



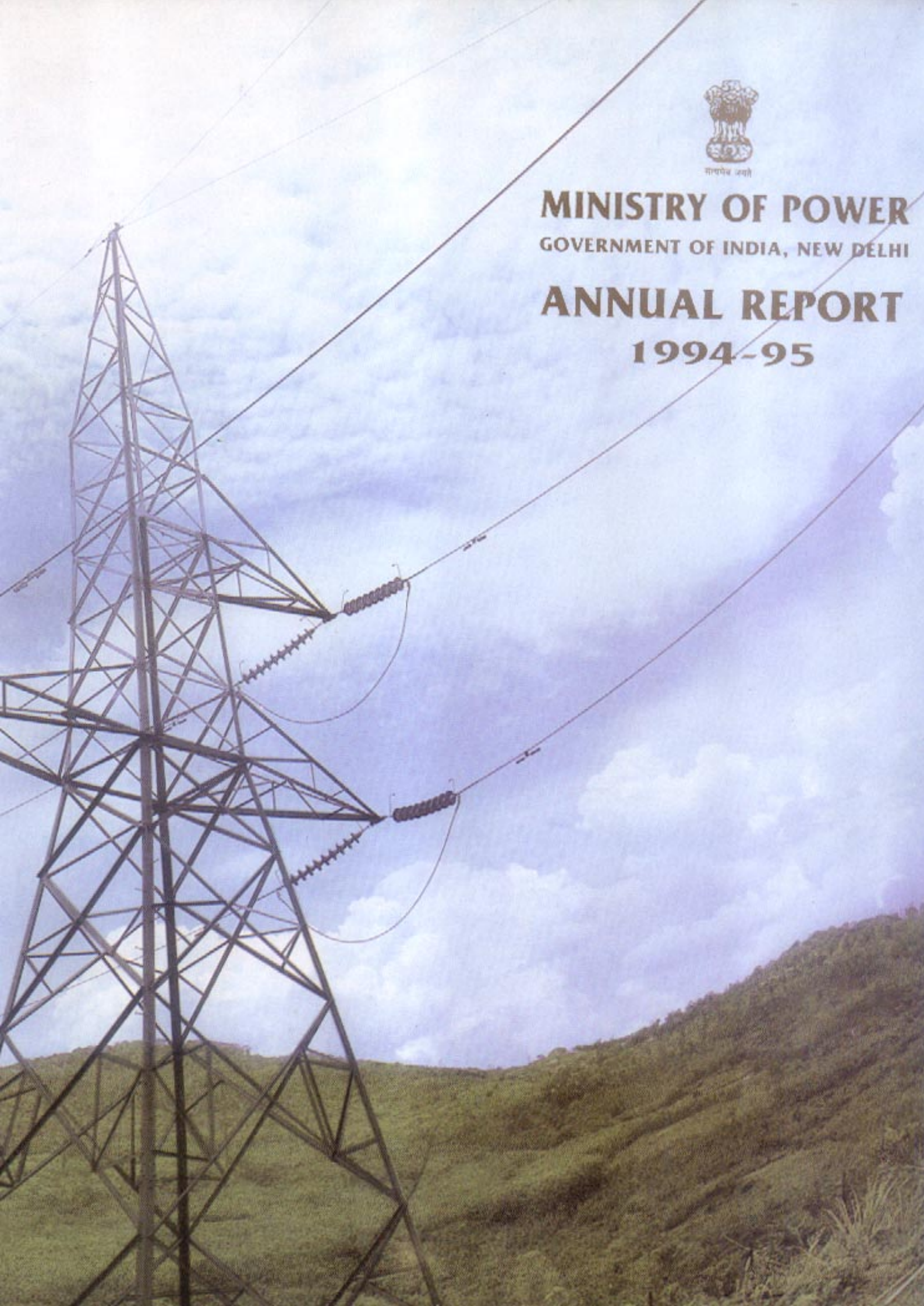
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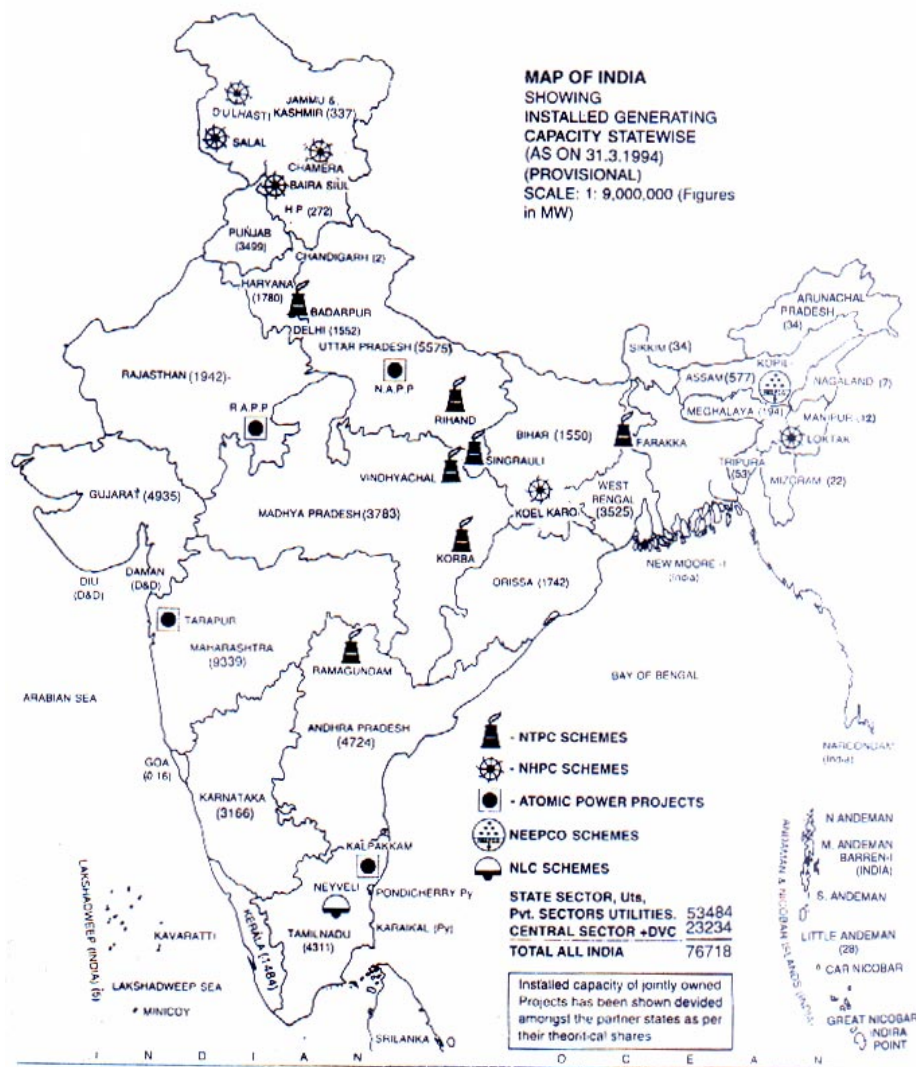
MINISTRY OF POWER

