No.	State Electricity Boards/ Corporations	PLF (%)
1.	Rajasthan	74.5
2.	Punjab	61.6
3.	Maharashtra	61.5
4.	Andhra Pradesh	62.2
5.	Tamil Nadu	68.5
6.	Karnataka	65.4
7.	West Bengal Power Development Corpn.	68.9
8.	NTPC	74.1
9.	Ahmedabad Electric Co.	70.7
10.	Calcutta Electric Supply Co.	73.6

2.4 In the State Sector, Kota Thermal Power Station of RSEB, Anpara TPS of UPSEB, Sikka of GEB, Khaperkheda II MSEB, Vijayawada of APSEB and Mettur of TNEB achieved highest PLF of more than 70% during this period. In the private Sector, Ahmedabad Electric Company achieved the highest Plant Load Factor of 70.7% during the same period. In the Central Sector, Singrauli Super Thermal Power Station of NTPC achieved the highest PLF of 80.1% during the same period.

Meritorious Productivity award scheme

2.5 The Meritorious Productivity Award Scheme for better performance of Thermal Power Stations is being implemented by the Ministry of Power since 1983-84. The objective of this Scheme is to maximise thermal generation by motivating employees working in various Thermal Power Stations by providing Cash Awards to them for significant achievement in Thermal generation in their respective stations. For the year 1992, the following power stations received awards under this scheme:

S. No.	Name of the Station
1.	Vijayawada
2.	Kota
3.	Anpara
4.	Gandhinagar
5.	Badarpur
6.	Ramagundam
7.	Kawas Gas
8.	Mettur
9.	Wanakbori
10.	Sikka
11.	Kolaghat
12.	Bhatinda
13.	Unchahar
14.	DESU Gas
15.	Amarkantak
16.	Kutch Lignite

During the 8th Five Year Plan, a total provision of Rs. 10 crores has been kept for this scheme assuming an average expenditure of Rs. 2 crores during each year of the Plan. The actual expenditure is likely to exceed this limit as the number of stations achieving the prescribed level of performance is increasing.

Another scheme for incentive/award for efficient and economic operation of thermal power stations for reduction of secondary fuel oil consumption and auxiliary power consumption in the country has also been approved. Suitable financial provision for this scheme is yet to be made.

2.6 **Generating Capacity during 1992-93**

An aggregate capacity of 4458.02 MW consisting of 879.1 MW hydro, 3358.92 MW thermal and 220 MW Nuclear was targeted for commissioning during the year 1992-93. Against targetted capacity the total generating capacity commissioned/rolled during the year 1992-93 was 3537.27 MW consisting of 372.95 MW hydro, 2944.32 MW thermal and 220 MW nuclear.

(All figures in MW)

Type	Programme for 1992-93				Achievement during 1992-93			
	CS	SS	PS	Total	CS	SS	PS	Total
Hydro	540	321.10	18	879.10	115	239.95	18	372.95
Thermal	1920	1438.92	-	3358.92	2140	804.32	-	2944.32
Nuclear	220	-	-	220	220	-	-	220
Total	2680	1760.02	18	4458.02	2475	1044.27	18	3537.27

2.7 **Generating Capacity addition programme and achievement during 1993-94**

Based on the status of various ongoing projects, a capacity addition programme of 4439.25 MW consisting of 954.65 MW hydro, 3264.6 MW of thermal and 220 MW of nuclear was drawn up for the year 1993-94. The details of the programmed units are given in Annexure-I. An aggregate capacity of 1248.93 MW consisting of 33.65 MW hydro and 1215.28 MW thermal has been added during 1993-94 (upto 21.1.94) as per the details given in Annexure II.

2.8 **8th Plan Power Programme**

The National Development Council has approved a capacity addition of 30537.7 MW alongwith the

associated transmission and distribution system. The break-up is given below:

(Figure in MW)

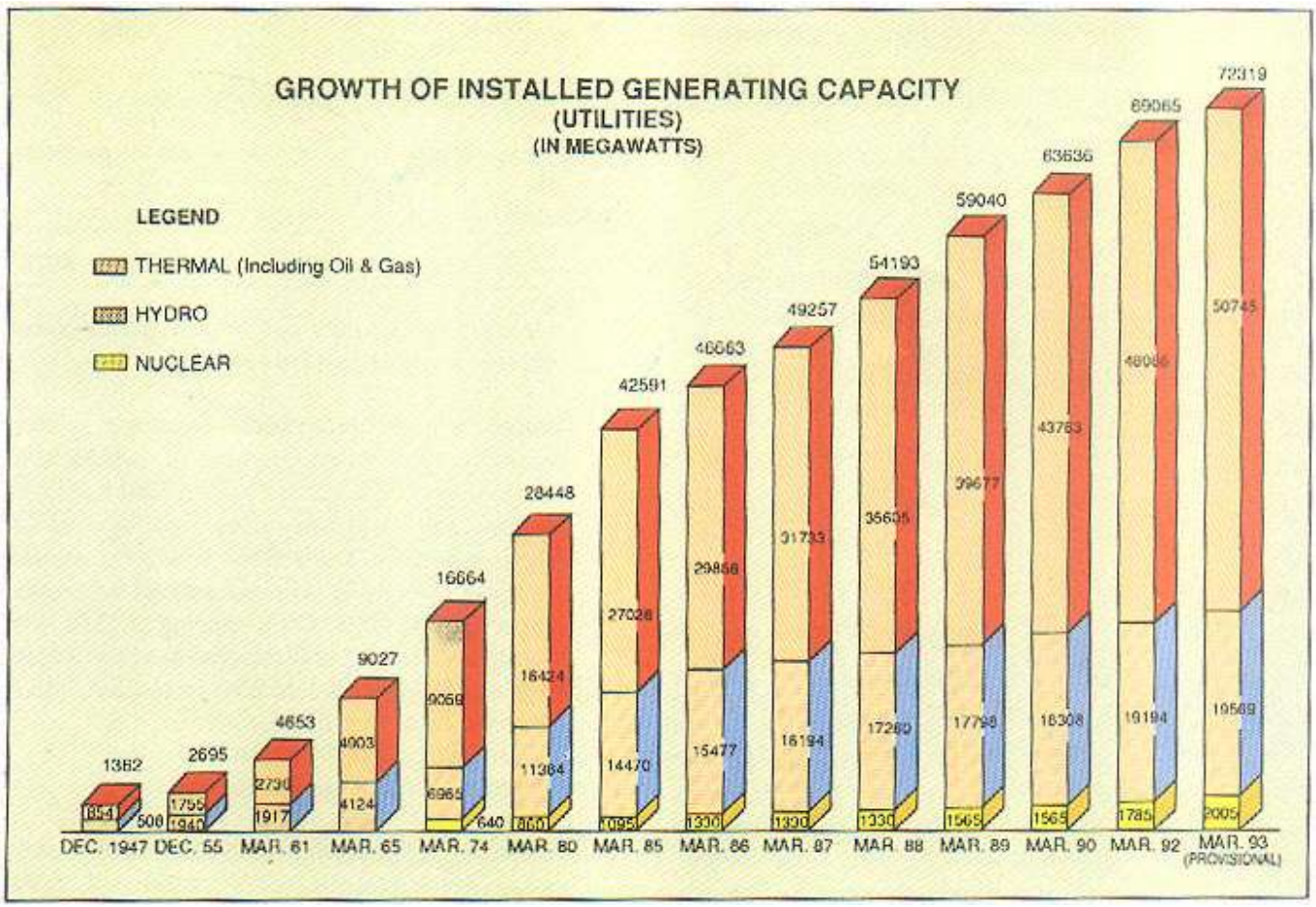
Sector	Hydro	Thermal	Nuclear	Total
Central	3260.0	8498.0	1100	12858.0
State	6022.2	11657.5	-	17679.7
Total	9282.2	20155.5	1100	30537.7

Plan Outlay

An outlay of Rs.79,589.32 crores has been provided for the 8th Plan in the power sector including advance action for schemes likely to give benefits during 9th Plan and includes outlays for Neyveli Lignite Corporation and Nuclear Power Corporation. The total investment in the Ministry of Power in the central sector during the 8th Plan is Rs. 25920.00 crores (excluding NLC and NPC). The Break-up of the 8th Plan outlay is given below:

(Rs. in crores)

	States	U.Ts	Centre	Total
Generation	24732.38	354.24	24337.13	49424.15
Transmission & Distribution	16782.41	1061.53	4436.31	22280.75
Rural Electrification	4000.00	-	-	4000.00
Renovation and Modernisation	1225.74	13.40	537.30	1776.44
Miscellaneous	220.93	16.71	1870.34	2107.98
Total	46961.86	1445.88	31181.58	79589.32



ANNEXURE-I

GENERATING CAPACITY ADDITION PROGRAMME FOR THE YEAR 1993-94

Sl. No.	Name of the Project and Unit No.	Hydel/ Thermal/Nuclear	State/ Organisation	Capacity (MW)	Commissioned/ Expected date of commissioning
	NORTHERN REGION				
1.	Pampore GT-1	T	J & K	25	10/93
2.	Pampore GT-2	T	J & K	25	12/93
3.	Salal St. II-2	H	J&K/NHPC	115	9/94
4.	Salal St. II-3	H	J&K/NHPC	115	3/95
5.	*Chamera ST. I-1	H	HP/NHPC	180	1/94
6.	*Chamera ST. I-2	H	HP/NHPC	180	2/94
7.	*Chamera ST. I-3	H	HP/NHPC	180	3/94
8.	Dadri ST-I	T	UP/NTPC	146.5	9/93
9.	Dadri ST-2	T	UP/NTPC	146.5	1/94
10.	*Tanda-4	T	UP	110	12/93
11.	Anpara 'B'-4	T	UP	500	12/93

	CENTRAL	STATE	PVT.	TOTAL
HYDRO	770	-	-	770
THERMAL	293	660	-	953
NUCLEAR	-	-	-	-

SUB TOTAL(I)	1063	660	-	1723
WESTERN REGION				
12. *Utran ST-1	T	Guj/GEB	45	6/93
13. Birsinghpur-2	T	MP	210	12/93
14. *Uran WH-1	T	Mah.	120	8/93
15. Uran WH-2	T	Mah.	120	12/93
16. Trombay CCGT GT-1	T	Mah/Pvt.	100	12/93
17. Kakrapara-2	N	Guj/NPC	220	12/93

	CENTRAL	STATE	PVT.	TOTAL
HYDRO	-	-	-	-
THERMAL	-	495	100	595
NUCLEAR	220	-	-	220

SUB TOTAL (II)	220	495	100	815

Sl. No.	Name of the Project and Unit No.	Hydel/ Thermal/Nuclear	State/ Organisation	Capacity (MW)	Commissioned/ Expected date of commissioning
	SOUTHERN REGION				
18.	*Penna Ahobilam-1	H	AP	10	12/93
19.	*Penna Ahobilam-2	H	AP	10	1/94
20.	Upper Sileru St. II-1	H	AP	60	1/94
21.	Upper Sileru St. II-2	H	AP	60	3/94
22.	Rayalseema-1	T	AP	210	2/94
23.	*Yelahanka DG set-1	T	Karnataka	21.32	11/93
24.	*Yelahanka DG set-2	T	Karnataka	21.32	8/93
25.	*Yelahanka DG set-3	T	Karnataka	21.32	10/93
26.	*Yelahanka DG set-4	T	Karnataka	21.32	7/93
27.	*Yelahanka DG set-5	T	Karnataka	21.32	6/93
28.	*Mallapur-1	H	Karnataka	4.5	7/93
29.	*Mallapur-2	H	Karnataka	4.5	7/93
30.	*Kallada-1	H	Kerala	7.5	9/93
31.	*Kallada-2	H	Kerala	7.5	10/93
32.	Neyveli-7	T	TN/NLC	210	6/93

	CENTRAL	STATE	PVT.	TOTAL
HYDRO	—	164.0	—	164.0
THERMAL	210	316.6	—	526.6
NUCLEAR	—	—	—	—

SUB TOTAL (III)	210	480.6	—	690.6
EASTERN REGION				
33. Kahalgaon-2	T	Bihar/NTPC	210	12/93
34. *Tenughat-1	T	Bihar	210	12/93
35. *Eastern Gandak-1	H	Bihar	5	10/93
36. *Eastern Gandak-2	H	Bihar	5	12/93
37. *Eastern Gandak-3	H	Bihar	5	2/94
38. *Sone Western Canal-3	H	Bihar	1.65	6/93
39. Farakka-5	T	WB/NTPC	500	12/93
40. Kolaghat-4	T	WB	210	7/93
41. *Upper Rongnichu-3	H	Sikkim	2	7/93
42. *Upper Rongnichu-4	H	Sikkim	2	8/93

	CENTRAL	STATE	PVT.	TOTAL
HYDRO	—	20.65	—	20.65
THERMAL	710	420.0	—	1130.0
NUCLEAR	—	—	—	—

SUB TOTAL (IV)	710	440.65	—	1150.65

Sl. No.	Name of the Project and Unit No.	Hydel/ Thermal/Nuclear	State/ Organisation	Capacity (MW)	Commissioned/ Expected date of commissioning
	NORTH-EASTERN REGION				
43.	*Lakwa GT-5	T	Assam	20	5/93
44.	*Lakwa GT-6	T	Assam	20	9/93
45.	*Lakwa GT-7	T	Assam	20	1/94

	CENTRAL	STATE	PVT.	TOTAL
HYDRO	—	—	—	—
THERMAL	—	60	—	60
NUCLEAR	—	—	—	—

SUB TOTAL (V)	—	60	—	60

ALL INDIA

	CENTRAL	STATE	PVT.	TOTAL
HYDRO	770	184.65	—	954.65
THERMAL	1213	1951.6	100	3264.6
NUCLEAR	220	—	—	220.0

GRAND TOTAL (I to V)	2203	2136.25	100	4439.25

**Slippage from 1992-93*

3 x 115 MW Power House Under Construction Salal Stage-II Project (J&K)

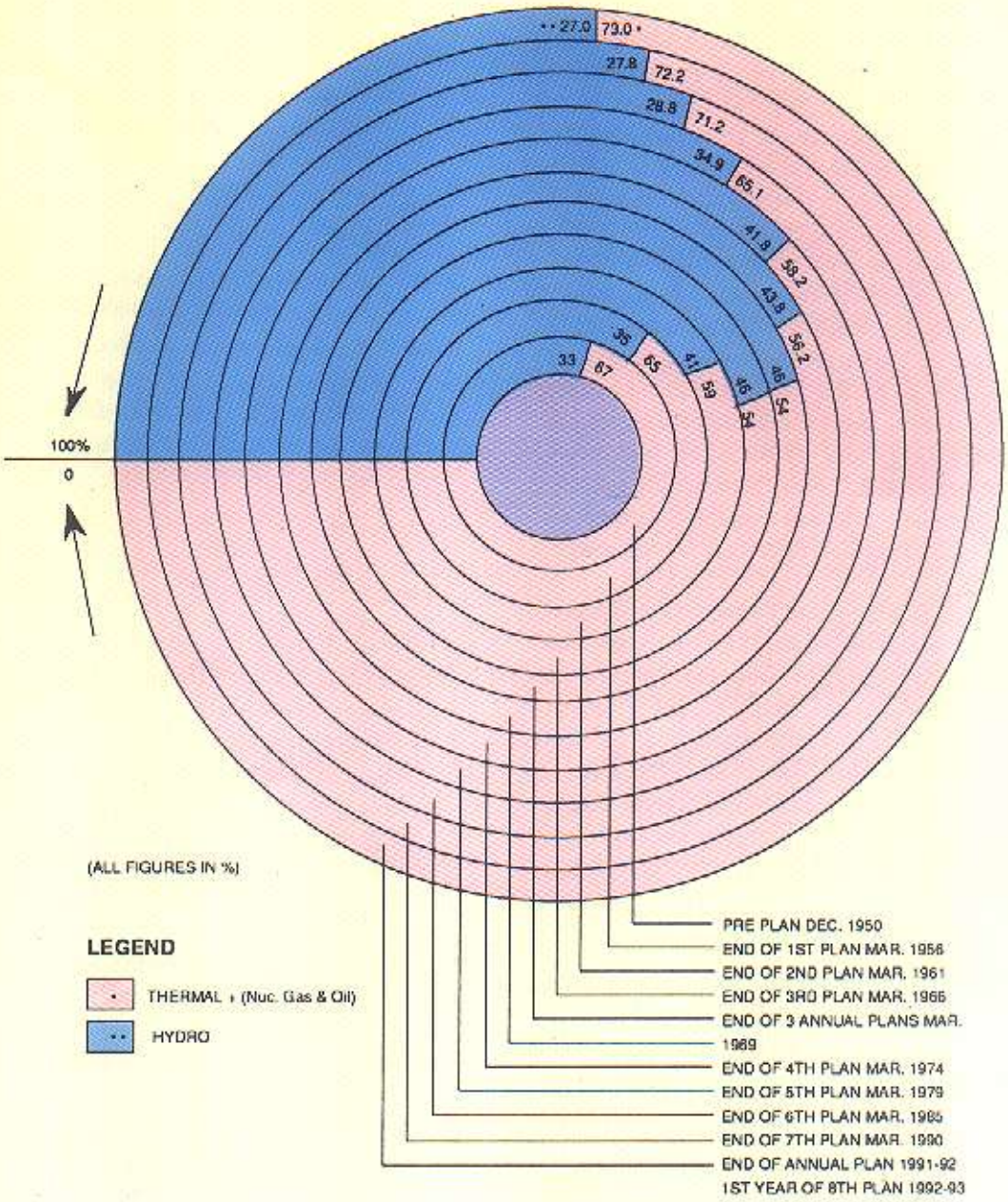


ANNEXURE-II

GENERATING CAPACITY ADDITION PROGRAMME & ACHIEVEMENT DURING THE PERIOD APRIL-NOVEMBER, 1993

Sl. No.	Name of the Project & Unit No.	Capacity (MW)		State/ Executing Agency	Date of	
		Prog.	Ach.		Rolling	Comm.
	HYDRO					
1.	Chamera I U-1	180	-	HP/NHPC		
2.	Chamera I U-2	180	-	HP/NHPC		
3.	Chamera I U-3	180	-	HP/NHPC		
4.	Salal II U-2	115	-	J&K/NHPC		
5.	Sone W. Canal U-3	1.65	1.65	Bih/NHPC	15.04.93	28.08.93
6.	Eastern Gandak U-1	5.00	-	Bih/NHPC		
7.	Mallapur U-1	4.50	4.50	Kar/KPCL	30.10.93	09.11.93
8.	Mallapur U-2	4.50	-	Kar/KPCL		
9.	Upper Rongnichu U-3	2	-	Sikkim/MOP		
10.	Upper Ronghichu U-4	2	-	Sikkim/MOP		
11.	Kallada U-1	7.5	-	Ker/KSEB		
12.	Kallada U-2	7.5	7.5	Ker/KSEB	27.08.93	
13.	Penna Ahobilam-U-1	10	-	AP/APSCB	1.1.94	
14.	Penna Ahobilam-U-2	-	10	AP/APSCB	31.12.93	
	SUB-TOTAL (H)	689.65	13.65			
	THERMAL					
1.	Lakwa GT U-5	20	-	Assam/ASEB		03.01.94
2.	Lakwa GT U-6	20	-	Assam/ASEB		
3.	Yelahanka DG Set-1	21.32	-	Kar/KEB		
4.	Yelahanka DG Set-2	21.32	21.32	Kar/KEB		26.11.93
5.	Yelahanka DG Set-3	21.32	21.32	Kar/KEB	23.09.93	19.10.93
6.	Yelahanka DG Set-4	21.32	21.32	Kar/KEB		27.07.93
7.	Yelahanka DG Set-5	21.32	21.32	Kar/KEB		14.05.93
8.	Utran ST U-1	45	45	Guj/GEB		17.07.93
9.	Neyveli U-7	210	210	TN/NLC		19.06.93
10.	Kolaghat U-4	210	-	WB/WBSEB		29.12.93
11.	Anpara 'B' U-4	-	500	UP/UPSEB		19.07.93
12.	Trombay CCGT U-1	-	120	Mah/TEC		29.07.93
13.	Uran WH U-1	120	-	Mah/MSEB		
14.	Dadri CC ST-1	146.5	-	UP/NTPC		
15.	Pampore GT-1	25	-	J&K/PGCL		07.01.94
	SUB-TOTAL (T)	903.10	960.28			
	NUCLEAR	Nil	Nil			
	SUB-TOTAL (N)	Nil	Nil			
	TOTAL (H+T+N)	1592.75	973.93			

ALL INDIA INSTALLED GENERATING CAPACITY
HYDRO-THERMAL MIX (%) (UTILITIES)



3 RENOVATION AND MODERNISATION OF POWER PLANTS

3.1 Concerned with the deterioration in the performance of the thermal power stations in the country, Government of India launched a Centrally Sponsored Programme for Renovation & Modernisation (R&M) of Thermal Power stations in September, 1984, to improve their performance. Likewise, a programme for Renovation, Modernisation & Uprating (RM&U) of Hydro-Electric power stations was formulated by the Central Electricity Authority in 1987. Keeping in view the demand and supply position of power and overall resource constraints, it was considered that R&M of old stations is a preferable alternative to increase in power generation capacity both from the point of view of costs involved and time framework. Such an approach for increasing power availability had been emphasised by the Planning Commission as well. R&M schemes are relevant also in the context of energy conservation and optimum energy usage.

3.2 **R&M of Existing Thermal Power Plants-Phase-I**

The first phase of the R&M programme was launched during the 7th Plan period. It covered 34 power stations comprising of 164 Thermal Units (aggregating to a total capacity of 13585.5 MW) at an estimated cost of Rs. 1223 crores, comprising of Central Loan Assistance (CLA) component of Rs. 451 crores and State Plan/Own Resources (SP/OR) of Rs.772 crores. The expected benefit from the Phase-I programme was an additional generation of 7000 MUs per annum.

3.2.1 **Achievements :** The average increase in generation during 1990-91 to 1992-93, after carrying out substantial R&M works on the 34 Thermal Power stations, is 3%. The total energy generation from these power stations prior to R&M scheme was 52351 MUs. After carrying out substantial R&M works, the average energy production from these power stations during the last 3 years has been 53957 MUs. Some of the Thermal Units where substantial R&M works have been completed, have shown significant improvement in their performance. As against the target of 7,000 million units per annum, the additional energy generation of 11,000 MUs; 10,800 MUs; 10,700 MUs, 9,500 MUs and 10,462 MUs have been achieved from these units during the years 1988-89, 1989-90, 1990-91, 1991-92 and 1992-93 respectively.