GOVERNMENT OF INDIA, NEW DELHI

ANNUAL REPORT

1994-95





The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.
The boundary of Meghalaya shown on this map is as interpreted from the north eastern areas (reorganisation) Act, 1971, but has yet to be verified.
The responsibility for the correctness of internal details rests with the publisher.
The administrative Head-Quarters of Chandigarh Haryana & Punjab are at Chandigarh.
Based upon Survey of India map with the permission of the Surveyor General of India.

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GOVERNMENT OF INDIA, NEW DELHI

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1. MINISTRY OF POWER

- (i) The Ministry of Power is functioning independently. Shri N. K. P. Salve has been the Minister for Power since 18th January, 1993. Shri Rangayya Naidu remained Minister of State for Power for the period 18.1.93 to 10.2.95. Smt. Urmila C. Patel took over charge as Minister of State for Power on 10th February, 1995.
- (ii) Shri R. Vasudevan has been the Secretary in the Ministry of Power with effect from the 14th July, 1992. He is assisted by a Special Secretary and six Joint Secretaries, including the Financial Adviser. The total staff strength of the Ministry is 308.
- (iii) There are six wings in the Ministry of Power, each headed by a Joint Secretary. These are :
 - i) Administration, Coordination and Energy Management.
 - ii) Thermal
 - iii) Investment Promotion
 - iv) Planning, External Assistance and Hydel
 - v) Systems & Operation, and
 - vi) Finance, Budget and Accounts.