3.2.2 **Constraints in Implementation of R&M Programme Phase-I** : Major constraints in completion of R&M schemes during the 7th Five year plan are as follows :

i) Delay in completion of various formalities by SEBs/Organisations for giving guarantee for repayment of loans.

ii) Delay in placement of orders by SEBs/Organisations and long delivery schedules.

iii) Delay in release of Central Loan Assistance by Power Finance Corporation.

iv) Inadequate flow of funds from State Governments to respective Electricity Boards/Organisations for R&M activities covered under State Plan/Own Resources.

v) Non-availability of the units for carrying our R&M activities due to over-all power shortage as a result of which the units could not be shut down.

3.3 **Renovation & Modernisation Programme of Thermal Power Stations Under Phase-II :**

Keeping in view the benefits derived from the R&M programme in Phase-I, its second phase has been launched for implementation during the 8th plan period. The programme covers 209 generating units with a total capacity of 20871.435 MW at 46 Thermal Power Stations. The original cost of this scheme was 1656.78 crores (including Rs. 147.40 crores, World Bank Loan Assistance and Excluding R&M scheme pertaining to Bandel Thermal Power Station of West Bengal State Electricity Board with an estimated cost of Rs.36.72 crores, which is yet to be sanctioned). Cost of certain R&M schemes have gone up and the revised cost of 45 schemes is Rs. 1847.81 crores (including Rs. 242.41 crores World Bank Loan assistance).

3.3.1 **Projected Benefits :**

i) The R & M programme, Phase-II is anticipated to improve the overall PLF of the units covered by about 5% from 51.52% to

of about 8750 MUs which is equivalent to about 1770 MW capacity addition.

ii) The R&M (Phase-II) is also anticipated to extend the life of 24 units in five thermal power stations covering a capacity of 1402.5 MW in 15-20 Years.

iii) This will also improve the peaking capacity of power stations by a total of 100 MW.

iv) The schemes will bring environmental improvement in 46 units having total capacity of 9238 MW.

3.3.2 **Present Status:**R&M programme under Phase-II has been divided into 1597 activities. Out of these 130 (8.14%) activities have been completed and 456 (28.56%) number of activities are under execution. In respect of 971 (60.80%) number of activities action is yet to be taken by the implementing agencies. Remaining 40 (2.50%) number of activities have been dropped.

3.3.3 **Financial Progress:** Out of the Sanctioned cost of Rs.1847.81 crores, an amount of Rs. 173.82 crores (9.4%) has been incurred up to 31st March, 1993. An outlay of Rs.399.47 crores has been made for the year 1993-94, of which Rs. 33.89 crores has been incurred up to Sept. 1993. The total expenditure upto Sept. 1993 stands at Rs. 207.71 crores (11.2%).

3.3.4 **Constraints in Implementation of R&M Programme, Phase-II :**

i) Non-availability of the units, as due to shortage of power, the units could not be shut down.

ii) It is observed that in the Annual Plan, the allocation for R&M Phase I & II shemes are clubbed. The State Plan Funds are also not forthcoming in some cases, resulting in time and cost overruns.

iii) The physical progress of the 15 schemes belonging to HSEB, UPSEB, BSEB, WBSEB and DPL, not eligible for PFC's financing, is most critical because of funds constraints.

3.4.1 **Renovation, Modernisation and Up-Rating of Hydro Power Stations :** A programme for Renovation, Modernisation and Uprating (RM&U) of Hydro-Electric Power Stations was formulated by the Central Electricity Authority in 1987. 55 schemes with a total installed capacity of 9600 MW (209 units) have been identified under this programme. The total estimated cost of this scheme is Rs. 1270 crores. Benefits expected after implementation of renovation works are 849 MW and 1377 MU per annum, apart from increase in plant service life, reliability and availability of power stations.

3.4.2 **Further Scope :** CEA has initiated action for furthering the scope of renovation and modernisation and has invited preliminary proposals from the utilities for preparing a shelf of projects for R&M works in the second stage. Some of the utilities have responded to the call of CEA and the other utilities are in the process of submission of proposals.

3.5 **Procedure for Clearing R&M Schemes:**

Teams comprising technical experts from CEA, major supplier of equipment like Bharat Heavy Electricals Limited (BHEL) etc. and engineers from the concerned power utilities, visit the Plants to study problems and find out the optimum solutions to overcome them. Subsequently, as per their recommendations, Detailed Project Report (DPRs) are prepared by the Utilities as per guidelines issued by the CEA from time to time. The DPRs are submitted to the CEA who examines them from techno-economic point of view and accords clearance to these proposals. The state sector schemes, after techno-economic clearance, are sent to the concerned utilities for implementation. The Central sector schemes are required to follow the P.I.B./E.F.C. procedure as the case may be.

3.6 **Funding of R&M Schemes :** The R&M programme was introduced as a centrally sponsored scheme by the Central Government. To start with, central loan assistance was being routed through the CEA till 31.3.1988. Thereafter, Power Finance Corporation (PFC) took over financing of these schemes with effect from 1.4.1988.

3.6.1 The PFC follows the undermentioned procedure for sanctioning the loans under R&M programme Phase-II:

i) SEBs/SGCs desirous of availing of loan

should meet the eligibility criteria as laid down by PFC under its OPS (Operational Policy Statement) including Financial/Economic Rate of Return (FIRR/EIRR) criteria.

ii) The proposed R&M scheme should have all the necessary statutory clearances such as TEC of CEA, approval of its own management (SEB), Environment clearance (if applicable) etc.

iii) As per the decision taken in consultation with Planning Commission, MOP & CEA; upto 70% of the cost of scheme for completion is given by PFC as loan. Remaining amount has to be spent by the concerned SEBs/SGCs out of Annual Plan outlay/own resources proportionately.

3.6.2 **The Sources of Funds of PFC :**

i) Under PFC'S Own Sources : PFC is giving highest priority to Renovation & Modernisation of Power Plants aimed at improving availability and performance of such plants. Till date PFC has sanctioned a total of Rs.460.61 crores as loans against 58 schemes under R&M programme.

Details are as follows:

Programme	No. of schemes	Amt (Rs. in Crs.)
R&M-I (CLA)	25	133.15
R&M-I (SP)	11	89.27
R&M-II	22	238.19
Total	58	460.61

ii) **Under World Bank Loan :** No R&M scheme is covered under WB loan. However, some of the Environmental Upgradation Activities covered under R&M programme are proposed under WB loan. Against total WB loan of US $265 million, the total amount proposed (under WB loan) for such schemes is US $ 28.5 million. The balance amount is to be provided by PFC/concerned SEBs.

iii) **Under ADB Loan :** Against total loan of US $ 250 million, an amount of US $ 35.28 million is proposed towards R&M loan. Till date, PFC has sanctioned a total of Rs. 10.10 crores under ADB supported schemes which include an amount of Rs. 6.50 crores of ADB loan component.

The Stacker Reclaimer at Singrauli Coal Yard



4. TRANSMISSION

4.1 Transmission line projects continue to be accorded a high priority in the context of the need to evacuate power from the Central Generating stations to the beneficiary State. The programme for 1993-94 in the Central and State Sector included construction of 1423 Ckm. of 400 KV lines and 2970 Ckm. of 220 KV lines alongwith the associated substations.

4.1.1 The progress achieved during the year 1993-94 (up to November 1993) in the construction of transmission lines and substations is summarised below:

400 KV lines	773 Ckm.
220 KV lines	1837 Ckm.
400 KV substation	945 MVA
220 KV substation	1878 MVA

4.2 Central Sector Transmission Systems

Central Sector Transmission lines and Sub-stations completed during the year 1993-94 (upto November 1993) are listed in the following table:

Transmission Lines	Executing Agency	Length Ckm.	Total Ckm.
400 KV			
i. Jamshedpur-Rourkela S/C	POWERGRID	174	
ii. Neyveli-Trichy D/C	POWERGRID	328	502
220 KV			
i. Gandhar-Bharuch D/C	POWERGRID	25	25

	Sub-station	Executing Agency	MVA	Total MVA
1.	Madurai 400/220 KV	POWERGRID	2 x 315	630
2.	Trichy 400/220KV	POWERGRID	2 x 315	630
3.	Jamshedpur 400/220KV	POWERGRID	2 x 315	630
4.	Rourkela 400/220	POWERGRID	2 x 315	630

4.3 The Power Grid Corporation of India is entrusted with the task of executing the transmission projects associated with the generation projects of NTPC, NHPC, NEEPCO, NPC & NLC. A HVDC back to back link between Vindhyachal and Singrauli Super Thermal Power Stations and another ± 500 KV HVDC bipole line from Rihand to Dadri are already in operation. The scheme for providing a 1000 MW HVDC back to back link between Chandrapur (in Western Region) and Ramagundam (in Southern Region) has been accorded Government approval. In addition, schemes for providing 500 MW HVDC back to back ties inter-connecting Jepore (in Eastern Region) with Gazuwaka (in Southern Region) and Mau (in Northern Region) with Bihar Sharif (in Eastern Region) are under process for investment approval. These projects will be taken up for execution by Power Grid Corporation of India.

Inter-State Transmission Lines Centrally Sponsored Programme

4.4 At the time of 4th Five Year Plan several Inter-State and Inter-Regional Transmission lines were planned to facilitate the integrated operation of the State Systems within the region. Loan assistance equivalent to the full cost of the scheme is extended to State Governments under the Centrally Sponsored Programme for construction of such Inter-State Lines.

4.4.1 Upto the end of Financial year 1992-93, a cumulative sum of Rs.324.09 crores was released to the States under the programme and stringing of over 7000 Ckm. of 400, 220, 132 and 66 KV transmission lines has been completed.

4.4.2 For the year 1993-94, the budget provision for releasing loan to utilities, for Centrally sponsored Inter-State Transmission lines is Rs.6.60 crores. It is expected that this amount would be fully utilised for the following lines:

1. 220 KV D / C Korba-Rourkela
2. 400 KV S / C Rengali-Kolaghat
3. 220 KV D / C Nagjhari-Ponda
4. 132 KV D / C Umaim-Umtru Stage-IV-Guwahati
5. 132 KV S / C Mariani-Mokokchung
6. 220 KV D / C Tenughat-Bokaro

Out of the above six lines, the first three have since been completed.

4.5 **Transmission & Distribution Losses**

4.5.1 The average All India transmission and distribution losses for the year 1991-92 have been about 22.83%

4.5.2 Under the Incentive Scheme, launched by the Government of India in the year 1987-88, the SEBs/ EDs and their distribution Divisions/cities/ towns are awarded Shields on the basis of their performance in reduction of T&D losses. Cash Awards are given to Distribution Divisions/Cities/ Towns of the Power Utilities which achieve a prescribed minimum reduction in T&D losses. Individual as well as institutions and organisations also qualify for grant of incentives for developing scientific devices or presenting new ideas which prove to be effective in saving energy by optimal utilization of T&D system or better quality of power supply or improved efficiency of electrical appliances.

4.5.3 During the year 1992-93, incentive awards for the year 1990-91 were given. Karnataka Electricity Board, Electricity Department of Pondicherry and four best performing Distribution Divisions viz., Naavasari O&M (GEB), Indore City (MPEB), Visakhapatnam (APSEB) and Jaipur City Circle (RSEB) were awarded Shields. Cash Awards were also given to 8 Distribution Divisions of GEB,3 Distribution Divisions of MPEB, 7 Distribution Divisions of APSEB and one city circle of RSEB. The proposals received so far from power utilities for the incentive award for the year 1991-92 are presently in the process of evaluation.

4.6 **Integrated Operation of Grids**

4.6.1 The Regional Power Grids in the Northern, Western, Southern and Eastern Regions facilitate flow of power from surplus areas to deficit areas and assist in the optimum utilisation of the power availability in the country. The Inter-State/Inter-Regional Assistance of energy effected during the period April, 1993 to November, 1993 is given below:

Inter-State/Inter-Regional Assistance of Energy

(All Figures in MU)

State	Assistance from	Assistance	
		Nov. 93	April 93 - Nov. 93
Northern Region			
Chandigarh	Punjab	0.0	0.0
	H.P.	0.0	0.0
	S.S.T.P.S.	3.4	25.2
Delhi	B.B.M.B.	0.0	0.0
	Punjab	0.0	2.2
	H.P.	0.1	224.5
Haryana	H.P.	0.0	56.6
H.P.	Haryana	3.5	3.5
	Punjab	2.6	21.1
	U.P.	23.6	240.0
	S.S.T.P.S.	11.0	48.6
J&K	S.S.T.P.S.	60.8	345.5
Punjab	H.P.	0.0	97.7
Rajasthan	H.P.	3.1	120.9
	Punjab	148.7	276.3
	M.P.	0.0	6.5
U.P.	BBMB	0.0	0.0
	H.P.	0.0	0.0
S.S.T.P.S.	Vindhyachal STPS	156.6	857.2
BBMB	S.S.T.P.S.	0.0	0.0
	Rihand	0.0	0.0
Western Region			
Gujarat	Maharshtra	0.0	0.0
	N.R.	0.0	0.0
	S.R.	0.0	0.0
M.P.	Rajasthan	31.9	191.0
	A.P.	0.0	0.0
	N.R.	0.0	16.5
	S.R.	0.0	0.0

Maharashtra	Gujarat	0.0	0.0
	Karnataka	0.0	0.0
	N.R.	0.0	0.0
	S.R.	0.0	0.0
Goa	Maharashtra	0.0	0.0
Southern Region			
A.P.	Karnataka	0.0	0.0
	Maharashtra	14.1	125.9
	M.P.	0.0	28.3
	Orissa	0.0	0.0
	Gujarat	5.0	22.6
	Goa	3.9	74.6
Karnataka	Kerala	0.0	0.0
	A.P.	0.0	0.0
	Maharashtra	0.0	0.0
Kerala	Karnataka	0.0	0.0
	T.N.	0.0	0.0
Tamil Nadu	Kerala	0.0	0.0
Eastern Region			
Bihar	Orissa	0.0	0.0
	D.V.C.	0.0	0.0
	NTPC (SSTPS)	0.0	0.0
	NTPC(Anta)	4.2	55.6
	NTPC(Auraiya)	15.1	88.6
	Assam	1.1	30.9
D.V.C.	Bihar	0.0	0.0
	Orissa	0.0	0.0
	West Bengal	0.0	0.0
	Assam	0.2	13.7
	DSP	2.2	2.2
Orissa	Bihar	0.0	0.0
	NALCO	50.2	560.2
	ICCL	46.0	302.4
	R.S.R.	0.0	0.5
	A.P.	0.0	0.0
	M.P.	1.6	37.0
	Assam	0.6	12.0
West Bengal	Orissa	0.2	0.0
	Bihar	0.0	0.0
	Assam	0.0	1.2
N.E. Region			
Assam	Eastern Region	16.5	110.7
	Meghalaya	27.0	257.3

4.7 Development of National Power Grid

4.7.1 The Union Cabinet in 1980 approved in principle the establishment of a Centrally owned and operated National Power Grid. The National Power Grid would eventually comprise strong Regional networks with suitable asynchronous (HVDC) links between the region. Already 18,680 Ckt. Kms of 400 KV lines and 5,897 Ckt. Kms of lines at 220 KV level have been constructed in the Central Sector, upto November 1993. An inter-regional link (Vindhyachal 2 x 250 MW HVDC back to back) connecting Western and Northern Regions is also in operation. These as well as other AC links between regions form the important components of the National Power Grid today.

4.7.2 In October, 1989 Government of India established the Power Grid Corporation of India Limited (POWERGRID) to further accelerate the development of the National Power Grid. The POWERGRID have already taken over most of the existing Central Sector transmission systems. The POWERGRID also propose to take up schemes for further strengthening of the Regional Power Grids and establish HVDC back to back inter-regional links.

4.7.3 Although the Regional Grids have already been inter-connected, paving way for formation of a National Grid, further strengthening of inter regional and inter-regional tie lines would be needed to enable increased power exchanges and achieve improved economy and reliability. This is a continuous process and projects are being taken up during each plan period depending upon the requirements of inter-regional power exchanges and the funds availability.

4.8 Regional Electricity Boards

In order to promote the integrated operation of the power systems, the country has been divided into five regions namely North, West, South, East and North-East. Regional Electricity Boards are functioning in each of these regions.

4.9 Regional Load Despatch Centres

In the Northern, Western and Eastern Regions,

permanent Regional Load Despatch Centres (RLDCs) equipped with computer based telemetry and data acquisition systems have already been established. RLDC of Southern Region is equipped with minimum display facilities like mimic diagram board, digital cyclic telemetering system, analog load frequency control equipment, etc. An interim RLDC equipped with minimum speech communication and teleprinting facilities is also operational in the North-Eastern Region. In the Northern Region, and interim scheme for augmentation action of existing load despatch and telecommunication facilities is under implementation and is likely to be completed during 1993-94. Similar schemes in respect of Eastern, Western and North-Eastern Regions are under formulation.

4.10 **Master Telecommunication Plan for Indian Power System**

Based on the Master Telecommunication Plan (got developed by Central Electricity Authority for the power sector of India), the State Electricity Boards/ Power utilities have commenced implementation activity. The project reports from most of the State Electricity Boards have been received and their techno-economic appraisal has been done by CEA. The DOT clearance for establishing multi-channel telecommuni-cation networks has also become available for practically all the Power utilities in India. MSEB and PSEB have floated tender enquiries for their optical fibre based telecommunication systems. The tender evaluation process is in progress. Radio surveys have been got conducted by DESU and GEB for their Digital Microwave links and their detailed technical specifications are under preparation. Action in respect of implementation of the Master Telecommunication Plan in a unified manner has also been initiated by Power Grid Corporation of India Ltd. (POWERGRID) in respect of various Regions.

4.11 **National Electric Power System Information Centre**

A National Electric Power System Information Centre (NEPSIC) established during 1991-92 to collect vital power system operational data from different Regional Electricity Boards for use in CEA and Ministry of Power has become fully operational. The data received at NEPSIC from

400 KV Switchyard at Kolaghat TPP (WBPDCL)



RLDCs are relayed to and displayed at CEA head quarters for which Special display formats have been developed.

4.12 National HVDC Project

The first stage of National HVDC project converting existing 220KV D/CAC line between Lower Sileru (A.P.) and Barsoor (M.P.) to 100 MW , 100 KV , 6 pulse operation, DC link has been completed at a total cost of Rs.29.21 crores. The DC link is in operation since October,1991. The Second stage of uprating this link to 200 MW , 200 KV , 12 pulse operation HVDC at an estimated cost of Rs. 103.98 crores (excluding customs duty) within a time frame of 48 months has been approved by Government of India in September, 1993. The finance for the second stage will be met by DHI Rs. 30 crores and Deptt. of Electronics, Ministry of Power, BHEL, APSEB and MPEB each Rs. 15 crores.

5. RURAL ELECTRIFICATION PROGRAMME

During the year 1993-94, (upto the end of November, 1993) 1062 inhabited villages have been declared as electrified and 138,727 pumpsets energised against the target of 3210 village electrification and 2,75,580 pumpsets energisation respectively, for the year as a whole. It is envisaged that the targets for the year will be achieved during the fourth quarter of the year. Cumulatively, 4,91,958 villages have been electrified and 99,86,539 pumpsets have been energised as on 30.11.1993.

Out of a total of 1,11,886 tribal villages in the country,76,661 villages constituting 68.5% have been electrified as on 30.11.1993. Similarly, 2,55,818 Harijan Bastis have also been electrified so far.

5.1 Kutirjyoti Programme

The Kutirjyoti Scheme was revived in 1992-93 and continued during 1993-94.

The scheme is financed from Central grant which is routed through REC.

6. COOPERATION WITH NEIGHBOURING COUNTRIES

6.1 Cooperation with Bhutan

From the Chukha Hydroelectric Project in Bhutan, the Royal Government of Bhutan earned a revenue of over Rs.248.83 crores by December, 1993 from sale of power to India, thereby recovering entire cost of the project besides supplying power for internal consumption of Bhutan. Encouraged by the successful operation of the project, Government of India and Royal Government of Bhutan have agreed to undertake preparation of Detailed Project Report (DPR) for Chukha Stage-II (Tala Hydroelectric Project - 1000MW) and Chukha Stage-III (Wangchu Reservoir Project - 175 MW) down stream of the existing Chukha Project. The DPR for Tala Hydroelectric Project has been submitted and DPR for Wangchu Reservoir Project is under preparation by WAPCOS. The Two Governments have also signed a Memorandum of Understanding on preparation of DPR for Bunakha Hydroelectric Project (2 x 60 MW) upstream of the existing Chukha Project.

6.2 Cooperation with Nepal

India and Nepal are cooperating on development of Karnali Hydroelectric Project in Nepal (18 x 600 = 10,800 MW) and Pancheshwar Hydroelectric Project on the international border between India and Nepal with an installed capacity of 6 x 250 = 1500 MW. Besides these Mega Projects, the experts of the two countries are undertaking surveys and investigation for Buri Gandok Hydroelectric Project (4 x 150 MW) and Sapta Koshi High Dam Multi-purpose Project (6 x 50 MW). Besides development of hydro resources of Nepal, exchange of power between India (U.P. and Bihar) and Nepal is taking place since 1970. It has been agreed to increase the quantum of exchange of power to 80 MW . India has also agreed to purchase surplus power from Nepal subject to commercial and operational aspects being settled satisfactorily by the two Governments. India has also agreed to provide 20 Million Units of energy to Nepal annually free of cost from Tanakpur Hydroelectric Project in India.

7. ENERGY CONSERVATION

7.1.1 India's per capita energy consumption of commercial energy is only one-eighth of the world average. However, it is likely to increase with the growth in GDP and standard of living. Investment in the energy sector in the Plan outlays have been steadily increasing. The development of energy sources is highly capital intensive. Therefore, India's energy strategy is focused not only on increased domestic energy production but also on more efficient energy utilisation. During the 8th Five Year Plan, the National Energy Efficiency Programme aims at saving in energy use to the extent of 5000 MW of installed capacity and reduce consumption of petroleum products by an equivalent of six million tonnes. A broad action plan for achieving this has already been drawn up.

7.1.2 As a result of energy conservation measures initiated by the Ministry of Power with the Energy Management Centre, acting as its Executive Agency, a network of Energy Management Advisory Service Centres through Lead Agencies to undertake energy audit services in the country has been developed. Energy Management Centre has also successfully achieved general awareness on Energy Conservation through information, dissemination and promotional campaigns. Experience gained through various energy audit programmes and other studies have shown energy saving potential to a considerable extent by adopting no cost house-keeping measures and a substantial portion can be realised through minor process/ technological improvement measures. It is estimated that in most cases the combined capital and life cycle costs of industrial energy conservation measures are substantially less than what is needed to generate equivalent amounts of energy supply. Also payback period for such measure ranges from a few months to a maximum of 3 to 4 years. Studies have also been undertaken to evaluate specific technical and policy options. Steps have been taken for training of professionals to create capable energy managers and auditors and to educate consumers through publicity campaign.

7.1.3 Campaigns carried out by the Ministry of Power and the Energy Management Centre gained momentum to create public awareness on the need to conserve energy countrywide. TV, Radio and Press have been widely used as the media for publicising Energy conservation message. Hoardings conveying messages of energy conservation have also been displayed in important metros besides Kiosks and Bus Panels. Brochures and Literature bearing messages of Energy Conservation relating to Domestic and Industrial Sectors have also been printed and widely circulated.

7.2 International Cooperation in Energy Conservation

Ministry of Power has been implementing the following Energy Conservation projects in cooperation with International agencies :

- India-UNDP Project on Energy Audits in Selected Areas
- India-EC Bus Programme
- TCDC Working Group (ESCAP)

7.2.2 Under United Nations Department of Technical Cooperation for Development (UN/DTCD) a programme relating to Energy Conservation in selected areas was carried out by EMC. Energy audits conducted in 45 units of Industrial sector have established that it is possible to save about 37008 KL of fuel oil, about 1,32,845 tonnes of coal and about 69.2 million kwh of electricity, which in monetary terms is equivalent to Rs. 42.42 crores per annum which constitutes 16% of the energy bill of audited units. Investment envisaged for achieving this energy saving potential is about Rs. 45.08 crores with simple payback period of about 13 months.

7.2.3 Under India-EC Energy Bus Programme, Lead Agencies have completed the targeted 200 energy audit days per year equivalent to 40 quick energy audit studies. Preliminary analysis of 60 quick energy audit studies has revealed an estimated energy saving potential of Rs. 426 lakhs which corresponds to 8% of the energy bill.

7.2.4 As a result of implementing of the above two International Cooperation Projects, 7 Energy Management Advisory Centres have been

developed through Lead Agencies to undertake energy audits in future and the findings of the energy audits have been disseminated to the target group through seminars and promotional campaigns.

7.2.5 **Other International Cooperation projects, which are at different stages of processing for approval, are :**

1. Indo-German Technical Cooperation on Energy Conservation in India Industries (GTZ).
2. Indo-Swedish Cooperation Programme on Demonstration of Industrial Technologies for Energy Efficiency.
3. Indian-European Economic Communities Energy Management Cooperation Programme.
4. Programme for Asian Cooperation on Energy and the Environment (PACE-E).
5. Demonstration Projects Fund for Energy Conservation and Environmental Improvements in India (ADB).
6. Indo-Finnish Cooperation Programme.

Mobile Unit fitted with Energy Audit equipment





33KV, 5MVAR Capacitor Bank

8 PRIVATE SECTOR PARTICIPATION IN POWER GENERATION & DISTRIBUTION

8.1 The policy to encourage greater private sector participation in electricity generation, supply and distribution was introduced in 1991 with amendments to the Electricity Generation Acts, namely, the Indian Electricity Act, 1910, and the Electricity (Supply) Act, 1948. These amendments widened the scope of private sector in the Power distribution and generation by permitting them to set up generating companies. The policy issued under these Acts provides the framework for private sector participation in the electricity sector. The response to the policy initiative has been quite encouraging which would be evident from the fact that so far 75 offers have been received for setting up power plants for a total capacity of 32661 MW at an investment of Rs.104151 crores. 35 of these offers are from foreign private firms including NRIs for a total capacity addition of 22,432 MW at a cost of Rs. 73,386 crores. Besides, one proposal for renovation and modernisation and two proposals for privatising distribution are under consideration. 7 of these proposals have been given approval by Government from foreign investment angle. These projects are currently at an advanced stage for tying up finances and some of them are expected to reach financial closure soon.

8.1.2 Private sector companies in power had existed from the beginning. About 5 private sector power companies were engaged in the business of generation distribution and supply of electricity for a capacity of 3005 MW as licencees. These private companies are currently executing projects for a total new capacity of 1354 MW which is likely to be commissioned by the 8th plan. In addition some of the gas based new proposals may also be commissioned by the 8th Plan. 1974 MW is estimated to be added from such projects. Thus approx. 3148 MW can be expected to be added in private sector by the end of 8th Plan.

9. CENTRAL ELECTRICITY AUTHORITY

FUNCTIONS

9.1.1. The Central Electricity Authority is a statutory organisation constituted under the Electricity (Supply) Act 1948. The main functions of the Authority are:

(1) to formulate short-term and perspective plans for Power Development.

(2) to collect data concerning generation, distribution and utilisation of power, study of cost efficiency, losses, benefits, publication of reports and investigations.

(3) to advise the State Governments, Electricity Boards, generation companies or any other agency engaged in the generation or supply of electricity on such matters as would improve the operation and maintenance of their system in an efficient and coordinated manner.

(4) to promote and assist in the timely completion of projects sanctioned in the power sector and to constantly monitor their implementation.

(5) to make arrangements for advancing the skills of persons in the generation and distribution of electricity.

(6) to promote research in matters affecting the generation, transmission and distribution of electricity.

(7) to advise the Central Government on any matter on which its advice is sought or to make recommendations which would help in improving the generation, distribution and utilisation of electricity.

9.1.2 In addition, the Electricity Rules 1977 make it incumbent on the Central Electricity Authority to evaluate the financial performance of the State Electricity Boards and undertake studies concerning the economic and commercial aspects of the power industry as well as analysis of the tariff structure and promote Inter-State and Joint Sector power projects.

9.1.3 During the year 1993-94 (till 30th Nov., 1993), 5 Thermal schemes were cleared/appraised by CEA from techno-economic angle. Brief details of these schemes are given below:

		Schemes
1.	Type of Schemes	Utility
2.	Total Capacity	1555.5
3.	No. of Schemes	5
4.	Estimated cost (Rs. lakhs)	501696

9.2 **New Thermal Schemes Cleared/Appraised During 1993-94**

Sl. No.	Name of the Scheme	Capacity (MW)	Date of Clear-ance	Estimated cost /Rs. lakhs
1.	Brahmapuram DG sets	100	09.07.93	28,100
2.	Rayalaseema TPS Extn. St.-II	2x210=420	08.06.93	1,27,300
3.	Ramgarh GT	1x35.5=35.5	08.04.93	12,083
4.	Kothagudem TPS St.-V	2x250=500	25.10.93	1,89,000
5.	Muzaffarpur TPS Extn. St.-II	2x250=500	26.10.93	1,45,213
	Total		1555.5	5,01,696

9.3 **Private Sector Proposals**

9.3.1 At present 7 proposals for setting up thermal power stations under private sector participation programme for capacity additions are also under examination in Central Electricity Authority with effect from 1st. Nov., 1993.

9.3.2 Environment clearance for 3 schemes aggregating to 930 MW was accorded by Ministry

of Environment and Forests. In addition to above, site clearance for Raigarh TPP (2x500 MW) was obtained and the condition of installation of FGD plant was deferred for one year after commissioning of Dahanu TPS. The condition of construction of stack height of 275 metre for Bakreshwar TPS St.-II was also modified and Ministry of Environment and Forests agreed for construction of stack height of 220 mtr. and additional ash disposal area in Dhanras village for NTPC's Korba STPP was agreed to by Ministry of Environment and Forests.

9.4. Training Organisation of the Central Electricity Authority.

9.4.1 Power System Training Institute (PSTI)

The Power System Training Institute, Bangalore imparts training in various disciplines, including power systems planning, operation, protection, communication in power systems, computer application and power telecommunication co-ordination. Since the inception of the Institute in 1972, 3730 engineers had been trained upto the end of 1992-93. During the year 1993-94,174 more engineers were trained at the Institute upto the end of October, 1993.

A scheme for augmentation of the training facilities at PSTI which was approved by the Government of India in February 1989, at an estimated cost of Rs. 323.38 lakhs is presently under implementation. Additional land has been acquired from Karnataka Government. Civil works pertaining to Hostel building entrusted to CPWD (Civil Wing) are in progress and are nearing completion. Work related to procurement, installation and commissioning of PC based computer laboratory has been completed. Protection laboratory has been augmented.

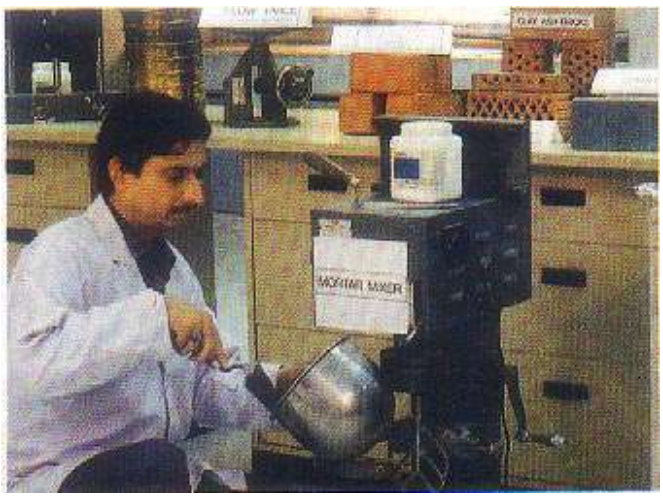
Dispatcher Training Simulator (DTS) and a set of educational video tapes alongwith video projection system, procured under UNDP Aided Project IND/86/005 have been integrated into the training programme being conducted by PSTI.

9.4.2 Hotline Training Centre (HLTC)

In order to reduce to the barest minimum the outages of transmission lines during maintenance, Hotline Maintenance Techniques are being introduced. A Hot Line Training Centre to train personnel in Hot Line Maintenance Techniques upto 220 KV was set up at Bangalore in 1975. The training course at 400 KV bare hand training technique is being conducted from 1991-92 onwards. 725 personnel were trained by the Centre upto end of 1992-93. During the year 1993-94, 23 personnel have been trained at the Centre upto end of September, 1993.

A scheme for augmentation of the training facilities at an approved cost of Rs. 479.48 lakhs is under implementation. The construction of staff quarters, hostel building and other civil works envisaged in the project are in progress.

R&D Centre of NTPC at NOIDA



Maintainence Training at NPTI



10. PUBLIC SECTOR UNDERTAKINGS & OTHER ORGANISATION

A. PUBLIC SECTOR UNDERTAKINGS

10.1 NATIONAL THERMAL POWER CORPORATION LTD. (NTPC)

Since its inception in 1975, NTPC has contributed 13,054 MW to the country's generating capacity. This represents about 18% of the total capacity and about 26% of the thermal capacity in the country. Presently, NTPC has to its credit ten coal based Super Thermal Power Projects and five gas based combined cycle projects with an aggregate approved capacity of 13,660 MW and 3,175 MW respectively. Besides its own stations, NTPC also manages the Badarpur Thermal Power Station in Delhi (720 MW) and the Balco's Captive Power Station near Korba, Madhya Pradesh (270 MW), which was also constructed by NTPC. The total approved investment of the corporation at the end of November, 1993 stands at Rs. 19426.58 crores (excluding the investment on Transmission Systems which has since been transferred to POWERGRID).

DETAILS OF COMPLETED/ONGOING PROJECTS OF THE NTPC

Name of the Project	Region/State	Capacity in MW		Actual/Expected date of commissioning	Approved Cost excluding associated TL System (Rs. in Crs.)
		Ultimate	Approved		
Singrauli STPP	Northern Uttar Pradesh	2000 Stage-I (3x200)	2000	Unit-1 (200) Feb. 82 Unit-2 (200) Nov. 82 Unit-3 (200) Mar. 83	1118.88
		Stage-II (2x200+2x500)		Unit-4 (200) Nov. 83 Unit-5 (200) Feb. 84 Unit-6 (500) Dec. 86 Unit-7 (200) Nov. 87	
Korba STPP	Western Madhya Pradesh	2100 Stage-I (2x200+1x500)	2100	Unit-1 (200) Mar. 83 Unit-1 (200) Oct. 83 Unit-3 (200) Mar. 84 Unit-4 (500) May. 87	1625.25
		Stage-II (2x500)		Unit-5 (500) Mar. 88 Unit-6 (200) Feb. 89	
Ramagundam STPP	Southern Andhra Pradesh	2100 Stage-I (3x200+1x500)	2100	Unit-1 (200) Oct. 83 Unit-2 (200) May 84 Unit-3 (200) Dec. 84 Unit-4 (500) Jun. 88	1674.62
		Stage-II (2x500)		Unit-5 (500) Mar. 89 Unit-6 (500) Oct. 89	
Farakka STPP	Eastern West Bengal	2100 Stage-I (3x200)	2100	Unit-1 (200) Jan. 86 Unit-2 (200) Dec. 86 Unit-3 (200) Aug. 87	2804.64

Name of the Project	Region/State	Capacity in MW Ultimate	Capacity in MW Approved	Actual/Expected date of commissioning	Approved Cost excluding associated TL System (Rs. in Crs.)
		Stage-II (2x500)		Unit-4 (500) Sept. 92 Unit-5 (500) Feb. 94	
		Stage-III (1x500)		Unit-6 (500) #	
Vindhyachal STPP	Western Madhya Pradesh	2260 State-I (6x210)	1260	Unit-1 (210) Oct. 87 Unit-2 (210) Jul. 88 Unit-3 (210) Feb. 89 Unit-4 (210) Dec. 89 Unit-5 (210) Mar. 90 Unit-6 (210) Feb. 91	1460.37
Rihand STPP	Northern Uttar Pradesh	3000 Stage-I (2x500)	1000	Unit-1 (500) Mar. 88 Unit-2 (500) Jul. 89	1688.17
Kahalgaon STPP	Eastern Bihar	2840 Stage-I (4x210)	840	Unit-1 (210) Mar. 92 Unit-2 (210) Mar. 94 Unit-3 (210) May 95 Unit-4 (210) Dec. 95	1715.89
National Capital Thermal Power Project (Dadri)	Nothern Uttar Pradesh	840 Stage-I (4x210)	840	Unit-1 (210) Oct. 91 Unit-2 (210) Dec. 92 Unit-3 (210) Mar. 93 Unit-4 (210) June 94	1063.60
Talcher STPP	Eastern Orissa	3000 Stage-I (2x500)	1000	Unit-1 (500) June 94 Unit-2 (500) June 95	1404.04
Kawas GBPP	Western Gujarat	1295 Stage-I (4x106+2x110)	600-Nominal 645-Actual	**Gas Turbine** Unit-1 (106) Mar. 92 Unit-2 (106) May 92 Unit-3 (106) June 92 Unit-4 (106) Aug. 92 **Steam Turbine** Unit-5 (110.5) Feb. 93 Unit-6 (110.5) Mar. 93	373.98
Auraiya GBPP	Northern Uttar Pradesh	1302 Stage-I (4x112+2x102)	600-Nominal 652-Actual	**Gas Turbine** Unit-1 (112) Mar. 89 Unit-2 (112) Jul. 89 Unit-3 (112) Aug. 89 Unit-4 (112) Sep. 89	595.93

Name of the Project	Region/State	Capacity in MW Ultimate	Capacity in MW Approved	Actual/Expected date of commissioning	Approved Cost excluding associated TL System (Rs. in Crs.)
				Steam Turbine Unit-5 (102) Dec. 89 Unit-6 (102) Jun. 92	
Anta GBPP	Northern Rajasthan	843 Stage-I (3x88+1x149)	430-Nominal 413-Actual	**Gas Turbine** Unit-1 (88) Jan. 89 Unit-2 (88) Mar. 89 Unit-3 (88) May, 89 **Steam Turbine** Unit-4 (149) Mar. 90	356.94
Dadri GBPP	Northern Uttar Pradesh	1225 Stage-I (4x131+2x146.5)	817	**Gas Turbine** Unit-1 (131) Feb.92 Unit-2 (131) Mar. 92 Unit-3 (131) Jun. 92 Unit-4 (131) Oct. 92 **Steam Turbine** Unit-5 (146.5) Dec. 93 Unit-6 (146.5) Mar. 94	783.44
Unchahar TPP	Northern Uttar Pradesh	840 Stage-I (2x210)	420	Unit-1 (210) Nov. 88 Unit-2 (210) Nov. 89	925.00
Gandhar GPP	Western Gujarat	648 Stage-I (3x131+1x255)	648	**Gas Turbine** Unit-1 (131) Mar. 94 Unit-2 (131) May 94 Unit-3 (131) July 94 **Steam Turbine** Unit-4 (255) Sept. 95	1656.30
Total Approved			**16835 MW**		**19247.08**

Unit to be commissioned in 5 years from the date of Main Plant Award

NB: 1. In addition Government approval to incur Rs. 103.5 Crs. (including Rs. 5.5 crores for ATS) by way of advance action/Stage-I clearance accorded in March, 90 for Vindhyachal Stage-II project.

2. Approved Cost of Other Schemes is Rs. 81.50 Crs.

10.1.3 **Capacity Additions**

By the end of March, 1993 NTPC had commissioned 13,054 MW at its various stations as per the details given below :

Project	Capacity Commissioned (MW)
Singrauli	2000
Korba	2100
Ramagundam	2100
Farakka	1100
Rihand Stage-I	1000
Vindhyachal Stage-I	1260
Anta GPP	413
Auraiya GPP	652
Kahalgaon Stage-I	210
NTPC Dadri	630
Kawas GPP	645
Dadri GPPP	524
Unchahar TPS Stage-I	420
Total	**13054 MW**

3.2 During the year 1992-93, as per the target indicated in the Ministry of Power' Annual Action Plan and the MOU signed between NTPC and the Ministry of Power, (Govt. of India), NTPC has programmed to commission 1134 MW generating capacity. The work on all the units programmed for commissioning during the year is progressing satisfactorily and it is expected that the target of commissioning 1134 MW during the year would be met.

10.14 **Generation**

By the end of November, 1993, a total capacity of 13,054 MW was under operation at various NTPC Stations. This comprises of 26 Units of 200/210 MW each at Singrauli, Korba, Ramagundam, Farakka, Vindhyachal, NCTPP, Unchahar & Kahalgaon, 11 Units of 500 MW each at Singrauli, Korba, Ramagundam, Rihand, and Farakka and 200 Gas/Steam turbine Units of various capacities operating at gas based combined cycle power plants at Anta, Auraiya, Kawas and Dadri Gas Power Projects.

The generation performance of NTPC stations has consistently been at a high level. Against the



target of 62900 MUs for the year 1993-94, till the end November, 1993, the gross generation from NTPC stations was 49047 MUs, which is commensurate with the pro-rata target of 43972 MUs for the period April-November 1993. The generation during the previous year (1992-93) was 66,092 MUs against a target of 57,940 MUs constituting 21.96% of the total generation and 29.4% of thermal power generation in the country.

During 1993-94, (till the end of November, 1993), the coal based units under commercial operation generated 42887 MUs at a Plant Load Factor (PLF) of 75.30%. During this period, the units under commercial operation at Singrauli, Korba, Ramagundam, Farakka, Vindhyachal, Rihand and Unchahar TPS operated at a PLF of 82.75%, 76.08%, 74.70%, 66.13%, 76.91%, 71.17%, and 66.33% respectively.

Coal based units of NTPC that attained a PLF in excess of 70% during the current year, (upto November, 93), are detailed below:

Sl. No.	Station	Capacity	Unit No. (MW)	PLF (%)
1.	Singrauli	200	1	91.13
2.	Singrauli	200	2	90.25
3.	Singrauli	200	3	75.09
4.	Singrauli	200	4	92.37
5.	Singrauli	500	5	91.47
6.	Singrauli	500	7	86.1
7.	Korba	200	1	78.10
8.	Korba	200	2	88.89
9.	Korba	500	3	77.71
10.	Korba	500	5	74.76
11.	Korba	500	6	77.94
12.	Ramagundam	200	1	84.52
13.	Ramagundam	200	2	84.08
14.	Ramagundam	200	3	80.97
15.	Ramagundam	500	5	76.26
16.	Ramagundam	500	6	81.26
17.	Farakka	200	3	79.57
18.	Rihand	500	2	81.48
19.	Vindhyachal	210	1	70.46
20.	Vindhyachal	210	2	74.16
21.	Vindhyachal	210	3	77.61
22.	Vindhyachal	210	3	77.61
23.	Vindhyachal	210	6	86.86
24.	Unchahar	210	2	76.29

Anta Gas Power Plant



10.1.5 **Budget Utilisation and Financial aspects**

The authorised share capital of the Corporation is Rs. 8000 crores. As of November, 1993, the paid up capital of NTPC was Rs. 7999.84 crores, which is wholly subscribed by the Government of India.

During the financial year 1992-93, the NTPC ed a net profit of Rs. 886.57 crores. The return on capital employed and return on net worth were 10.90% and 11.57% respectively (excluding prior period income).

10.1.6. **International Financial Assistance - New Projects**

World Bank Loan for "NTPC Power Generation Project" under Time-slice Concept

The World Bank approved a loan of US $ 400 million for NTPC Power Generation Project on June 29, 1993. This loan will be the first of a series

of time-slice loans from the World Bank for a cumulative amount of about US $ 1.2 billion to support NTPC's investment programme.

The time-slice concept envisages utilization of the committed loan amount over a specific period of time. This approach, has the flexibility to permit use of the proceeds of the Bank loan for future projects even if they are currently not included in the Company's investment programme, provided they meet the eligibility criteria based on Bank's appraisal. For the first time-slice loan of US $400 million, Vindhyachal STPP Stage-II (2x500 MW) and Rihand Stage-II (2x500 MW) have been identified as priority projects.

ADB Loan for Feroze Gandhi Unchahar Thermal Power project Stage-II (2x210 MW)

Negotiations were held with Asian Development Bank (ADB) on the draft Project Agreement and the amendments required in the Loan Agreement is respect of US $ 160 million loan for change of implementing agency from Uttar Pradesh Rajya Vidyut Utpadan Nigam (UPRVUN) to NTPC. ADB Board of Directors have since accorded their approval for the change in the implementing agency from UPRVUN to NTPC.

OECF Assistance for Faridabad GPP (400 MW)

Faridabad gas based power project (400 MW) of NTPC was one of the projects posed by Government of India for financing by Overseas Economic Cooperation Fund (OECF) Japan. After necessary appraisal, the first tranche of OECF assistance for the project amounting to yen 23536 million (including transmission line component to be executed by POWERGRID) is understood to have been pledged by the Japanese Government. The loan negotiations for this tranche are expected to take place shortly. OECF financing for the project is expected to cover upto 80-85% of the project cost in several tranches.

10.1.7 **Transfer of Transmission Assets**

Subsequent to the de-facto transfer of transmission line assets and manpower in 1991-92, with the promulgation of the ordinance dated 8.1.1993 by the Government of India (which has subsequently been regularized by passage of a Bill in the Parliament), the de-jure transfer of NTPC's transmission assets to the POWERGRID has been completed. The value of assets transferred to POWERGRID has been arrived at jointly between NTPC & POWERGRID based on audited accounts for the year 1991-92. The equity and loan components to be transferred to POWERGRID have also been worked out jointly. The total value of assets transferred to POWERGRID as on 31.3.92 was Rs.3386.86 crores comprising Rs. 1349.37 crores of equity and Rs. 2037.49 crores of loans including Government of India loans, foreign/Indian loans and power bonds.

10.1.8 **Consultancy Services**

The Consultancy Services Division of NTPC continued to expand its activities by undertaking turnkey assignments in the domestic and international markets. Consultancy Wing attained a turnover of Rs. 17.18 crores during the year 1992-93 including a foreign currency turnover of US $ 4.71 million. The value of orders received during the year 1992-93 was Rs. 4.43 crores while the same for the period April-November, 1993 was Rs. 27.67 crores. The turnkey contract by the Dubai Electricity & Water Authority of about US $ 18 million for the supply, erection and commissioning of their 400 KV transmission line and upgradation of an existing 132 KV line was commissioned five months ahead of schedule.

Orders from International clients during the financial year 1992-93 include Engineering Services for Kathalguri GPP (NEEPCO) from EPDCI, Japan and inspection of CVTs for Hydro Electric Commission, Tasmania. The assignment from Asian Development Bank for the Operational Improvement Efficiency Support to Tamil Nadu Electricity Board is nearing completion. As a result of NTPC's excellent performance in this assignment, further order from ADB for additional services is expected in near future.

During the current year, 1993-94 (April to November, 1993) NTPC secured a number of consultancy contracts. On the home front,

orders received by NTPC include a major Consultancy assignment from Indian Oil Corporation Ltd., for their 3x25 MW Oil Fired Captive Power Project for Panipat Refinery. It also bagged the contract for turnkey execution of 132KV/66KV/33KV Substations from the Nepal Electricity Authority, Govt. of Nepal, during this period.

10.1.9 **Joint Venture Projects**

NTPC has already developed to an advance state a joint venture with Spectrum Technology USA, Inc and has also proposed another one alongwith ABB, Switzerland which is in preliminary stage.

NTPC has signed "Promoters Agreements" with Spectrum Technologies USA, Inc. New York including their associates and Jaya Food Industries, Hyderabad for equity participation by NTPC in Spectrum Power Generation Ltd. (SPGL) - a private generating company set up for implementing a 208 MW gas based power station at Kakinada, A.P. NTPC's equity in the joint venture would be 10% of the total equity of SPGL. The negotiations for finance closing for this project are in progress.

NTPC has also signed a Memorandum of Understanding (MOU) with ABB, Switzerland for development of a power project and, in term of which, has responded to DESU for its gas based project at Bawana, Delhi. NTPC and ABB are one of the short listed project proponents and have jointly submitted a detailed project proposal bid to M/s DESU in February, 1993.

10.1.10 **Memorandum of Understanding**

NTPC is amongst the PSUs who first started signing the MOU with GOI in 1986-87. The MOU identifies the performance targets to be achieved by NTPC during the year in respect of power generation, addition of new capacity, financial and other performance parameters. These targets are fixed after detailed deliberations amongst all concerned agencies namely Central Electricity Authority (CEA), Ministry of Power, Planning Commission, and various other Department/ Ministries of the Government of India. MOU also identifies actions to be taken by the Government of India to enable NTPC to achieve most of these targets. The provision in the draft MOU was thoroughly reviewed by an ad-hoc task force comprising experts in their respective fields and was finally approved by a high powered committee with Cabinet Secretary as its Chairman. NTPC's performance under the MOU has generally been excellent and for the year 1992-93 NTPC has achieved or, surpassed targets for various performance parameters such as capacity addition generation, profit etc.

The Memorandum of Understanding (MOU) for the year 1993-94 was signed between NTPC and the Ministry of Power on 23.7.1993. MOU targets for the year 1993-94 in respect of major performance parameters are given below:

	(Target)*
1. Capacity Addition (MW)	1134
2. Generation (MUs)	62900
3. Availability Factor %	78
4. Heat Rate (Kcal/Kwh) (Coal Based Stations)	2525
5. Gross Margins (Rs. cr.)	2222
6. Net Profit to Capital employed (Rs. Cr.)	7.31
7. Consultancy turn over (Rs. Cr.)	2.63

**(corresponding to Very Good rating)*

10.1.11 **Environmental Management**

With the goal of environmentally sustainable development in view, NTPC has developed a comprehensive Environmental Action Plan (EAP) identifying specific plans for (i) Institutional strengthening of environment management function; (ii) Environment management and monitoring at power station; (iii) Specific Environmental Projects; and (iv) Resettlement and Rehabilitation of project affected persons.

During the year, NTPC initiated studies like ecological impact assessment through satellite imageries, detailed geohydrological studies around ash pond of various projects.

Based on the recommendations of the Integrated EIA study of Singrauli Area conducted by EDF, France, an Action Plan has been drawn up for implementation of mitigatory measures envisaged for NTPC's projects in the area. Similar studies of Korba and Ramagundam areas have been planned and would be taken up shortly.

During the year Environmental Audits at four stations viz. Badarpur, Ramagundam, Vindhyachal and Singrauli were conducted and remedial actions for meeting the environmental norms were identified. Under a Technical Co-operation Programme independent experts from National Power, U.K. visited Singrauli area and expressed satisfaction on NTPC's management of environmental activities.

Extensive efforts are being made to provide effective R&R measures as per NTPC R&R policy.

The projects have well defined afforestation programmes including development of green belts around the plant premises. About 8 lakh trees have been planted at the NTPC projects during 1993-94 (upto Nov. '93) bringing the total number of trees planted at various projects to 65 lakhs (approx.)

10.1.12 **Energy Conservation**

A number of awareness campaigns and workshops for energy conservation were held at all NTPC units. Energy - Audits have been initiated at NTPC stations for identifying and accomplishing possible energy savings. Feasibility of setting up minihydel power stations has also been taken up with a view to utilizing the residual head at C.W. outfall-canal in NTPC's power stations.

Studies have been initiated for development of 2 MW (approx.) solar thermal power plant in association with leading Indian organisations. NTPC is also assisting Ministry of Nonconventional Energy Sources as Project Manager for implementation of their proposed solar thermal power plant.

10.1.13 **Ash Utilisation**

With a view to promoting productive utilization of ash, NTPC has finalised a comprehensive Ash Utilization Policy with long term and short term measures defined therein.

Various incentives/assistance to be provided to entrepreneurs as per the policy include technical and managerial assistance, marketing information, acquainting them with the procedure/ system for assistance from financial institutions, assistance for formation of Joint Venture Company with NTPC as a minority partner based on techno-economic examination in specific cases, making available land, steam, water and electricity depending on their availability and subject to techno-economic feasibility etc. The Policy also seeks to promote use of fly ash and fly ash based products in appropriate areas.

Dry Ash being collected at Dadri for productive use



In pursuance of the Policy, measures for collection dry ash at NTPC stations to facilitate its use are being incorporated.

Detailed market Research Study is being carried out covering about 200 KM area around thermal power plants located at Singrauli, Korba, Ramagundam, Farakka, Vindhyachal, Rihand, BCPP and Delhi so as to enable NTPC to assess the potential of use of ash in the manufacture of ash based products and make a long term strategy for ash utilisation. An agreement was signed with M/s. Ballarpur Industries Ltd. (BILT) for supply of dry fly ash at the rate of about 250 T per day from Badarpur Thermal Power Plant for the manufacture of aerated autoclaved concrete products. Their plant became operational during the year. A consultancy work for extraction of alum from fly ash awarded for setting up a pilot plant at Farakka.

10.1.14 **Research & Development**

With a view to enhancing the reliability and availability of plant and equipment, the Research & Development Centre of NTPC undertakes applied research and development work to seek solutions to various operational problems faced in the power stations owned by NTPC. It also offers its services to electricity generating organisations.

During the year the R&D Department started functioning from its new premises at NOIDA. New facilities like wear debris analysis, quantitative metallography, microprocessor development system, corrosion studies through electro-analytical techniques etc. have been added during the year, thereby further augmenting the house analytical and diagnostic capabilities.

Research studies on power plant related problems such as chemical condition of post operational regime of boilers, effectiveness of various fault diagnosis techniques for rolling element - bearings, metallurgical features of boiler tube failures, evaluation of dissolved gas norms in oils for transformers and reactors, ash amalgamation studies, waste utilisation etc. were undertaken in house.

As an indigenisation effort, electronic water drum level indicator was successfully, developed and is undergoing field trials at one of NTPC's stations.

With the aim of utilising national scientific resources, joint studies on some of the plant problems were also initiated with other organisations.

10.1.15 **Awards**

1. **Productivity Award:** Under the Meritorious Productivity Award Scheme of Government of India, six projects, namely - Singrauli, Korba, Ramagundam, Farakka, Rihand and Vindhyachal were selected for this award in recognition of efforts put in by employees of these projects on improving generation performance during the calender year 1991.

2. **Prime Minister's Shram Awards for 1993 :** Three workers from Anta Gas project were given the prestigious Prime Minister's Shram Bhushan Award and 4 workmen of Rihand project received the Shram Vir Award for their meritorious services to the Company. This is the ninth consecutive year that employees of the company have got Prime Minister's Shram Award.

3. **Company's Standardization Award:** NTPC has also bagged the Company Standardisation Award for 1992 from Institute of Standards Engineers, an affiliated professional body of Bureau of Indian Standards.

10.1.16 **Badarpur Thermal Power Station**

Badarpur Thermal Power Station (BTPS) consists of 3x100 MW and 2x210 MW coal fired units with an installed capacity of 720 MW. The station is owned by Government of India and is being managed by NTPC since April, 1978. During the year 1993-94, till the end of November, 1993, the station generated a total of 2768 Mus at a PLF of 67.06% against the target of 4200 MUs (PLF68%) for the whole year. Other parameters like specific oil consumption and auxiliary power consumption during the year (upto November).

10.1.17 **Ash Utilisation at BTPS**

BTPS has been making sincere efforts for productive utilisation of fly ash generated for constructive purposes. M/s Ballarpur Industries has set up a dry fly ash evacuation system for its use for manufacture of auto claved concrete blocks and beams consuming fly ash to the tune of 250 T/day. BTPS has started, on experimental basis the manufacture of ash based bricks using FAL-G technology. BTPS has also invited entrepreneurs for setting up industries to manufacture ash based products and also for free lifting of pond ash for development of low lying area.

10.1.18 **Renovation & Modernisation at BTPS**

BTPS in one of the thermal Power Stations identified under the centrally sponsored scheme for renovation and modernisation of the thermal utilities in India. Under R&M Scheme Phase-I various works in the area of boiler pressure parts modification, control and instrumentation, additional electrostatic precipitator, mill reject handling system, ash handling system etc. have been carried out. Encouraged by the achievements after the implementation of first phase of R&M programme, proposal has been submitted for the second phase of the Renovation & Modernisation programme for all units of BTPS. The R&M phase-II has been Technoeconomically cleared by CEA and is to be considered by PIB.

10.1.19 **Reservation for SC/STs**

Special efforts were made with a view to achieving better compliance of directives of the Government. Special training programmes/ conference of Liaison Officers were also held for better coordination in the implementation of the directives. A number of Special Recruitment Drives were launched to fill up physical backlog and current reserved vacancies. The Fourth Special Recruitment drive was launched in February, 1993.

The following efforts were also made to fill up the reserved vacancies:

- Exclusive advertisement/notifications covering populous belts of SC/ST.
- Notification of vacancies to recognised SC/ ST associations.
- Announcements of vacancies on Doordarshan/All India Radio.
- All major vacancies involving all India competitive selection tests are circulated to all accredited SC/ST associations as prescribed under the relevant Govt. Directivies.
- Exchange of reserved vacancies in the 3rd year of carry forward.
    - Award of Annul Scholarship to SC/ST students pursuing Degree/Diploma in Engg. Courses.
    - Induction of SC/ST Steno-Typists on relaxed norms through Special Training Scheme.

10.1.20 NTPC has taken a number of community development programmes for the upliftment of population around Project sites, including SC/ST. These include construction of roads, drains, sulabh sauchalayas, panchayat bhawan, libraries, bus shelters, provision of drinking water, schools, health camps and conduct of training classes in tailoring, carpentry etc.

10.2 NATIONAL HYDROELECTRIC POWER CORPORATION LTD. (NHPC)

10.2.1 The National Hydroelectric Power Corporation Limited (NHPC) was incorporated in 1975 under the Companies Act, 1956. The main objectives of the Corporation are to plan, promote and organise an integrated development of hydroelectric power in the country.

The authorised share capital of the corporation stands at Rs. 2500 crores. The paid-up capital which was Rs. 2255.23 crores as on 31.3.93 increased to Rs. 2499.08 crores at the end of October, 1993. The profit during the year 1992-93 was Rs. 41.49 crores as against Rs.49.30 crores in the previous year. The turnover of the Corporation during the year 1992-93 was Rs. 187.90 crores as against Rs. 243.94 crores in the previous year. The fall in the profit as well as the turnover of the Corporation was due to transfer of transmission lines to the Power Grid Corporation of India Ltd.

The Operating Projects of the Corporation, namely the Loktak, Baira Siul, Salal and Tanakpur Hydroelectric Projects generated 3639.05 MUs against a target of 3380 MUs-an achievement of 107.66% over the target. The cumulative generation during the year 1993-94 upto December, 1993 was 2952 MUs.

10.2.2 **During the year, NHPC** has been engaged in the construction of the following Hydroelectric Projects:

1. **Chamera H.E. Project (Stage-I)(3x180MW), H.P.**

   The project is in its final stages of completion and all the three units of the project are expected to be commissioned by the end of current financial year.

2. **Dulhasti H.E. Project (3x130MW), J&K**

   The French Consortium which was executing the project on turnkey basis had suspended the works at site with effect from 24th August, 1992 contending that the security environment at site was not conducive to fulfilment of their contractual obligations. The Govt. has since taken various steps to strengthen the security arrangements in and around the project areas and reassure the French Consortium in this regard. However, the Consortium have not resumed work at site and discussions are in progress with them to arrive at an agreed framework for completion of the balance work. About 27% of the major civil works and 75% of the work relating to engineering and design stands completed. The French Consortium has also supplied about 28% of the electromechanical equipment and another 50% of the equipment is ready with them.

3. **Uri H.E. Project (4x120MW), J&K**

   The project is being executed by a Swedish-U.K. Consortium on turnkey basis. Work on construction of the project is in progress and about 22 lac M^3 surface works excavation has been completed against a total quantity of 38 lac M^3. Tunneling is in progress in Head Race Tunnel and 5300 M excavation has been completed so far against a total length of 10653 M. Work is also in progress in Tail Race Tunnel. About 50% excavation of Power House Caverns has also been completed. The project is likely to be commissioned by May, 1997.

4. **Salal H.E., Project (Stage-II) (3x115 MW), J&K**

   One of the three units was synchronised in June, 93. Erection of the other two units is in progress and efforts are being made to rotate the second unit by March, 94. The Tail Race Tunnel and the last unit is likely to be completed by March, 95.

5. **Rangit H.E. Project (3x20MW), Sikkim**

   The infrastructure works have been completed. The diversion tunnel has been constructed and the river diverted to facilitate the dam works. Boring of the Head Race Tunnel has been commenced. 68000 M^3 excavation has been done for Power House out of a total of 146000 M^3.

6. **Dhauliganga H.E. Project (Stage-I) (4x70MW), U.P.**

Due to paucity of funds, no land could be acquired for the project and infrastructural and major works could not be started.

7. **Koel Karo H.E. Project (710 MW), Bihar**

Due to paucity of funds, no land could be acquired for the project and infrastructural and major works could not be started.

NEW SCHEMES

1. **Chamera H.E. Project (Stage-II) (3x100MW), H.P.**

Global bids have been invited for the Chamera H.E. Project (Stage-II) for turnkey execution together with 100% financing. Technical bids were opened on 9th Nov. '93 and the evaluation is in progress.

2. **Baglihar H.E. Project (3 x 150 MW), J&K**

The project has been techno-economically cleared by CEA. The environmental and forest clearances for the project have also been received. The project has been posed for World Bank funding and NHPC proposes to engage an international consultant for re-appraisal of the project as per requirements of the World Bank.

3. **Kurichu H.E. Project in Bhutan**

The Government of India has recently entrusted to NHPC the investigation of the Kurichu Project in Bhutan. Topographical survey and hydro-meteriological survey and geological mapping of the project area and drilling at the proposed diversion tunnel outlet are in progress.

Barrage under construction - URI Project (J&K)



4. The Government of India have decided that the Sawalkot H.E. Project in J&K and the 1200 MW Teesta H.E. Project (Stage-III), Sikkim will be implemented by the State Governments concerned.

10.2.4 **Outstanding dues from beneficiaries**

As on 31.12.93, a total sum of Rs. 317 crores was due to the Corporation from the beneficiaries/SEBs for power supplied to them by NHPC Power Stations. Steps are being taken with the help of the Union Government for recovery of arrears from the SEBs, as the mounting arrears are affecting the liquidity position of the Company.

10.2.5 **Consultancy Services**

With a view to diversify the activities the Corporation has set up a full fledged Consultancy Wing which would provide a range of specialised services in setting up of hydel projects.

10.2.6 **Bonds**

During the year 1992-93, the Corporation was asked to raise Rs.500 crores through issue of non convertible redeemable bonds. However, due to depleted Bonds market, the Corporation could raise only Rs. 59 crores through private placement. For 1993-94, the Corporation has been asked to raise Rs.600 crores through issue of Bonds. The Corporation will be redeeming this year its 'A' Series Bonds issued in 1986 of the aggregate value of Rs. 156 crores inclusive of interest payable on these bonds.

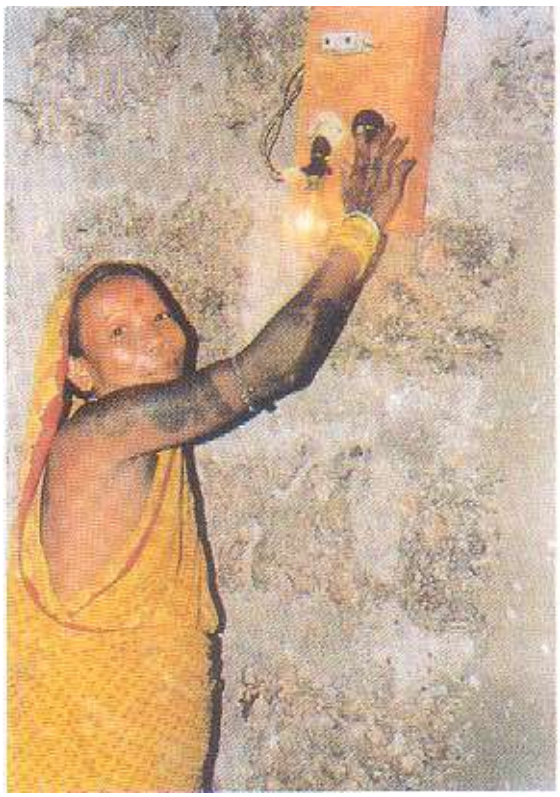
10.2.7 **Voluntary Retirement Scheme**

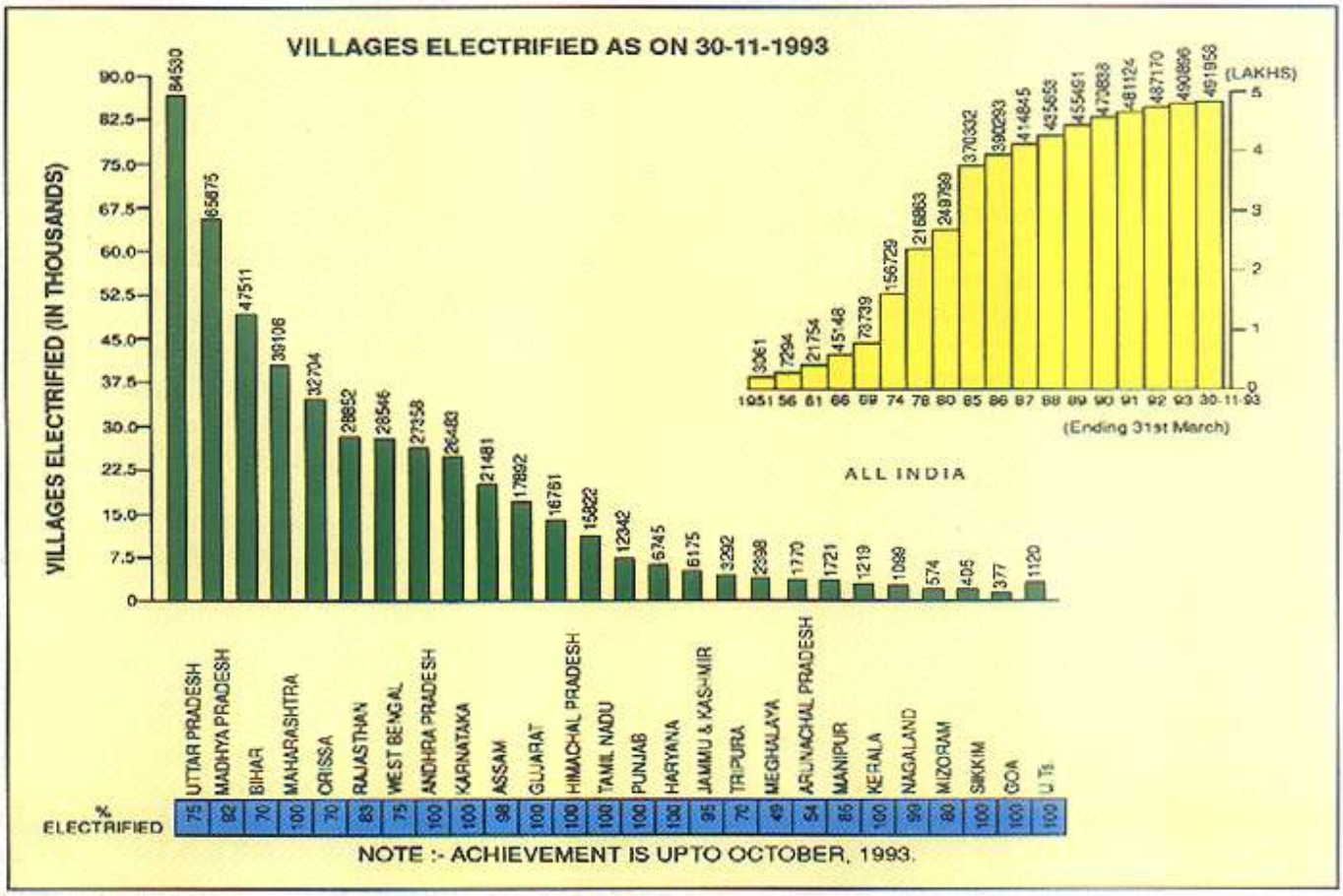
To reduce surplus manpower with a view to relating the manpower available to the work load the Corporation introduced a voluntary retirement scheme for its employees. 287 employees took benefit under the scheme which was opened between April and July, 1993. The Scheme was once again kept open between 1st September and 31st October, 1993.

10.3 RURAL ELECTRIFICATION CORPORATION (REC)

Rural Electrification Corporation (REC) was set up in 1969 with the primary objective of providing financial assistance for rural electrification programme in the country. Rural Electrification programmes undertaken by the REC cover electrification of villages, including tribal villages and Harijan Bastis, energistation of pumpsets, provision of power for small and agro-based rural industries., lighting of rural households and street lighting. The Corporation also provides assistance to the State Electricity Boards for taking up Systems Improvement Projects for strengthening and improving of sub-transmission and distribution system and small hydel projects.

The authorised Share capital of the Corporation is Rs. 600 crore. The paid-up-capital of the Corporation upto the year 1992-93 stands at Rs.390.10 crore. During the current year (upto October, 1993), the Central Government have contributed Rs. 48.50 crore towards the share capital of the Corporation, increasing its equity base to Rs. 438.60 crore.





During the year 1992-93, the REC approved 1169 new projects involving a loan assistance of Rs.502.23 crore. During the current year (upto October, 1993) REC approved 114 new projects involving financial assistance of Rs. 19.82 crores (Provisional) Cumulatively upto October, 1993, REC sanctioned 25617 RE Projects involving financial assistance of Rs. 9363.56 crores (Provisional).

Loan advanced by REC to the SEBs, State Governments and RE Coop. Societies during the year 1992-93 amounted to Rs. 474.26 crore. Inclusive of this, the total loan amount advanced at the end of 1992-93 aggregated to Rs. 6479.14 crore. During the year 1993-94, the Corporation has advanced Rs. 53.76 crore (Provisional) as loans upto October, 1993.

During the year 1992-93, against the target of electrification of 3000 villages and energisation of 214000 pumpsets, 3354 villages were reported electrified and 330827 pumpsets energised. The target of pumpsets was exceeded by 55%.

During the year 1992-93 (upto October, 1993) 94345 pumpsets (provisional have been energised.

The level of rural electrification in the country has risen from mere 12.8% at the time of establishment of REC in 1969 to 85% as of now. During the same period, the number of pumpsets energised has rapidly risen from 10.9 lakhs to over 98.48 lakhs.

As a part of its strategy to improve the efficiency of the electrical network, especially to reduce power losses and improve voltage conditions in the system the Corporation continued to give special thrust for implementation of System Improvement projects. As a result the Corporation sanctioned 3 new System Improvement projects involving financial outlay of Rs. 3.6 crore (Provisional) for creation of 3 new sub-stations during the current year upto October, 1993. During the year, the Corporation also disbursed Rs. 14.8 crores to the SEBs for various System Improvement projects. Thus since the year 1987-88, a total of 908 projects

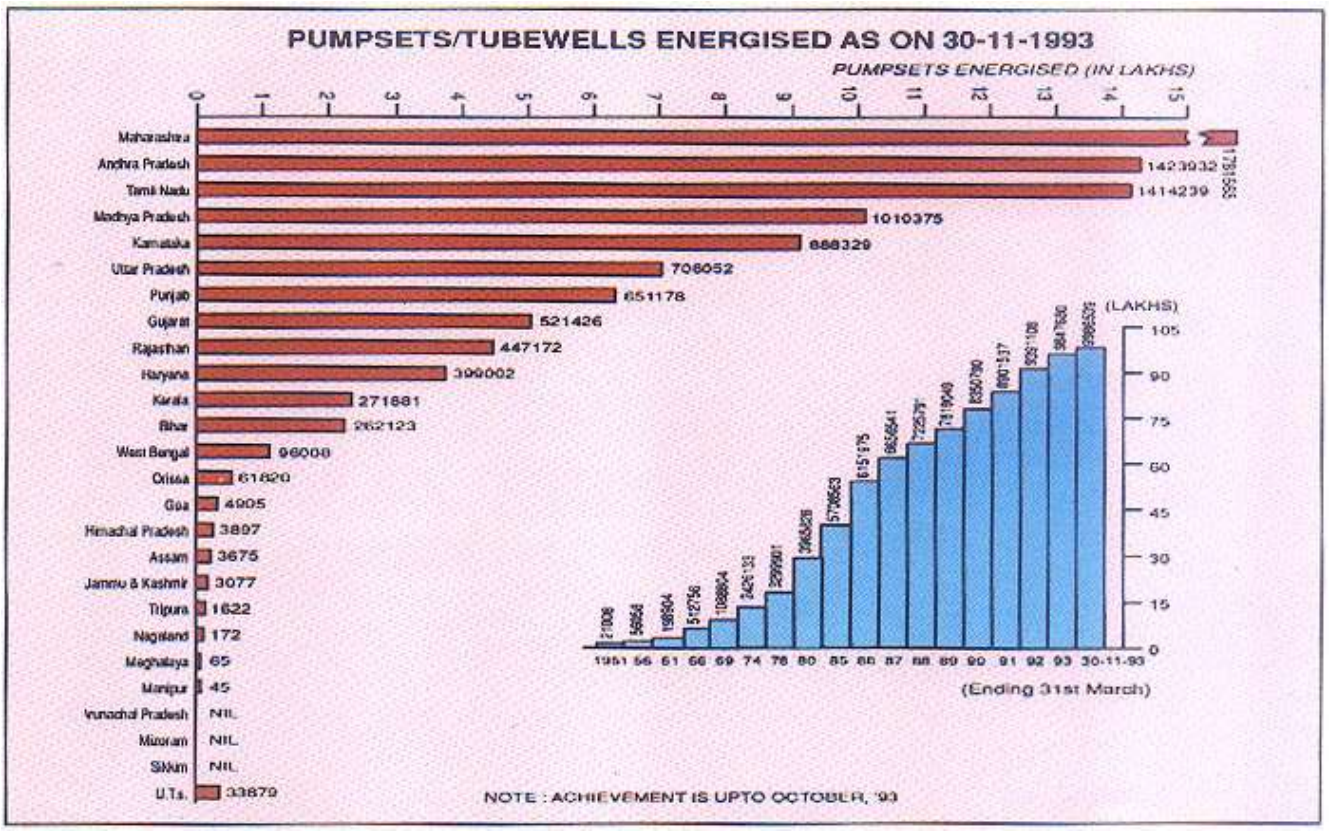
involving financial outlay of Rs. 727.6 crore (Provisional) stand sanctioned by the Corporation under System Improvement Programme upto October, 1993. During the same period, a total amount of Rs. 491.7 crore (Provisional) has been disbursed and as many as 451 sub-stations commissioned under System Improvement projects financed by the Corporation.

The Corporation continued its drive towards Standardisation of equipments, material and construction practices for rural electrification programme including introduction of innovative technologies with special emphasis on conservation of energy. Cumulatively 20 standards comprising 71 specifications for equipment and material and 219 construction practices have been evolved by the REC till 31st March, 1993. REC organised its 13th conference on S3tandardisation, Technical Development and Training on 4th to 6th May, 1993 which was inaugurated by the Hon'ble Minister of Power Shri N.K.P. Salve. A large number of distinguished delegates from SEBs, various central organisations like CEA, BIS, CBI & P CPRI, Central Ministry and leading manufacturers attended the conference. Consequent upon the deliberations held and recommendations made in this Conference, the Corporation has taken up the work of finalisation of 15 new specifications and 53 new construction standards apart from revision of the existing 13 specifications and 6 construction standards.

The Corporation being a Public Financial Institution has initiated special action plan to gear up itself to meet the challenges in the present day competitive environment. Recovery of past dues from SEBs, raising resources from the market and diversifying into areas relevant to the Corporation's activities are part of the special action plan to be implemented.

The REC has for the first time entered into a Memorandum of Understanding with Ministry of Power for the year 1993-94, laying down therein the expectations from REC in the area of financial and physical performance.

The loss of Rs. 93.77 crores is primarily because of non-realisation of dues of Rs.229.79 crore for the year 1992-93 from the State electricity Boards.



10.4 NORTH EASTERN ELECTRIC POWER CORPORATION LTD. (NEEPCO)

10.4.1 The North Eastern Electric Power Corporation Ltd. (NEEPCO), was constituted in 1976 under the Company's Act of 1956 with the objective of developing the large power potential of the N.E. Region. As per assessment made by CEA the Hydro Power Potential of Brahmaputra Basins is nearly 34,920 MW (at 60% load factor). Besides this, the N.E. Region has vast reserves of Natural Gas. The Corporation, in order to tap the power potential of the region is marching ahead with a perspective plan on power generation to cater to the need of the N.E Region and beyond. Against the total installed capacity of 1175 MW for the on-going projects under States & Central Sector Schemes in N.E. Region, the Corporation's programme is 955 MW (Hydel Power 580 MW & Gas Based Thermal Power 375 MW). In addition, the Corporation is also engaged in Survey & Investigation of viable projects for future execution. The Kopili H.E. Project of 150 MW, commissioned in March 1988, is continuing to supply power to the States of Assam, Meghalaya, Manipur, Mizoram, Tripura & Arunachal Pradesh through 132 KV and 220 KV Transmissions Lines which were completed by the Corporation and subsequently transferred to Power Grid Corporation of India Ltd. on 1st April, 1992.

10.4.2 **The various projects taken up by the Corporation are as follows:**

10.4.2.1. **Project Completed (Generation)**

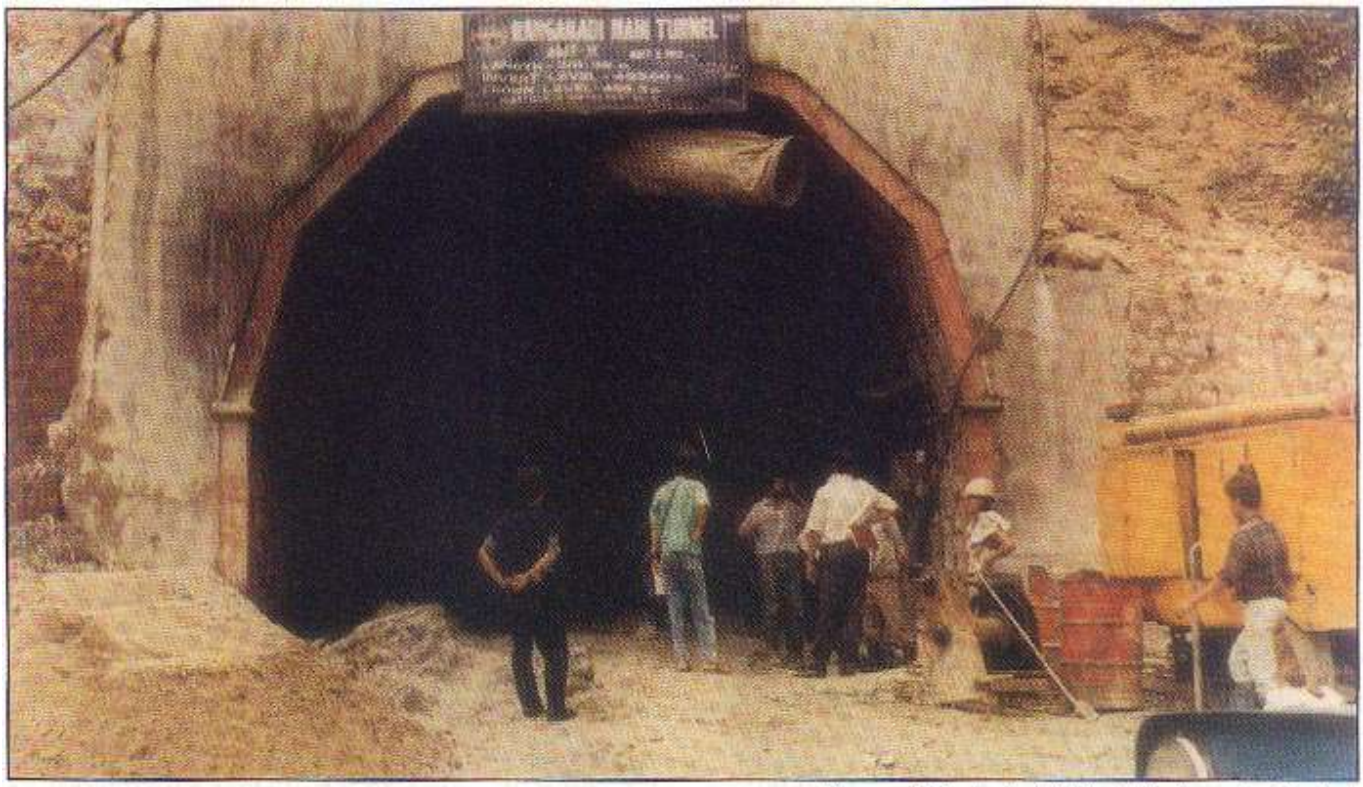
Kopili Hydro Electric Project : (150 MW) - Assam

This project having installed capacity of 150 MW is located in the N.C. Hills District of Assam and was completed in March 1988 at a cost of Rs. 243.82 crores.

It is a twin project, consisting of two Dams and two Water Conductor Systems leading from the Kopili Reservoir to the Khandong Power House (2 x 25 MW) and from the Umrong Reservoir to the Kopili Power House (2 x 50 MW). The Khandong Power Station was commissioned in March/April 1984, while

KOPILI Power House





Ranganadi Hydroelectric Project in Arunachal Pradesh

Kopili Power Station in March 1988 and started commercial generation from June /July 1988.

Since commissioning, both the Power Houses have been running satisfactorily & over the last five years actual generation of Kopili H.E. Project was more than the targetted generation. During the current year, against the yearly target of 806 MU, actual generation from April 1993 to October 1993 was 651.68 MU and with this trend of generation, it is expected that actual generation will be more than target in this year too. So far, over 4680 MU of power has been generated till October, 1993 since inception of the Project and this has resulted in earning of about Rs. 270 crores in terms of sale of power.

10.4.2.2 **Project on-going (Generation)**

i) **Doyang Hydro Electric Project (75 MW) Nagaland**

This project is located in the Wokha District of Nagaland with 3 units of 25 MW each. The latest cost of the Project at February 1993 level stands at Rs.331.59 crores, which was Techno-Economically cleared by CEA on 10.8.93. The project envisages generation of 227 MU yearly at rated capacity. The latest commissioning schedule of the project is July 1997. Land acquisition process for the entire project has been competed. Works in respect of infrastructure development are almost complete and the main construction activities have been taken up.

ii) **Ranganadi H.E. Project (405 MW) Arunachal Pradesh**

This Project is located in the Lower Subansiri District of Arunachal Pradesh and has a provision for installing 3 Units of 135 MW each. The cost of the project has been undated upto February 1993 price level and stands at Rs. 675.74 crores. On completion, the project will generate 1874 MU of energy at rated capacity. The commissioning schedule of the project is March, 1997. Works in respect of infrastructural development are nearly complete.

iii) **Kathalguri Gas based combined cycle power project (291 MW) - Assam**

This project envisages installation of 6 units of Gas Turbine and 3 units of Steam Turbine for a total installed capacity of 291 MW at a cost of Rs. 203.17 crores. The project was covered for financing under OECF, Japan, for which loan agreement was concluded for an amount of 30,000 Million Yen. The project cost was approved at Rs. 895.77 crores in May 1992.

The project will be completed by March, 1996.

iv) **Kopili H.E. Project - Ist stage Extension (2 x 50 MW) Assam**

The project envisages installation of 2 units of 50 MW each near the existing Kopili Power House of Kopili H.E. Project. Investment approval to the project was accorded in May 1993, at an estimated cost of Rs. 101.97 crores.

The project, on completion, will generate 502 MU of energy yearly in 90% dependable year, taking the annual generation of Kopili H.E. Project to 1308 MU. The project is scheduled for commissioning in August 1996.



GT Foundation of Kathalguri (Assam)

NEW SCHEMES

i) **Agartala Gas Turbine Power Project (4 x 21 MW) Tripura**

This project, to be set up at Ramchandra Nagar, 15 Km away from Agartala, has a provision of installing 4 units of 21 MW each by utilising natural gas available locally. The latest cost of the project stands at Rs. 319.60 crores and the project will require 28 months for completion from zero date.

Collection of Hydro Metereological (HM) data and other investigation works for the following schemes are being continued :

1. **Ranganadi H.E. Project (Stage-II) 100 MW : Arunachal Pradesh**

   Investigation of this scheme has been completed and project report is under preparation.

2. **Papum Pam H.E. Project (100 MW): Arunachal Pradesh**

   Contour Survey of Dam & Power House site have been completed and geo-technical investigation are in progress.

3. **Dikrong H.E. Project (100MW): Arunachal Pradesh**

   Investigation works have been completed. The project report is under preparation and will be submitted by March 1994.

4. **Kopili H.E. Project (Stage-II) - 25 MW : Assam**

   The scheme is waiting approval for carrying out hydrological survey, drilling at Power House site, reservoir investigation and Soil testing etc. The concept of the scheme is to add another 25 MW to the existing Khandong Power Station of Kopili H.E. Project.

10.4.5 **Financial :** The authorised share Capital of the Corporation is Rs. 500.00 crores as on date. The total paid up Capital and loan as on 31.3.93. stood at Rs. 362.26 crores and Rs. 244.67 crores respectively including deferred Credit of Rs. 12.72 crores.

10.5. POWER FINANCE CORPORATION LIMITED (PFC)

10.5.1 The Power Finance Corporation Limited (PFC) was incorporated on July 10, 1986 with the objective of providing term-finance to Power Utilities and bring about improved efficiencies and institutional development of its borrowing entities. It started its lending operations from the last quarter of the year 1987-88. The following major areas have been identified by the Corporation for providing financial assistance on priority basis :

i) Renovation and Modernisation of Thermal Plants;

ii) Renovation and Uprating of Hydro Plants;

iii) System Improvement through quick-yielding investment;

iv) Expansion of transmission and distribution systems; and

v) Acceleration of ongoing generation projects.

The authorised share capital of the Corporation stands at Rs. 2000 crores. The paid-up capital which was Rs. 975.45 crores as on 31st March, 1992 has increased to Rs.985.45 crores by the end on November, 1993. The net profit during the year 1992-93 was about Rs. 143 crores (Provisional) thereby registering an increase of about 32% over the preceding year's net profit of Rs. 108.21 crores.

In view of the fact that the Power Sector in States owns and operates a major portion of power systems in the country, the financial assistance from PFC till now has been confined to the State Power Utilities i.e. State Electricity Boards (SEBs) and State Generation Corporation (SGCs), and to State Governments where they run the power systems departmentally. The funds provided by the Corporation are in the nature of additionality to Plan allocation and based on the merits of the individual projects.

10.5.2 **Lending Criteria**

The Corporation lends for projects which meet the following criteria:

(a) Are economically justified with a Rate of Return of not less then 12%;

(b) Are technically sound;

(c) Technical solutions proposed must be least-cost;

(d) Are compatible with existing plans;

(e) Solutions proposed should meet Central Government's or State's environmental and impact standards, whichever are more stringent; and

(f) Schemes should have clearances required by the State and Central agencies.

10.5.3 **Energy Management Consultation and Training Project (EMCAT)**

Apart from providing term-finance, PFC has also paid attention to the institutional development of its borrowers, i.e. SEBs and SGCs. Steps has been initiated to draw up plans of action for the latter to improve their operational, financial and managerial capabilities. Their skills are sought to be upgraded through organising training programmes and field visits. An Energy management Consultation & Training (EMCAT) Project, aided by USAID has become effective from March 20, 1992. The purpose of the project is to improve technical and management capabilities for the efficient supply and end-use of energy by industry and other sectors. Thus, EMCAT will open avenues to use both, the supply and the demand side of the energy equation.

10.5.4 **Cell for Power Studies**

PFC had identified a number of problem areas of common concern to the various Utilities in the Power Sector. In order to carry out specialised technical, economic, financial and institutional diagnostic studies in these issues of the Power Sector for all round development, a "Cell for Power Studies" has been created in PFC with EMCAT assistance.

10.5.5 **Environmental Cell**

A specialised "Environmental Cell" was created

in PFC to assist its borrowers in preparing the environmental and social dimensions of the projects and an Environmental Consultant was also appointed under this Project.

10.5.6 **External Assistance**

(i) **Loan from World Bank**

A loan of US $ 265 million from World Bank for Power Utilities Efficiency Improvement Project had become effective from 18-3-1992. During the year 1992-93, a certain progress was made in approval of schemes, initiation of procurement action etc. Upto 31-3-93, total amount of sub-loans sanctioned under the above loan was Rs. 81.20 crores for 5 sub-projects. Terms and conditions of on-lending of the loan to SEBs has also been finalised.

A second loan from the World Bank of US $ 20 million under Technical Assistance (Private Power Develop-ment) Project has been negotiated and signed in July, 1993. This would be primarily utilised for financing consultancy services to be commissioned by SEBs and other power utilities to review and evaluate outstanding project proposals, to negotiate power purchase agreements and privatisation of power projects, and to select competitive bidders for the implementation of new Power Projects. It could also assist in preparation of future Privatisation Projects in the Power Sector.

(ii) **Loan from Asian Development Bank**

A loan of US $ 250 million from ADB was also signed during the year 1992-93 and became effective from 22nd July, 1992. This loan is to be used for financing subprojects of selected SEBs under Power Efficiency (Sector) Project. The terms and conditions under which the funds from ADB will be on-lent by PFC to SEBs had been finalised. Sanction letters for projects aggregating Rs. 68.20 crores had been issued upto 31-3-1993.

10.5.7 **Human Assets**

The Corporation has a manpower strength of 103 in the Executive cadre and 61 in the non-executive cadre (Total 164). PFC believes that focus should be on the expertise and professional competence rather than on the size of the work-force.

10.5.8 **Future Plans**

With over Rs. 5000 crores of loans sanctioned till September, 1993 for various State Power Projects in just over five years of its lending operations, PFC has established itself as the lead financial institution in the Power Sector. In addition, it has also started well on way to helping the State Power Utilities in their institutional development, through formulation and monitoring of the implementation of "Operational & Financial Action Plans" (OFAP). In the immediate future, PFC intends to assume a larger role for itself in the Power Sector, both in the category of its eligible borrowers and the expert services that it could provide. Thus, PFC intends to expand its category of borrowers, apart from the State Power Utilities, to progressively include also the Central Power Corporations, Power Utilities in the Municipal, Joint and even Private Sector.

The position relating to sanctions and disbursements is detailed below:

Scheme	1993-94 (April to Nov.'93) (Rs. in Crores)		Cumulative Upto Nov.'93 (Rs. in Crores)	
	Sanctions	Disbursement*	Sanctions	Disbursement
Renovation & Modernisation	22.10	49.63	582.95	289.13
Capacitors	26.60	23.32	236.86	175.68
Transmission	528.60	102.93	1855.21	992.50
Urban Dis.	354.00	15.84	697.81	195.55
Generation	119.00	160.45	2414.40	2423.78
Total	1050.40	352.17	5787.23	4076.64

** Include disbursements against previous years' sanctions also. As per practice adopted by SEBs, claims for disbursements are sent mostly in the second half of the financial year. Thus the disbursements are relatively lesser during April-November period.*

10.6 POWERGRID CORPORATION OF INDIA LIMITED

POWERGRID, incorporated in the year 1989 by a Cabinet decision, was the result of an amalgamation of all the transmission system assets which were earlier under the various Central/Centre-State joint venture power generating organisations.

10.6.2 The Mission

Establishment and Operation of Regional and National Power Grids to facilitate Transfer of Power within and across the Regions with Reliability, Security and Economy on Commercial Principles.

10.6.3 Objectives

The Corporation has set the following objectives in line with its Mission :

- Efficient operation and maintenance of transmission systems.
- Strengthen regional power grids and establishing inter-regional links leading to the formation of a National Power Grid.
- Establish/augment regional load despatch centres and communication facilities.
- Introduce a rational tariff structure for exchange of power.
- Establish Power Pools to facilitate the exchange of power between States/Regions leading to the formation of a National Power Grid.
- To achieve constructive cooperation among and build professional relations with stake-holders, peers and other related organizations.

10.6.4 Phased Development of POWERGRID

The phased development of POWERGRID, as conceived, is as follows :

First Phase—Taking over commissioned/under construction and planned transmission lines and substations from the Central/Centre-State joint venture organizations, augmentation of load despatch and communication facilities. Transfer of related manpower and wheeling of power from the participating power stations to the beneficiary States.

HVDC Terminal Stations at Rihand STPS (2x500 MW)



Second Phase—This phase involves improved coordination in the operation of regional grids, transfer of existing RLDCs and related operational functions for regional and inter-state integrated operation and coordination to facilitate power trading.

Third Phase—Establish Power Pools to facilitate the exchange of power between states/ regions leading to the formation of a National Power Grid.

10.6.5 **POWERGRID** : A revitalised Name

The name of the company has been changed from national Power Transmission Corporation Limited (NPTC) to "Power Grid Corporation of India Limited" with "POWERGRID" as the approved abbreviated name, with effect from October23, 1992. The name has been changed to give the corporation a distinct identity and keeping in view the organization's corporate mission of ultimately establishing the National Power Grid.

10.6.6 **De-Jure Transfer of Transmission Assets**

Formalities in respect of legal as well as physical transfer of transmission system assets from National Thermal Power Corporation Limited (NTPC), National Hydroelectric Power Corporation Limited (NHPC) and North Eastern Electric Power Corporation Limited (NEEPCO), to POWERGRID with retrospective effect from April, 1992,have almost been completed. POWERGRID has also taken over the transmission system assets from Neyveli Lignite Corporation Limited (NLC) on a management basic. An MOU for transfer of transmission assets and related manpower with Tehri Hydro Development Corporation Limited (THDC) has been signed. This arrangement will enable POWERGRID to take up implementation of the projects transferred from THDC as per schedule. Southern Region Load Despatch Centre (SRLDC) has been taken over with effect from 1.1.1994 Transfer of other Regional Load Despatch Centers (RLDCs) shall also be done in a phased manner.

10.6.7 **Funds Mobilization from International Financial Institutions**

i) **World Bank**

The World Bank has extended a loan of US$ 350 million directly to POWERGRID for its various projects and organizational studies, which has become effective from March 26, 1993. This loan is the first of its kind to be granted to any Central Transmission Agency by the Bank, and will enable POWERGRID to implement the following important projects :

(i) The AC portion of Chandrapur HVDC Project, i.e. Ramagundam Hyderabad 400 KV Second Circuit transmission line, including the switchyard.

(ii) The Unified Load Despatch and Communication project for the Southern Region.

(iii) The additional transmission system associated with the Vindhyachal Super Thermal Power Project Stage-I.

(iv) The balance payments for Central Transmission Project (CTP) Stage-I and Rihand Transmission Project for which original loans were closed on March 31, 1992 and December 31, 1992 respectively.

(v) Various technical studies viz., Institutional Development Study, Transmission Planning Study and Load Despatch and Communication Study.

Along with this new loan of US$ 350 million, World Bank has also approved the transfer of World Bank loan utilized for the existing transmission projects as also for the on-going transmission project, namely Farakka-II and Talcher-I of NTPC already transferred to POWERGRID. The World Bank has also approved the transfer of a loan amounting to US$ 475 million for the on-going Northern Region Transmission System Project (NRTS) of NHPC transferred to POWERGRID.

ii) **Asian Development Bank (ADB)**

ADB has extended a financial assistance, as grant, to the tune of US$ 600,000 for undertaking a study on "Bulk Power Transmission, Tariffs and Regulation". M/s. ECC Inc., USA, was appointed as consultants by the ADB. M/s. ECC has submitted draft final report.

A Fact Finding Mission from Asian Development Bank (ADB) visited POWERGRID in May, 1993, with a view to appraising the North-East Energy Conservation and Power Rehabilitation Project. The scope of the project was reviewed and it was re-named as North-East Power Project (NEPP). This Project includes the transmission, re-inforcement and load despatch projects of POWERGRID, the rehabilitation of Bongaigaon Thermal Power Project, distribution rehabilitation and technical assistance of Assam State Electricity Board (ASEB). Out of the total loan of US $ 110 million envisaged for this project, POWERGRID is estimated to get US $ 86 million. In view of the fact that POWERGRID is the major beneficiary of the loan, ADB was requested to delink the POWERGRID components from the loan for ASEB. Besides the above, ADB has shown interest in funding some of the future POWERGRID project(s).

iii) **Overseas Economic Corporation Fund of Japan (OECF)**

The 3rd tranche of the OECF loan (2nd tranche for the transmission portion) in respect of transmission system associated with Gandhar Gas Based Power Project, amounting to J¥ 3.237 billion was provided to POWERGRID during this year. With this, the OECF has so far sanctioned J¥ 7.115 billion for the Gandhar transmission project. The Kathalguri transmission project is also being implemented with OECF assistance amounting to J¥ 13.552 billion for transmission system of the project. The transmission system associated with Faridabad Gas based power project has also been approved "in principle" by OECF for possible financial assistance.

iv) **European Investment Bank (EIB)**

The European Investment Bank (EIB) has taken up POWERGRID as the first organization in their very first ever extension of lending activity in Asia. They have considered to co-finance the Southern Region Load Despatch Communication (SRLDC) Project to the extent of European Currency Unit (ECU) 55 million (about Rs. 198 crores). In this connection, the loan agreement between POWERGRID and EIB is expected to be signed shortly.

v) **Other Financial Institutions and Banks**

In addition to mobilization of funds from the World Bank, the ADB and the OECF, discussions have also been held in this regard with Overseas Development Administration of U.K. (ODA), the West Merchant Bank (WMB), the Banque Indosuez, Paris and Credit Nationale, Paris which has resulted in loan commitments of 122.5 million Pound Sterling and FF 396 million respectively.

10.6.8 **Capital Re-Structuring**

On the basis of asset transfer and associated loan values, the debt-equity ratio of the Corporation is quite adverse at 61.39. Such a debt-equity ratio of POWERGRID at the beginning of its activities was likely to affect its smooth functioning, primarily due to inadequate internal resource generation and very limited net budgetary support now available from the government.

Considering the critical importance of correcting this imbalance in the debt-equity ratio, the Cabinet Committee on Economic Affairs (CCEA) has already approved conversion of a portion of transferred loans into equity so as to maintain a ratio of around 50:50, as per the norm for power projects. A formal administrative order in this regard is expected to be issued soon.

10.6.9 **Operations**

As on March 31, 1993, a total of 22,228 Circuit Kms. of 400/220/132KV transmission lines and a total transformation capacity of 12,201 MVA, distributed over 39 substations, were under operation. The operational performance of POWERGRID transmission system has been impressive with an overall average line availability of the order of 98.6%.

POWERGRID has developed adequate expertise for hotline maintenance of transmission line. This technique is adopted in Southern and Western Regions. Further, POWERGRID has implemented a major programme for replacement of insulators of various transmission

lines in the North-Eastern Region, which had been the main reason for transmission line breakdown.

10.6.10 **Construction**

A total of 6,040 Circuit kms. of transmission lines which includes 4,716 Circuit kms. of 400 KV, 941 Circuit kms. of 220 KV and 383 Circuit kms. of 132 KV are under construction by POWERGRID. An additional 4,646 Circuit kms. of transmission lines, including 580 Circuit kms. of 800 KV, 3,951 Circuit kms. of 400 KV and 85 Circuit kms. of 220 KV shall be taken up for construction shortly. POWERGRID is also engaged in the construction of 4,195 MVA of transformation capacity at present with another 945 MVA transformation capacity to be taken up for construction shortly.

10.6.11 **Signing of MOU**

POWERGRID has signed it first Memorandum of Understanding (MOU) for the financial year 1993-94, with the Ministry of Power (Government of India) on July 12, 1993. The signing of MOU will enable POWERGRID to exercise the financial and administrative powers in investment approval for schemes upto Rs. 50 crores and to incur advance expenditure up to Rs. 5 crores on schemes under approval. On the other hand, this MOU commits POWERGRID to stringent targets for project completion and operation.

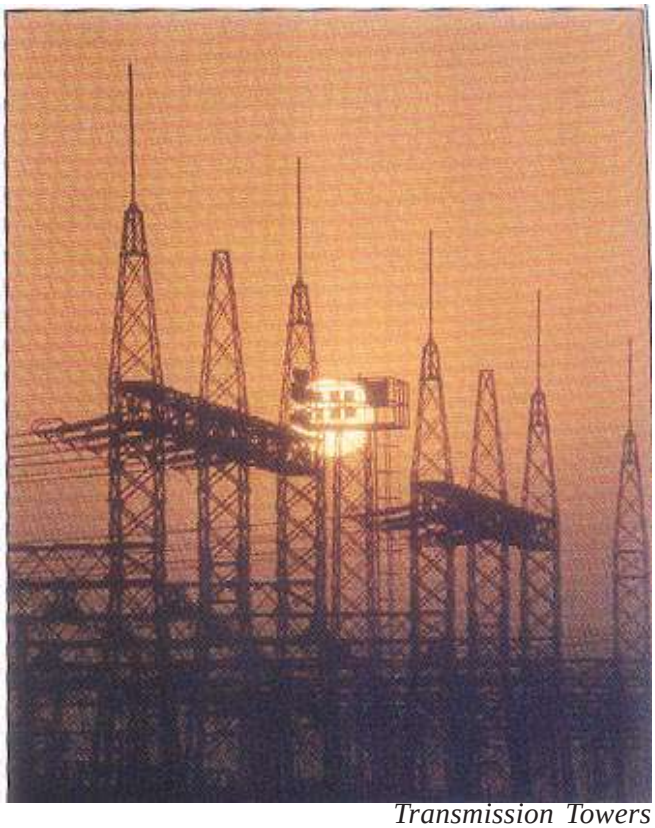
10.6.12 **Performance against MOU targets**

POWERGRID performance against MOU targets for the year 1993-94(during April-October, 1993) is as follows :

- Cumulative average line availability was 98.60% against the MOU target of 98.80%.
- Average no. of cumulative outages per line was 3.412 against the MOU limit of 4.31.
- Total stringing completed was 460 Circuit Kms. against the MOU target of 1088 Circuit Kms.

10.6.13 **Concern for Environment**

Transmission of power is one of the most environment friendly industries. A part from the aspect of forest clearance wherever necessary, it involves no environmental degradation at all



Transmission Towers

and even this can be minimised drastically by optimal sighting of the lines.

Appreciating the concern for environment, a dedicated Environment Management Department has been constituted in POWERGRID in order to further bring down the impact of transmission lines on forests. The department has environment experts to ensure that route alignments cause bare minimum adverse ecological effects.

A long-term plan for reducing the processing time required for obtaining environment clearance(s) for new transmission projects has been drawn-up by POWERGRID, and a proposal for development of a Forest Bank is presently under consideration. Through this approach, land for compensatory afforestation will not be required to be identified and acquired on a case to case basis, prior to project approval, but instead an equivalent area from the Forest Bank could be off-set against various forest infringement(s). This process would streamline the procedure of seeking Government approval and also for timely implementation of various transmission system schemes of POWERGRID.

10.6.14 **Human Resource Management**

POWERGRID started its operations with experienced manpower drawn from various constituent organization in the power sector The first batch of 69 Engineering Executive Trainees (EETs) were inducted into POWERGRID in January 1993.

To amalgamate the manpower drawn from organizations with diverse environments and work cultures, a drive was launched by POWERGRID for imparting requisite exposure to reorient such work force into a uniform POWERGRID culture. Adequate steps are also being undertaken to establish necessary infrastructural facilities for catering to the training needs of the employees.

10.6.15 **System Co-ordination Centres**

The Regional Electricity Boards are presently responsible for scheduling and despatching the Regional Electric System which includes schedule of generation, coordination of plant maintenance schedules, setting tariffs for inter-agency power transfers and accounting of these transfers. POWERGRID, ultimately, will be responsible for economic and reliable system operation of Regional System Coordination Centres (RSCCs). With adequate communications and control facilities in RSCCs, POWERGRID will evolve into an operator of loose regional power pools, with members not only continuing to have the basic responsibility for operating their plant and serving their customers, but also for coordinating many of the activities for mutual benefits voluntarily and effectively.

10.6.16 **Inter-Regional Links**

It has been realized that the establishment of inter-regional links of adequate capacity are the key factors, which would help increase levels of reliability of power supply through emergency assistance and improved stability of inter-connected regions. Further, this inter-connection will lead to an optimal utilization of the available energy sources, which presently remain unutilized in substantial quantity over the year in different regions, as at certain time of day / season, the generating stations in one region have to be backed down, while simultaneously there is a perceptible power shortage in the neighboring regions. With overall energy shortage facing the country this is not a desirable situation. Thus, POWERGRID is making concerted efforts to realize this goal as expeditiously as possible. It would also help reduce unserved energy and, in the long term, overall investment for generation. Studies conducted by CEA in 1991 also reveal that Inter-Regional Links will save about 10,000 MW of Generation capacity by the end of Tenth Plan. The findings / recommendations of the World Bank Study conducted in the year 1991,on"Long Term Issues in India Power Sector" has also suggested this approach. The findings indicate that the Inter-Regional links could reduce unserved demands by 50% and accrue benefits of Rs. 1,100 crores per year which will be about Rs. 13,000 crores by 1999.

10.6.17 **Technological Thrust**

POWERGRID aims to pool the best possible expertise on transmission systems available in the country using advanced methodology and the latest engineering techniques in planning, designs, construction and maintenance of the transmission systems. The thrust areas include installation of static var compensators, shunt capacitors, use of helicopters in construction, monitoring and breakdown maintenance, hotline maintenance, gas insulated substations, substation control and data acquisition (SCADA), satelite image processing for route survey, flexible AC transmission system etc. In its endeavor to upgrade technology, POWERGRID has joined hands with Central Power Research Institute (CPRI), Bangalore for enhancing R&D in transmission system development. Recently, POWERGRID has also signed an MOU with Indian Institute of Technology (IIT), Kharagpur for "Long Term Association in respect of Software/Hardware Development" in Sept., 1993, to develop computer software/hardware related with Power System Planning, Design and Analysis. Upgradation of technology and adoption of new technology will not only improve reliability of equipment and power supply but will also reduce the overall cost in design, planning, construction and O&M techniques.

B. JOINT VENTURE CORPORATIONS

10.7 TEHRI HYDRO DEVELOPMENT CORPORATION LTD. (THDC)

10.7.1 The Tehri Hydro Development Corporation (THDC) was incorporated on 12th July, 1988, as a joint venture of the Govt. of India and Govt. of U.P. to execute the Tehri Hydro Power Complex in Garhwal Distt. of U.P. and also to plan, promote and organise the development and harnessing of such other hydroelectric sites/ project in Bhagirathi, Bhilangana Valley as may entrusted to the Corporation by the Government. The Corporation has an authorised share capital of Rs. 1200 crores.

10.7.2 **Salient Features of Tehri Hydro Power Complex**

Tehri Hydro Power Complex is located on river Bhagirathi envisaging of Tehri Town and the other at Koteshwar, 22 km down-stream. The Complex comprises of the following four components :

- A 260.5 metre high earth and rockfill dam at Tehri with and underground power house of 1000 MW (4x250 MW) capacity with conventional turbine-Generating sets.
- Second underground power house of 1000 MW (4x250 MW) capacity with reversible pump turbine sets at Tehri.
- A 103.5 metre high concrete dam (which will provide a balancing reservoir) with a surface power house of 400 MW (4x100 MW) capacity at Koteshwar.
- Transmission system for evacuation of power generated at Tehri and Koteshwar projects through two single circuits 765/400 KV lines for distribution of power in Northern Region.

The estimated cost of the entire Tehri Hydro Power Complex is Rs.5583 crores at March 1993 price level. An investment of about Rs.876 crores has been made on the project till December, 1993.

Because of paucity of funds, it is now proposed to take up construction of the Complex in stages. In Stage-I, it is proposed to take up during the Eighth Plan the construction of Tehri Dam and HPP 1000 MW (4x250 MW), alongwith some compulsory and committed works of PSP and Koteshwar HPP. The first two units of 250 MW each (500 MW) of Stage-I are likely to be commissioned during 1997-98 and remaining two units (2x250 MW) during 1998-99. The Transmission component, which was earlier envisaged to be executed by THDC, would now be taken up by the Power Grid Corporation Ltd.

10.7.3 **Project Benefits**

The Tehri Hydro Power Complex, the largest multipurpose development venture in the country, will provide both irrigation and power benefits and usher in an era of rapid development in Uttar Pradesh. The main benefits from the project when fully completed, would be :

- Generation of 6533 MU of energy every year.
- Increased energy generation from existing hydro station downstream of Tehri.
- Additional intensified irrigation to 2.7 Lakhs hectare of land.
- Stabilisation of irrigation in existing 6.04 Lakhs hectare of land.
- 300 cusecs (162 million gallons per day drinking water supply to Delhi catering to approx. 40 Lakhs population.

Besides the above, other benefits would also occur in the Project area by way of improved communication, tourist traffic, Development of fisheries, growth of horticulture and agro-based industries etc.

Benefits from the 1st Stage of the complex, viz; Tehri Dam and HPP would involve an addition of 1000 MW of installed generating capacity and annual energy generation of 3568 Million Units, besides other full benefits relating to irrigation and drinking water as for the entire complex.

10.7.4 **Project Status**

Inspite of handicaps and financial constraints,

the project has made substantial progress in various activities and has now reached a stage where very fast progress in its implementation can be made. Following is the brief status of works:

- Infrastructure works completed.
- 4 Nos. diversion tunnels 11 m diameter each completed.
- 4 Nos.8.5 m diameter each Head Race Tunnel excavation completed and lining works is nearing completion.
- Various approach adits to underground Power House cavern completed.
- Foundation work of Coffer Dam and the Main Dam have been completed and dam raised to 15 metre above river bed level in its entire length of 1.1 Km.
- Considerable works have also been completed for rehabilitation of rural and urban oustees; the first stage rehabilitation of rural oustees is nearly complete.
- All studies relating to environment impact of the project as required by MOEF while granting environmental clearance are also completed.

Project Cost and Commissioning Schedule

(Rs. in Crores)

Project	Estimated cost (at March '93 Price Level)	Commissioning Schedule for 8th Plan
i) Tehri Dam & HPP (4x250 MW)	2815	1997-98
ii) Koteshwar Dam & HPP (4x100 MW)	725	-
iii) Tehri Pump Storage Plant (4x250 MW)	1224	-
iv) Associated Transmission System (800 KV)	819	To be implemented by Power Grid Corpn.

10.8 NATHPA JHAKRI POWER CORPORATION (NJPC)

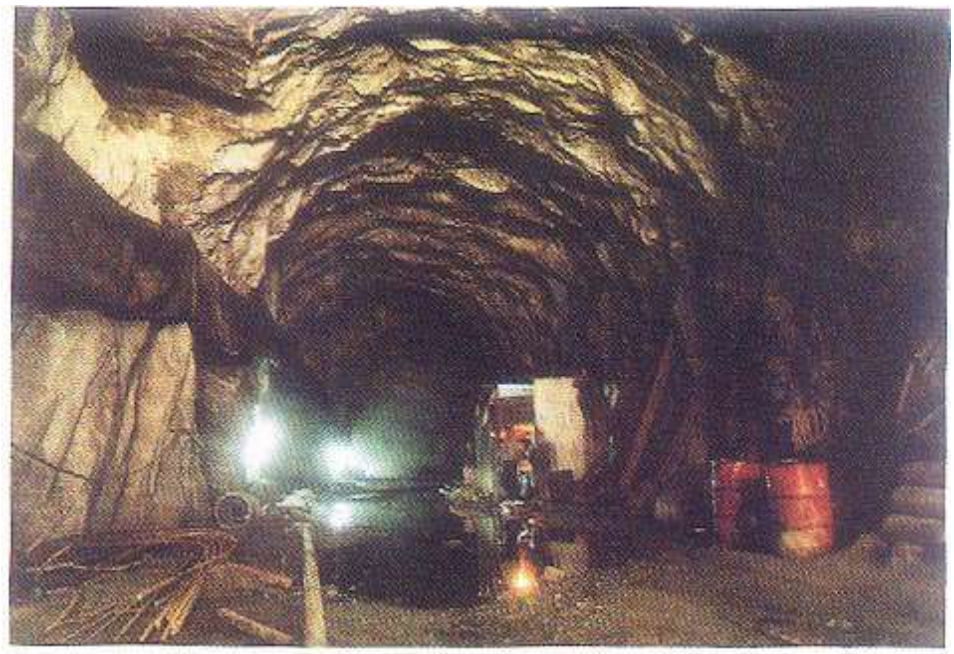
10.8.1 Nathpa Jhakri Power Corporation was incorporated on 24th May 1988 as a Joint Venture of Government of India and Government of Himachal Pradesh, both sharing the cost of the Projects in the ratio 3 : 1 respectively, to plan, promote, organise, execute the Hydroelectric Power Projects in the Satluj river basin in Himachal Pradesh and thereafter, operate and maintain these power stations.

NJPC is presently executing its first project Nathpa Jhakri Hydro-Electric Project (installed capacity 1500 MW) in Distt. Kinnaur/Shimla, Himachal Pradesh.

10.8.2 **Nathpa Jhakri Hydro-Electric Project**

The Nathpa Jhakri Hydroelectric Project envisages to harness the hydro power potential in the upper reaches of river Satluj in the form of a run-of-river scheme. The main features of the project are :

- a 60.50 m high concrete dam on Satluj river at Nathpa to divert 405 cusecs of water through four intakes.
- an underground desilting complex, comprising of four chambers, each 525 m long, 16.31 m wide and 27.5 m deep to exclude particles down to 0.2 mm size.
- a 10.15 m diameter and 27.30 km long head race tunnel terminating in a 21 m diameter and 301 m deep surge shaft.
- an underground Power House with a cavern size of 216 m x 20 m x 49 m having six Francis Units of 250 MW each, utilising a design discharge of 405 cusecs and a design head of 425 m.
- three circular steel-lined pressure shafts, each 4.9 m in diameter and 633 m long taking off form the surge shaft bifurcating near the underground power house to feed the six Francis units.
- a 10.15 m diameter and 1080 m long tail race tunnel to lead the water back into the river Satluj.



Adit to Main Access Tunnel To Power House Cavern (NJPC)

The Project consisting of six units of 250 MW each is scheduled to be commissioned progressively by December, 1998. The project when completed will generate 6700 MU of electrical energy in a 90% dependable year and 7447 MU in an average year besides providing 1500 MW of valuable peaking power to the Northern Region.

The approved cost of Project is Rs. 4337.95 crores at March, 1993 price level (this includes Rs.648.69 crores as interest during construction). The estimated cost of Civil and Electrical components (generation only) in this approved cost being Rs. 2784.26 and Rs. 905 crores respectively. The World Bank has sanctioned a loan of US$ 437 millions (Rs. 1376.55 crores) through Government of India and the loan has become effective from 31st January, 1990.

At present, the pre-construction activities are in advance stage and nearing completion. The pre-construction investigations are almost complete. The land acquisition has been practically completed. Over 70 kms. of road work has been executed. The 22 KV single circuit (35.30 kms.) and double circuit (29.75 kms.) construction power line work has been completed and the facility is available. Over 5.3 kms. of adit work has been completed which would facilitate the taking up of the work by the Main Civil work contractors. Around 50% of the planned building construction has been completed.

The four major civil work contracts under the international competitive bidding had been awarded in 1993. The civil works are to commence shortly.

10.8.3 **Generating and Associated Equipment**

The turbine, generator and associated works package including Station Control system is presently under negotiation and is expected to be finalised during this year.

10.8.4 **Information Communication System**

i) **Satellite Data Communication System**

Micro Earth Stations have been installed/ commissioned at Delhi, Nathpa, Jhakri and Shimla during January 1993 for data communication through Indian National Satellite using NICNET facility of NIC.

ii) **Speech Communication System**

For providing speech communication registration of Nathpa Jhakri project for long distance satellite, telephone link is under process and is likely to be issued shortly by DOT. The speech communication system is likely to be commissioned during 1994.

Wireless System

Wireless stations have been installed at Delhi, Shimla, Solan, Parwanoo, Nathpa, Jhakri and Nugalsari. Major work sites have been connected with wireless network.

10.8.5 **Eighth Plan Allocation, Budget & Expenditure**

The 8th Plan allocation for this project is estimated at Rs. 2225.74 crores. The budget estimate provision for the project for the year 1993-94 was Rs. 575.31 crores. The expenditure during the year till November, 1993 was around Rs.57.71 crores. The total expenditure upto end November, 1993 on the Project was Rs. 240.45 crores. The revised estimate cleared by the Planning Commission for this Project for the year 1993-94 is Rs.427.35 crores alongwith Rs.2 crores for survey and investigation for new projects.

For the year 1994-95 an outlay of Rs. 742.02 crores has been recommended by the Planning Commission for the Project alongwith Rs.2 crores for the survey investigation for new Projects. The Government of India portion including foreign assistance though budget of Rs.389.34 crores being Rs.610.59 crores for this Project and Government of Himachal Pradesh portion being Rs.73.75 crores. In addition, the Government of India will also provide for Rs.2 crores for survey and investigation. Balance Rs. 55.68 crores is proposed to be made out of buyer' credit directly by NJPC.

10.6.6 **Rehabilitation and Resettlement**

NJPC being run of the river scheme involves the construction of only a diversion dam and has virtually no impoundment except for diurnal storage. Accordingly, the related problems associated with ecology, displacement of population and deforestation are minimal. Presently only 47 families have been identified as land-oustees. Out of this, for all the 29 families at Jhakri, demarcation of plots/land has been made. For the balance, formalities of transfer of land is in process. Out of the families who have lost their houses, for 30 families compensation has been paid.

10.8.7 **Planning and Investigation of other Hydro Electric Projects in Satluj Basin**

Following new Hydel Projects in the Satluj Basin, in various stages of investigations, are likely to be taken up by NJPC in the near future:

- Karcham Wangtoo 900 MW
- Rampur 640 MW
- Baspa Stage-I 210 MW
- Suni Dam 1080 MW
- Shongtong-Karcham 225 MW
- Thopan-Powari 400 MW

Sholding Adit (NJPC)



C. STATUTORY BODIES

10.9 DAMODAR VALLEY CORPORATION (DVC)

The Damodar Valley Corporation was established in July, 1948 under the Damodar Valley Corporation Act. The Corporation has a full time Chairman and two part-time Members. The part-time Members represent the States of Bihar and West Bengal.

The Function of the Corporation include :

- the promotion and operation of schemes for irrigation, water supply and drainage;
- the promotion and operation of schemes for the generation, transmission and distribution of energy, both, hydro-electric and thermal;
- the promotion and operation of schemes for flood control in the Damodar river and its tributaries and the channels excavated by the Corporation for the improvement of flow conditions in the Hooghly river;
- the promotion and control of navigation in the Damodar river and its tributaries and channels, if any;
- the promotion of afforestation and control of soil erosion in the Damodar Valley; and
- the promotion of public health and the agricultural, industrial, economic and general well-being in the Damodar Valley and its areas of operation.

The Corporation has so far constructed four multipurpose dams at Tilaiya, Konar, Maithon and Panchet. The irrigation system comprises a barrage over river Damodar at Durgapur and the canal system of 2495 Kms which includes 137 Kms long irrigation-cum-navigation canal on the left bank of the river Damodar. The management of irrigation system excluding the navigation canal was transferred to the Government of West Bengal in 1964.

The installed capacity (derated) and generation of power during the year 1993-94 upto 15th November, 1993 are as follows :

BOKARO-BTPS



Name of Station	Installed capacity (MW)		Generation in MU upto 15.11.93
A) **Thermal**			
1) Bokaro 'A'	3x50 1x40	190	267.796
2) Bokaro 'B'	3x210	630	1404.930
3) C.T.P.S.	3X140 3X120	780	1258.708
4) D.T.P.S.	1X140 1X210	350	827.113
TOTAL (Thermal)		1950	3,758.547
B) **Gas Turbine**			
Maithon GTS	3x27.5	82.5	12.387
C) **Hydel**			
1) Tilaiya	2x2	4	1.861
2) Panchet	2x40	80	100.348
3) Maithon	3x20	60	51.104
TOTAL (Hydel)		144	153.313
TOTAL GENERATION			3924.247

The position relating to the on going generation and transmission projects to the Corporation is given below :

Work under Progress	Capacity	Target date of completion
A) **Generation Projects :**		
1) Mejia Thermal Power Station	(3x210 MW) 630 MW	Unit-I Dec.,'94 Unit-II June '95 Unit-III Dec. '95
2) Panchet Unit-II (Hydel) (Reversible Pump Turbine)		The work of Tail Pool Dam on both the banks started in May, 1987 but had to be stopped due to severe resistance from the local people. Work has, however, since been resumed.
3) Proposed Thermal Power Station at Maithon (R/Bank)	(4x210 MW)	The terms of credit agreement dt. 12.9.89 between USSR and GOI have been further revised by M/s. Techno Prom Export (TPE), Moscow for the deferred payment which is awaiting GOI's approval.
4) Proposed Thermal Power Station at Maithon (L/Bank)	(4x250 MW)	The Techno economic clearance has been sought which is awaiting approval for the estimated cost of Rs. 2081.63 crores. The study of Environmental Impact Assessment (EIA) is under progress.
B) **Transmission Projects :**		
i) 220 KV Bokaro 'B' Jamshedpur line		Commercial operation started in April, 1993.
ii) 33 KV Gola-Rajarappa line		70% work completed and scheduled to be finished shortly.
iii) 132 KV Gola Sub-station		95% work completed and scheduled to be finished shortly.
iv) 220 KV CTPS Switchyard (3rd 150 MVA Auto-Transformer)		84% work completed and scheduled to be finished shortly.

Work under Progress	Capacity	Target date of completion
v) 220 KV Kalyaneswari Swtichyard-2 Nos. Bays.		75% work completed and scheduled to be finished shortly.
vi) 132 KV BASL Sub-station-3 Nos. Bays.		58% work completed and scheduled to be finished shortly.
vii) 33 KV Power supply to Giridih		60% work completed and scheduled to be finished shortly.
viii) 132 KV Konar-Hazaribagh line		33% work completed and scheduled to be finished by March, 1994.
ix) 33 KV CTPS-Dugda line (BCCL)		30% work completed and scheduled to be finished by March, 1994.
x) 220 KV Parulia (NTPC) DSP (Tamala) S / C Line		79% work completed and scheduled to be finished by March, 1994.
xi) 220 KV CTPS-DTPS Mejia line		66% work completed and scheduled to be finished by June, 1994.
xii) 132 KV Patratu-North Karanpura line		12% work completed and scheduled to be finished by June, 1994.
xiii) 132 KV North Karanpura Sub-station (Phase-II)		8% work completed and scheduled to be finished by June, 1994.
xiv) 220 KV Kalyaneshri Kaliparahi Mejia line		47% work completed and scheduled to be finished by December, 1994.
xv) 132 KV Konar Sub-station		20% work completed and scheduled to be finished by December, 1994.
xvi) 33 KV Ramgarh West Bokaro line		Forest clearance is still awaited.

10.9.2 **Renovation and Modernisation**

The status of R&M activities as on 31-10-93 are as follows :

Bokaro 'A' TPS	Most of the R&M activities have been completed. Balance activities are expected to be completed by 1993-94.
Chandrapura TPS	Out of 31 activities, 25 activities completed. Status of balance 6 activities is as follows :
i) Installation of addl. CHP	90% work completed Phase-I plant commissioned in March '93.
ii) Replacement of existing MDC and ESPs including connected Ash Handling system.	80% work completed. ESPs in Unit-I, Unit-2 and Unit-4 have been put into service.
iii) Augmentation of Seal Air System.	All 12 Nos. Fans have been installed. Commissioning work is in progress.
iv) Replacement of HP Heaters.	25% work is complete. HP Heaters in Unit-4 have been installed and commissioning work is in progress. HP Heater No. 5 in Unit-6 has been installed. Other are under procurement.
v) Augmentation of Rly. siding.	LOI has been placed on M/s. RITES.
vi) Development of new Ash Disposal Area	Work on both ponds A & B has been completed except item ii) above. All the balance activities are expected to be completed by 1993-94 and the item at ii) will be completed by 1994-95 as per the shut down and over hauling programme.
Durgapur T.P.S.	Completed in 1988-89.

Phase-II

Bokaro 'A' TPS — Out of total 6 activities, 1 activity has been completed and one activity has been abandoned. Balance activities are in progress and scheduled to be completed by 1994-95.

Chandrapura TPS — Out of 14 activities, 3 activities have been completed and 7 activities are in progress and are expected to be completed by 1993-94. Balance activities will be taken up after detailed Residual life Assessment study and finalisation of life extension scheme.

Durgapur TPS — Out of 15 activities, 5 activities have been completed and 5Nos.activities are in progress and expected to be completed by 1993-94. Balance 5 activities are being taken up with the completion target by 1996-97 during the 8th Plan.

10.9.3 **Research and Development**

The following works of R&D nature are in progress :

To assess the residual life for the units at Bokaro 'A' and Chandrapura TPS RLA study has been undertaken.

i) CTPS Unit 1, 2 & 3 - USAID Team visited recently to study the performance of above units and unit-2 has been taken up as Model Unit for the aid.

ii) CTPS Unit 4, 5 & 6 - Plant performance improvement programme has been taken up as Model Unit for the aid.

iii) BTPS 'A' Unit-4 Rehabilitation work by M / s. B&W Ltd., has been started.

iv) Environmental Management and Pollution abatement.

v) Utilisation of coal Mill Rejects in Fludised bed Boiler Plant.

10.9.4 **Human Resource Development Through Training** :

DVC Training Institute at Chandrapura has been installed to take care of the training needs of the Power Station Personnel and other disciplines. The facilities available with PETS at Durgapur and Badarpur are also availed of for imparting training to the Executives, Operatives and Technicians. Executives are also sponsored under Executive Development scheme to undergo various management training. The facilities of the foreign training under the Colombo Plan, UNDP are availed of for development of the executives from time to time.

The capital expenditure of DVC is met from its internal resources and is supplemented by Market Borrowing.

The DVC constitutes the major power infrastructure in the power sector for the Coal Mines, Steel Plants, Railways and Copper Mines located in the Eastern Region. The other beneficiaries are the West Bengal and Bihar State Electricity Boards and Calcutta Electric Supply Corporation. Power generation in the DVC system is shared between Bihar and West Bengal regions approximately in the proportion of 65 and 35 respectively.

During the year 1992-93 the net deficit on power amounted to Rs. 43.51 crores.

MEJIA TPS under Construction



10.10 BHAKRA BEAS MANAGEMENT BOARD (BBMB)

10.10.1 The administration, operation and maintenance of Bhakra Nagal and Beas Projects has been entrusted to the Bhakra Beas Management Board under the Punjab Re-organisation Act, 1966. The works on Bhakra Nangal project consist of the Bhakra Dam, Two Power Houses i.e. Left Bank and Right Bank Power Plants, Nangal Dam, Nangal Hydel Channel (NHC), two Power Plants namely Ganguwal and Kotla on N.H.C. The Beas Project consists of two units namely Unit No. I and Unit No. II. Unit No. I comprises the Pandoh Dam, Pandoh Baggi Tunnel, Sundernagar Hydel Channel, Balancing Reservoir, Sundernagar Sutlej Tunnel, Dehar Power Plant including Surge Shaft and bye pass chute. Unit No. II comprises the Pong Dam, the Pong Power Plan, two Irrigation Tunnels and the Spillway.

The installed capacity of the Power Plants is as Under:

S. No.	Power Houses	Installed Capacity (MW)		
1.	Bhakra (Right Bank)	5 x 132	=	660
2.	Bhakra (Left Bank)	5 x 108	=	540
3.	Ganguwal	2 x 24.2 + 1 x 29.25	=	77.65
4.	Kotla	2 x 24.2 + 1 x 29.25	=	77.65
5.	Dehar	6 x 165	=	990
6.	Pong	6 x 60	=	360
	TOTAL			2705.30

The BBMB also manages the Operation & Maintenance of large transmission system comprising 574.30 circuit Kms. of 400 KV line and 2998.00 circuit Kms of 220 KV lines extending from Bhakra, Pong and Dehar to Delhi passing through Himachal Pradesh, Punjab and Haryana and having three Nos. 400 KV Sub-Stations at Dehar, Panipat and Bhiwani and Seventeen 220 KV Sub-Stations at various other places.

10.10.2 **Inflows into the Reservoirs**

(A) **Bhakra Reservoir**

The maximum reservoir level attained was El. 1628.84' (496.470 mtrs) on 1.10.1993 against the maximum permissible level of 1685.00' (513.588 mtrs). (The Board has reduced the level to El. 1680' (512.064 mtrs) for flood absorption). The total quantity of water received in the Bhakra reservoir during the period April, 1993 to 30th Nov. 1993 was 11.7858 MAF (14538 MCM) comprising 8.5750 MAF (10577 MCA) of Sutlej water and 3.2108 MAF (3961 MCM) of Beas diverted water through BSL system. It is anticipated that during the period Dec. 1993 to 31st March, 1994, the Sutlej inflows into Bhakra Reservoir would be approximately 0.8683 MAF (1071 MCM) and Beas diverted water 0.4600 MAF (567 MCM) based on dry year pattern of inflows. The total inflows during the previous year were 15.7411 MAF (19416 MCM).

(B) **Pong Reservoir**

The maximum reservoir level attained was 1362.44' (415.271 mtrs) on 21.9.93 against the maximum permissible level of 1400.00' (426.72 mtrs). (The Board has reduced the level to El. 1390' (423.672 mtrs) for flood absorption). The total quantity of water received during the period April, 1993 to 30th Nov. 1993 is 6.1669 MAF (7607 MCM). It is expected that 0.3115 MAF (384 MCM) would be received in Pong Reservoir during the period Dec. 1993 to 31st March, 1994 based on dry year pattern of in-flows. The total inflows during the previous year were 8.7065 MAF (10739 MCM).

10.10.3 **Generation**

The actual generation from BBMB Power Houses during the period from 1st April, 1993 to 30th Nov. 1993 was 8339 MUs. the estimated generation during the period Dec. 1993 to March, 1994 would be about 2122 MUs. Thus the total estimated generation from BBMB Power Houses during the Year 1993-94 would be about 10461 MUs.

D. AUTONOMOUS BODIES

10.11 NATIONAL POWER TRAINING INSTITUTE (NPTI)

10.11.1 National Power Training Institute (NPTI) (formerly Power Engineers Training Society) was set up by the Government of India on 1.1.1980 to function as a National Apex Body for meeting the training needs of the Power Sector in the country. Besides its Hqrs. office at NPTI Complex, Sector-33 Faridabad (Haryana), it has four Regional Power Training Institutes (formerly Thermal Power Station Personnel Training Institutes) at Neyveli, Durgapur, Badarpur (New Delhi) and Nagpur, set up in the years 1965, 1968, 1974 & 1975 respectively. The infrastructure of these Institutes was acquired through various schemes such as TPSPTI, Workshop and Laboratories and 210 MW Simulator at Badarpur etc. which have already been completed.

The scheme for upgrading the PETS into national Power Training Institute (NPTI) together with an Institute for Advanced Learning and Management Studies (INALMAS) at Faridabad, was sanctioned on 26.11.91 at an estimated cost of Rs. 1273.74 lakhs. Pending completion of civil works, PETS has been upgraded to NPTI with effect from 1.4.93 and has started functioning in the existing complex. The development of INALMAS is in progress. The scheme is likely to be completed by 1995.

NPTI will also embody an Institute for Advanced Learning and Management Studies for higher echelons of power sector, which is being established at NPTI Complex, Sector-33, Faridabad. NPTI has been organising training programmes for Power Engineers, Operators and Technicians in its Institutes. The training courses being conducted at the Regional Institutes of NPTI include the following :

- Induction Level courses for Graduate Engineers (Thermal/Hydro/Power System)
- Induction Level courses for Operators (Thermal/Power System)
- Induction Level courses for Technicians. Apart from 15 long-term courses in Thermal Hydro and Power System areas, NPTI also organises around 150 short-term courses on different specialised subjects. It also organises training courses on Simulator, training courses for in-service engineers, tailor made courses and on-plant/on site training programmes etc. More than 34,530 personnel have been trained upto March 1993. The number of persons trained in the various courses conducted by the Institutes under PETS during the year 1993-94 (upto Nov. 1993) is as follows :

S. No.	Courses	No. of persons trained
1.	Regular courses for Engineers	152
2.	Condensed courses for Engineers	116
3.	Operators courses	92
4.	Short-term courses for Engineers	320
5.	Maintenance courses for Technicians	395
6.	On-Plant/On-site courses	295
7.	Simulator Courses	366
	TOTAL	**1736**

This works out to 13715 trainee weeks upto Nov., 1993 as compared to 12556 trainee weeks for the same period during 1992-93.

Till now 3215 Engineers have been trained on the 210 MW Simulator since the installation in 1982 with UNDP Assistance at Badarpur Institute of NPTI.

10.11.2 **Conference**

A Two Day National Conference on "Human Resource Development" in Power Sector-Complexities and Challenges was organised on 23.11.93 and 24.11.93 under the auspices of NPTI at NPTI's new complex which was participated by 65 senior level officers of Indian Power Sector.

10.11.3 **Simulator Schemes**

The scheme for installation of one 500 MW Simulator at TPSPTI, Badarpur and one 210 MW Simulator at Nagpur was approved during 1990-91 at an estimated cost of Rs. 1840.12 lakhs and Rs. 1737.21 lakhs respectively. It is expected that these Simulators shall be installed within the 36 months of placement of orders.



Out door Experimental line mock-up tower for Testing equipment from 400 KV to 1200 KV range at UHV Research Lab, Hyderabad

The scheme for Housing Complex for Badarpur Institute was sanctioned on 26.12.88 at an estimated cost of Rs. 345.68 lakhs. The revised cost of Rs. 570.18 lakhs has been approved by the Government. The staff quarter under this scheme have been completed and occupied by the staff. The other works included in the scheme i.e. 120 room trainee hostel, guest house and community facilities have also been completed.

10.11.4 **Training Resources**

A Training Resources Unit (TRU) is also functioning at NPTI HQ to develop training material to meet the training need of the power Sector. During 1993-94, it has published/reprinted 6 manuals. A number of course material for short-term courses on different subjects are in the process of printing. 6 No. of Video Cassettes on Safety have been procured as training aid.

A Computer cell has been formed at NPTI HQ, Faridabad. In order to produce high quality material, a Desk top Publishing System has been installed. PC-LAN System has also been installed for development of computer based learning packages, collection of case studies and question bank. As input to the power system courses, computer based power system study packages with 1000 buses and 20 HVDC lines have been installed. Officers from each Institute and HQ have been trained for utilisation of Power System Study Package. A few of the Officers have also been trained to develop the computer based learning system packages in collaboration with ODA, UK.

A Corporate film on PETS/NPTI has also been produced.

10.11.5 **Grants by Government**

Ministry of Power had released the grants in-aid during the year 1992-93 amounting to Rs. 634.00 lakhs viz Rs. 420.00 lakhs (plan) and Rs. 214.00 lakhs (Non-Plan) for the financial year 93-94 (upto Nov. 93) Ministry of Power has released Rs. 30 lakhs as 'Plan' and Rs. 120 lakhs under 'Non-Plan' grants-in-aid to NPTI. The training fee during 93-94 is targetted to fetch a revenue of Rs. 102.80 lakhs as compared to the revenue of Rs. 92.96 lakhs during 1992-93.

CENTRAL POWER RESEARCH INSTITUTE (CPRI)

The Central Power Research Institute (CPRI) was established in Bangalore by the Government of India in 1960. The main objective of the Institute are:

- to serve as a national centre for applied research in electrical power engineering;
- function as an independent National Testing & Certification Authority for electrical equipment and component; and
- to improve, innovate and develop new products in the field of electrical power.

It was re-organized into an autonomous society in the year 1978 under the Karnataka Societies Registration Act, 1960. CPRI is administratively controlled by the Ministry of Power (Government of India) and the Secretary, Ministry of power is the President of the Governing Council, CPRI.

The Institute has several research laboratories and testing installations engaged in different specialised fields. The Head Office and one major unit (Central Research & Testing Laboratory) are located at Bangalore. The other units of CPRI are: Switchgear Testing & Development Station, Bhopal; UHV Research Laboratory, Hyderabad; Thermal Research Centre, Nagpur; Regional Testing Laboratory, Muradnagar; Energy Research Centre, Thiruvananthapuram; and Demonstration Centre for Utilisation of Fly Ash for Value Added products at Raichur.

400 KV Testing Facility for EHV Circuit Breakers, CPRI, Bangalore



The Institute has identified many R&D problems for investigation which are of importance and relevance to the electric power sector. A number of technical problems faced by power utilities and manufacturing industries are also referred to the Institute for investigation.

As a result of its R&D efforts, the Institute has been able to develop a number of new products and processes useful to the power sector. These efforts relate to energy saving, power system improvement, profitable utilization of waste products, curtailing distribution losses, etc. Many of the products and processes have been transferred to entrepreneurs for commercial exploitation. The Institute with its expertise built up over the years also offered consultancy for manufacturer's utility and industries in the power sector.

With a view to exposing the engineers & scientists in the power sector to the latest developments in the professional fields, seminars/workshops on different subjects are organised periodically. During the year, Institute organized two national seminars/workshops. A large number of technical papers were presented and discussed at these seminars/workshops.

The engineers and scientists of the Institute presented/published a large number of research papers during the year in various symposia/ technical Journals in India and abroad.

The Institute is fully equipped for development testing of switchgear and fusegear, transformers, power cables, capacitors, solid insulating materials, insulating oils and varnishes, transmission line towers, etc. For effective quality control, facilities are available for impulse and power frequency testing of equipment, short circuit testing of switchgear, fusegear, transformer, CTs and other Power system apparatus and evaluation testing of power cables, capacitors, solid insulating materials, insulating oils and varnishes etc. in accordance with relevant standards. New testing facilities are being set-up by the Institute to cater to the increasing testing needs from time to time.

The Institute has tested 4578 samples upto 30th November, 1993 and 1820 organizations have availed themselves of the testing and certification facilities during the same period.

The revenue realised by the Institute in the last three years is as follows:

1991-92	1992-93	1993-94 (upto 31st October, '93)
Rs. 595 lakhs	Rs. 618 lakhs	Rs. 416.47 lakhs

During 1991-92 and 1992-93, the Institute has earned adequate revenue to meet its Non-Plan expenditure. No grants-in-aid was therefore availed of from the Government during these years to meet the non-plan expenditure.

The following major capital projects have been inaugurated/commissioned by the Institute during the year:

	Project	Total outlay
1.	2500 MVA High Power Testing Station	Rs. 12460.00 lakhs
2.	UHV Research Laboratory, Hyderabad	Rs. 2684.45 lakhs
3.	Thermal Research Centre, Koradi (Nagpur)	Rs. 1718.17 lakhs
4.	Regional Testing Laboratory, Muradnagar (U.P.)	Rs. 636.00 lakhs

Under phase II of the long term R&D co-operation programme with CESI, Italy, engineers and scientists of CPRI and CESI have jointly worked on many projects concerning topics and problems of current interest.

Several software packages developed by CPRI in the field of distribution planning, transmission tower design analysis, load forecasting, load scheduling etc. have found favour with utilities who are approaching CPRI for using the software.

A number of products like Microprocessor based single phase Energy meter, cable fault locator, Electronic Ballast, Capacitors detector, value added products from fly ash etc. developed by CPRI have been licensed for commercial exploitation.

CPRI organized training programme to give exposure to Research & Development work as well as testing facilities for the middle level officers of utilities.

10.13 ENERGY MANAGEMENT CENTRE

10.13.1 Energy Management Centre (EMC) was established by the Government of India in April 1989 to act as a focal point for exchange of experience among energy institutes within India and as a Centre for information, research and training activities in the energy field based on cooperation between India and the European Communities.

The institutional structure for determining and directing energy policies is a two-tiered one. The energy Conservation Cell in the Ministry of Power formulates policy, designs the energy management programme and ensures effective coordination between interested Ministries and other entities. The Energy Management Centre is the executive agency under the policy function, designed to implement and monitor the energy conservation programme.

10.13.2 **Role as Coordinator**

The institutions active in the field of energy management today are doing highly competent and effective work within the ambit of their charter and constraints of the their resources. However, their efforts are fragmented and lack coordination and national perspective.

This is where the Energy Management Centre steps in to guide, promote and coordinate, develope overall strategic vision, supported by quantitative analysis, to improve energy efficiency in the country.

10.13.3 **Organization of the Centre**

EMC has been registered as a Society under the Registration of Societies Act, 1960, so that it functions as an independent and autonomous body. This gives it the responsibility and required flexibility to make its operations more dynamic.

Its Operational Headquarter is in Delhi while the Training Headquarter is at Nagpur.

10.13.4 **Activities**

- Ten one-week 'Training of Trainers' Programmes organised and Training Modules prepared.
- Institution building and development of network of seven Energy Management

Advisory Service Centres through lead agencies.

- Development of an Energy Usage Data Base through energy audits conducted under UNDP and EEC Programmes.
- In 45 Energy Audits under UNDP Project, potential savings of Rs. 45 crores have been identified and annual recurring savings of Rs. 12 crores achieved.
- Creation of general awareness on Energy Conservation through information and promotional campaigns.

10.13.5 **Activities of the Centre**

The activities of EMC are as follows

- develop a National Energy database by collecting and analyzing data on energy supply, demand and information on prices.
- identify barriers for improving energy efficiency and propose appropriate incentives and other measures to overcome them. These would include recommendations for assistance with capital investment, taxes, duties and other financial incentives.
- review laws and regulations that have an impact on energy consumption and propose modifications and formulate suitable policies and actions.
- suggest introduction of standards, labels and setting of consumption targets.
- provide planning assistance to government agencies.
- organize public information and promotional campaigns on an on-going basis.
- organized sector specific promotional campaigns for the main energy consuming sectors (industry, transport, agriculture, commercial and government buildings). Also provide technical assistance in the field of energy efficiency to these sectors.
- promote energy audits enterprises and provide recommendations to improve energy efficiency and fuel substitution.
- monitor progress made in energy conservation and fuel substitution and initiate follow-up actions where needed.
- organize training for energy managers and equipment operators.

10.13.6 **Expenditure during the year 1992-93 and Budget Estimates for the year 1993-94**

The total expenditure of the EMC during the year 1992-93 was Rs. 44.25 lakhs. The budget estimates for the year 1993-94 is Rs. 50 lakhs against which an expenditure of Rs. 28.36 lakhs has been incurred till November, 1993.

Celebration of Energy Conservation Day on 14th December, 1993 all over the Country including several Schools.



E. PRIVATE SECTOR COMPANY

10.14 ACC-BABCOCK LIMITED

ACC-Babcock Ltd. (ABL) was established in 1962 specialising in the manufacture of boilers and became one of the largest heavy engineering companies in India with a wealth of expertise garnered from the renowned promoters and other well known organisations through technical collaboration. ABL ceased functioning following filing of a winding-up petition before Bombay High Court by previous management in October, 1986. Under an IDBI/BIFR package, which were approved by Government, ABL resumed operations in June, 1988, under the administrative control of Ministry of Power (Government of India). The Department of Atomic Energy and Ministry of Power have extended a long term interest free loan to the extent of Rs. 13 crores each, totalling to Rs. 26 crores. Financial institutions led by IDBI have extended assistance for the revival of the company. The State Governments of Karnataka and West Bengal have extended concessions regarding collection of Central sales tax from ABL's units located in these states.

The manufacturing range of ABL, apart from power and industrial boilers, includes cement manufacturing machinery, Pressure vessels, Electrostatic Precipitator (ESPs), air quality control system, machinery for chemical, metallurgical, sugar, defence and mineral ore processing industry, miscellaneous engg. equipment and foundry products. ABL's manufacturing units are in Durgapur (West Bengal) and Shahabad (Karnataka). ABL has a subsidiary, namely Babcock & Wilcox of India Ltd., (B&WI), located in Calcutta, which specialises in erection and commissioning.

In 1992, the Government of India reiterated its commitment to the revival of ABL in terms of the rehabilitation package prepared by IDBI, retaining the existing structure of the company. The rehabilitation process includes allocation of orders on ABL to optimise operations of the indigenous units and also issuing of guarantees/ counter guarantees to ABL for financial assistance.

During the year under review, ABL started the year with an order book position of Rs. 710.86 crores which included unexecuted orders value of Rs. 125 crores against Bakreswar project and Rs. 92 crores in respect of Sanjay Gandhi Thermal Power Station Units (3 & 4). The company has not been in a position to execute both these orders as per the original schedule as both these project authorities were facing paucity of funds throughout the year. During the current year, BIFR approved the revised rehabilitation package scheme submitted by IDBI. During the year 1992-93, the company showed an operating profit of Rs. 205 lakhs after a gap of nearly 10 years. During the year 1993-94, the company is expected to improve upon its operation to Rs. 150 crores turnover and profit of Rs. 3 crores.

Computerised Control Room at a Power Station



11 OTHER IMPORTANT ACTIVITIES

11.1 CONSULTATIVE COMMITTEE OF MEMBERS OF PARLIAMENT

During the year 1993-94 (i.e. upto December, 1993), the Ministry of Power coordinated and organised five meetings of the Consultative Committee. The agenda items of discussion at these meetings related to, "Energy Conservation", "Private Sector Participation in Power Generation & distribution", "Transmission and Distribution Losses", "Hydro Scene", and "Damodar Valley Corporation".

11.2 IMPLEMENTATION OF OFFICIAL LANGUAGE POLICY-HINDI

i) The Ministry of Power, its Attached and Subordinate Offices and the Public Sector Undertakings/ societies / Autonomous Bodies / Boards under its administrative control have continued their efforts to implement various measures to promote and motivate progress and augment the progressive use of Hindi in Official work.

ii) In compliance with the constitutional and statutory requirements of section 3(3) of the Official Language Act, 1963 as amended from time to time, all documents required to be issued bilingually are being issued bilingually by the Ministry. The Sub-committee of Parliament of Official Language visited Ministry of Power on 8.2.1993 with a view to taking stock of progress made in implementation of various inspection/ hurdles issued by the Government in regard of Official Language Policy from time to time. The committee has appreciated the progress achieved by the Ministry in the field of Official Language Policy. The Sub-Committee of the Parliament on Official Language also visited Central Electricity Authority (an attached office) on 15.4.1993 and BBMB, Chandigarh Office on 30.10.1993 to assess the progress made in implementation of various instructions/orders issued by the Government in regard to Official Language Policy from time to time.

iii) Meetings of Official Language Committee of Ministry of Power were convened regularly during the year 1993-94. Meeting of Hindi Advisory Committee of the Ministry of Power was recently convened on 7.9.1993, where the progress made in the Ministry of Power as well as the other offices under the Ministry was discussed. Steps have been taken to implement the decision taken in the meetings.

iv) Hindi Workshops were organised with a view to motivating and encouraging the employees as well as officers to do their official work in Hindi and to remove their hesitation for doing official work in Hindi. About more than 75 employees, including senior level officers of the Ministry were given training through Hindi Workshops.

v) The Cash Awards Scheme which were formulated & circulated by the Department of Official Language for promoting the use of Hindi continues to be followed in the Ministry, its attached offices as well as public sector undertakings under the administrative control of this Ministry. These schemes are yielding fruitful results as have been widely accepted by the Staff and Officers of the Ministry and other organisations under the Ministry of Power. Apart from this, incentive scheme, over and above the incentive scheme of Department of Official Language for originating Notes/Drafts in Hindi in Official works was also introduced during the year 1993-94. The employees who took part in the scheme were awarded during the year.

vi) To encourage the employees to acquire proficiency in Hindi, Prabodh, Praveen and Pragya Classes were conducted under Hindi teaching scheme. Similarly 19 Stenographers and 12 LDCs were also deputed for learning Stenography and Hindi Typing during the year.

vii) During the period under review, some of the offices of Corporation under the

Ministry, were also inspected by the Officers with a view to assessing the position regarding progressive use of Hindi. Inspection Reports were prepared and guidelines issued to the concerned offices on the basis of above Inspection Reports. This has proved a landmark in promoting the use of Hindi Language in the Offices. The Ministry has also issued its own publication "OORJA SUNDESH" exclusively in Hindi and two editions of this magazine have been issued.

11.3 ASSISTANCE TO THE STATE ELECTRICITY BOARDS

i) **Uttar Pradesh**

Anpara B Thermal Power Project (2x500 MW)

Anpara B Thermal Power Project (2x500 MW) is being set up in Sonebhadra district of UP by the UP State Electricity Board with the Japanese assistance. The first unit of 500 MW and the common auxillary of both the units are being funded by OECF by the 4 loan agreements signed till date amounting to 101.420 Billion Yen. The Govt. of Japan have pledged an additional loan assistance of 17638 Million Yen. The loan negotiations for the 5th loan were concluded in Dec., 1993. The second unit of 500 MW is being assisted by Exim Bank of Japan under Suppliers' Credit scheme to the extent of 27.393 B. Yen.

At the request of the State Government, the Ministry of Power has agreed to provide a special loan assistance of Rs. 156 crores for the year 1992-93 and Rs 75 crores for 1993-94 for providing Central assistance towards custom duty in respect of import of equipment for Anpara B Project. Necessary sanction for the release of funds by credit to the customs shall be issued after Supplementary Grants have been passed.

Unit-1 of 500 MW has already been commissioned in July '93 and Unit-2 is planned to be commissioned in June'94.

ii) **West Bengal**

Bakreshwar Thermal Power Project

The Govt. of Japan have pledged a loan assistance of 27069 Million Yen for installation of two 210 MW Turbine Generator sets together with two boilers of matching capacity, plant water system for 3 units, ash pond for 3 units, fuel handling system for 3 units, intake pumps and pipelines for 5 units, switchyard for 5 units and associated transmission system and fly ash utilisation plant. The negotiations to firm up loan assistance were concluded in December, 1993.

In addition to the above, efforts are being made to tie up external assistance for the Suratgarh Thermal Power Project (2x250 MW) (Rajasthan), Tenughat Stage-II TPP (3x210 MW) (Bihar), Muzaffarpur TPP Extension (2x250 MW), Sanjay Gandhi Extension TPP Birsinghpur (2x210 MW) and Rayalaseema TPP Stage-II (2x210 MW).

11.4 FOREIGN EXCHANGE

During the period April 1993 to November, 1993 foreign exchange was released for import of equipments/services under various credits. The details are given below:

Sl. No.	Project	Line of credit	FE released
1.	Import of Civil Construction Machinery	O.E.C.F., IDP-43	JY 834.46674 millions
2.	Test Instruments for switchyard Capacitor	CIDA Grant	C$241,842.39
3.	Payment to expatriate Member on panel of Experts for Lower Periyar HEP KSEB (Dr. Friedrich Karl Enert)	W.B. Assistance	$6,589.67

11.5 PRIME MINISTER'S 15 POINT PROGRAMME ON WELFARE OF THE MINORITIES

The Prime Minister's 15 Point Programme on Welfare of Minorities is being implemented in the Ministry of Power. It has been ensured that in case of direct recruitment to Group 'C' and 'D' Posts, a member of a minority community is included in the Selection Committee. Quarterly returns in respect of scheduled castes and scheduled tribes and minorities from Public Sector Undertakings are being regularly monitored in accordance with the guidelines on the subject.

A statement incorporating the total number of Government Servants, including the number of scheduled castes and scheduled tribes employed in the Ministry of Power, is given below:

Sl. No.	Name of Office	Group A			Group B			Group C			Group D		
		Total	SC	ST	Total	SC	ST	Total	SC	ST	Total	SC	ST
1.	Ministry of Power	33	4	1	84	10	-	120	17	-	69	34	4
2.	CEA (including Subordinate offices of CEA)	671	88	10	383	63	2	1025	138	21	394	133	15
3.	Controller of Accounts (Min. of Power)	2	2	-	13	2	-	70	6	1	10	5	1

11.6 INTERNAL WORK STUDY UNIT

Internal work Study Unit dealt with 34 cases relating to grievances which include 14 pending cases of the last year i.e. 1992-93. All these relate to Pension Cases of employees/ex-employees of the Central Electricity Authority/Public Sector Undertakings and non-supply of electricity/non-installation of electric poles in certain villages. Of these 34 grievances, 19 have been finally disposed off.

11.7 VIGILANCE/DISCIPLINARY CASES

At the beginning of the year 1993, there were five disciplinary/vigilance cases, of which three cases have been disposed of during the year. Thirteen new cases were opened in the year 1993, raising the number of cases under process to fifteen.

11.8 AUDIT OBSERVATIONS

The organisation-wise break-up of Audit observations and Inspection Report/ Audit paras as on 30.11.1993 are as under:

Sl. NO.	Organisations	Inspection Reports	Inspection Paras
1.	C.E.A.	10	51
2.	BTPP/BTPS	62	187
3.	C.W.C	28	129
4.	PETS (Now NPTI)	3	4
5.	Ministry of Power	7	64
6.	C.P.R.J.	2	2
Pay & Accounts Office/Controller of Accounts			
7.	PAO (CEA) New Delhi	2	2
8.	PAO (BMCC) New Delhi	1	2
9.	PAO (SECTT)	6	22
10.	Pay & Accounts Office, CEA, Bangalore	2	2
11.	Principal Accounts Office	-	-
	Total	123	465

11.9 INTERNAL INSPECTIONS

1. The Internal Audit Wing of the office of the Controller of Accounts, Ministry of Power, ensures the adoption of sound procedures, regularity and propriety of final transactions and accuracy of accounts. This wing also advises the DDOs and their staff in correct implementation or rules and maintenance of proper accounts records. Internal Audit Wing also pursues the settlement of objections raised by the Statutory Audit.

2. The performance of the Internal Audit Wing during the year 1992-93 is given below:

Year	No. of units Due & Inspected	No. of Paras raised	No. of paras settled	No. of paras outstanding upto Nov. 93
1992-93	25/22	339	238	189

11.10 CONSTITUTION OF THE POWER SPORTS CONTROL BOARD

In the meeting taken by Hon'ble Minister of Power on 3.11.1993, it was decided to constitute the Power Sports Control Board, to encourage sports and other allied activities. In order to follow-up this decision, a Committee under the Chairmanship of the CMD, PFC, was constituted to prepare and formulate Memorandum and Articles of Association of the Board for its registration as a Society under the Societies Registration Act. It has also been proposed that the registered office of the Board will be at the office of the Power Finance Corporation, New Delhi. The committee will also look into other matters such as fixation of rates of contribution from members for creation of Corpus fund and monthly/annual contribution, preparation of schedules for organising tournaments for the year 1993-94, appointment of Honorary Secretary for the Board, Organisation of cultural programme, etc.



Sports Activities at Project Sites

Sports Activities at Project Sites



ELECTRICITY STATISTICS AT A GLANCE
ELECTRICITY-INSTALLED CAPACITY, GENERATION & CONSUMPTION

	Unit	1970-71	71-75	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	90-91	91-92	92-93*
Installed Capacity																	
Utilities + Non-Utilities	MW	16271	20345	31307	33316	35781	39235	43706	47705	52273	54980	60500	66564	71752	74699	78367	81750
Utilities	MW	14709	18317	28148	30214	32345	35363	39339	42585	46769	49266	54155	59040	63636	66086	69065	72328
Hydro	MW	6383	7529	11384	11791	12173	13056	13856	14460	15472	16196	17265	17798	18308	18753	19194	19574
Nuclear	MW	420	640	640	860	860	860	1095	1095	1330	1330	1330	1565	1565	1565	1785	2005
Thermal(Coal)	MW	7508	9753	15991	17128	18695	20712	23648	26211	28809	30394	34237	37943	41237	43004	44792	46597
Oil & Gas	MW	398	395	433	440	617	735	740	719	1158	1346	1323	1734	2526	2764	3294	4152
Non-Utilities	MW	1562	2028	2859	3102	3436	3872	4367	5120	5504	5714	6345	7524	8116	8613	9302	9422
Generation (U+NU)	BU	61.21	76.68	112.82	119.26	131.12	140.30	150.99	169.21	183.39	201.28	218.98	241.31	268.66	289.44	319.63	331.56
Utilities	BU	55.83	70.20	104.63	110.84	122.10	130.26	140.18	156.86	170.35	187.71	202.09	221.40	245.44	264.33	287.03	301.41
Hydro	BU	25.25	27.88	45.48	46.54	49.56	48.37	49.95	53.95	51.02	53.84	47.44	57.87	62.12	71.64	72.76	69.89
Nuclear	BU	2.42	2.21	2.88	3.00	2.02	2.02	3.55	4.07	4.98	5.02	5.04	5.82	4.63	6.14	5.53	6.75
Thermal (Coal)	BU	27.80	39.50	55.72	60.71	68.75	77.91	84.44	96.96	112.54	125.45	145.81	154.90	172.64	178.32	197.16	211.08
Oil & Gas	BU	0.36	0.57	0.55	0.59	0.77	1.96	2.24	1.88	1.81	3.40	3.80	2.81	6.05	8.23	11.58	13.69
Non-Utilities Auxiliary	BU	5.38	6.46	8.19	8.42	9.02	10.04	10.81	12.35	13.04	13.57	16.89	19.91	23.22	25.11	28.60	30.15
Consumption (U+NU)	BU	3.44	4.86	7.35	8.20	9.38	10.21	11.41	13.28	14.84	15.96	18.20	19.64	21.57	22.77	24.67	25.99
T&D Losses	BU	9.31	13.56	20.06	21.32	23.59	25.64	27.69	31.21	34.19	37.78	42.23	46.03	53.26	56.52	61.44	61.53
Consumption (U+NU)	BU	43.46	58.26	85.39	89.74	98.15	104.45	111.89	124.72	134.36	147.84	158.55	175.64	193.83	210.15	229.52	244.04
Industrial	BU	34.33	38.31	53.24	55.40	60.89	61.75	66.55	73.56	79.44	81.95	82.94	92.02	100.37	105.35	110.60	114.04
Transport	BU	1.37	1.53	2.30	2.27	2.50	2.83	2.71	2.88	3.00	3.26	3.65	3.80	4.10	4.14	4.54	5.61
Agriculture	BU	4.47	7.76	13.45	14.49	15.00	17.82	18.23	20.96	23.47	29.44	35.27	38.88	44.06	50.32	58.56	63.77
Domestic Commercial and Services (£)	BU	8.29	10.66	16.40	17.59	19.56	22.25	24.40	27.32	28.42	37.89	36.69	40.94	45.30	50.34	59.82	60.62

*Provisional

£ Includes net energy exported to neighbouring countries.