1.2 ORGANISATIONS

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

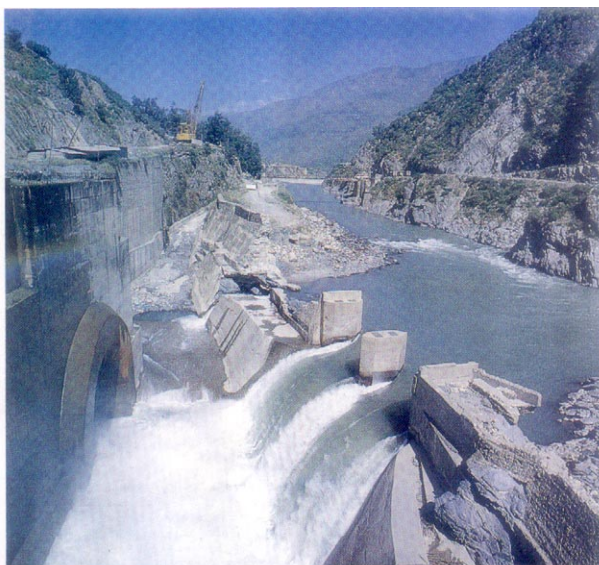
the Power Grid Corporation of India Limited (POWERGRID). The POWERGRID, which was incorporated on the 23rd October, 1989, is responsible for all the existing and future transmission projects in the Central Sector and also for the formation of the National Power Grid. There are two joint venture Power Corporations under the administrative control of the 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 Act, 1966, are also under the administrative control of the Ministry of Power. Further, the Central Power Research Institute (CPRI), the National Power Training Institute (NPTI) and the Energy Management Centre (EMC) are 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. Badarpur Management Control Cell (BMCC), a subordinate office of this Ministry administers the management with NTPC to make payment etc. to BTPS/BTPP and allied works.

1.3 FUNCTIONS

- (i) The primary responsibility of the Ministry of Power lies in the development of electrical energy in the country. The Ministry is concerned with perspective planning, policy formulation, processing of projects for investment decision, monitoring of the implementation of power projects, training and manpower development and the administration and enactment of legislation

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|-------|--|------|--|
| | in regard to Thermal and Hydel power generation, transmission and distribution. | | to undertake such amendments to these Acts, as may be necessary from time to time, in conformity with the Government's policy objectives. |
| (ii) | Electricity is a concurrent subject at Entry 38 in the list III of Seventh Schedule of the Constitution of India. | (iv) | 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. |
| (iii) | The Ministry of Power is responsible for the administration of the Electricity (Supply) Act, 1948 and the Indian Electricity Act, 1910 and | | |

Diversion Tunnel – Tehri Project Upstream



2. POWER SECTOR —HIGHLIGHTS

2.1 POWER GENERATION

The actual energy generation in 1993-94 was 323531 MUs consisting of 247757 MUs Thermal, 5399 MUs Nuclear and 70375 MUs Hydro, as against the target of 316700 MUs. The generation during 1993-94 was 7.4% more as compared to 1992-93. Thermal generation registered an increase of 10.3% over 1992-93. The generation programme for 1994-95 is 352000 MUs consisting of 274700 MUs Thermal, 8300 MUs Nuclear and 69000 MUs Hydro. The generation programme envisages an increase of about 8.9% over the actual generation during 1993-94. Energy generation during the period April to Dec., 1994 as compared to the programme and to the corresponding period of the previous years is given below:

April to Dec., 1994

(Figures in Million Units)

Type of Generation	Programme 1994	Actual 1994	Actual 1993	% of the Programme	% of the corresponding Period/last year
Thermal	193638	189234	178480	97.7	106.0
Nuclear	6018	3780	4264	62.8	88.6
Hydro	54787	64857	55117	118.4	117.7
TOTAL	254443	257871	237861	101.3	108.4

2.2 PLANT LOAD FACTOR (PLF) OF THERMAL STATIONS

- (i) Thermal capacity, at present constitutes about 70% of the total installed capacity, in the country, and contributes about 76% 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 plant load factor 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 1993-94 the PLF was 61.0% which is the highest ever achieved. During the period April, 1994 to Dec., 1994 the All India PLF has been 57.5%. During this period the following State Electricity Boards/Corporations achieved PLF higher than the All India average of 57.5%.

SL. State Electricity Boards/ No. Corporations		PLF (%)
1.	Rajasthan	73.6
2.	Maharashtra	59.3
3.	Andhra Pradesh	65.7
4.	Tamil Nadu	65.0
5.	Karnataka	62.2
6.	West Bengal Power Development Corporation	60.5
7.	NTPC	72.5
8.	Ahmedabad El. Co.	69.4
9.	Calcutta El. Supply Co.	76.4
10.	Tata Power Company Ltd.	59.6

In the State Sector, Kota Thermal Power Station of RSEB, Khaperkheda II of MSEB, Vijayawada of APSEB and Mettur of TNEB achieved highest PLF of more than 70% during this period. In the private sector, CESC achieved the highest Plant Load Factor of 76.4% during the same period. In the Central Sector, Singrauli (76.0%) Korba (75.3 %) and Vindhyachal (77.5%) Ramagundam (73.3%) and Farakka (75.2%) Super Thermal Power Stations of NTPC achieved the highest PLF during the same period.

The exhibit for “All India” Sectorwise PLF during April, 94 - December, 94 (cumulative) is as under :

All India/Sector	April '94-Dec., '94 (Percentage)
All India	57.5
Central Sector	65.8
State Sector	52.7
Private Sector	65.4

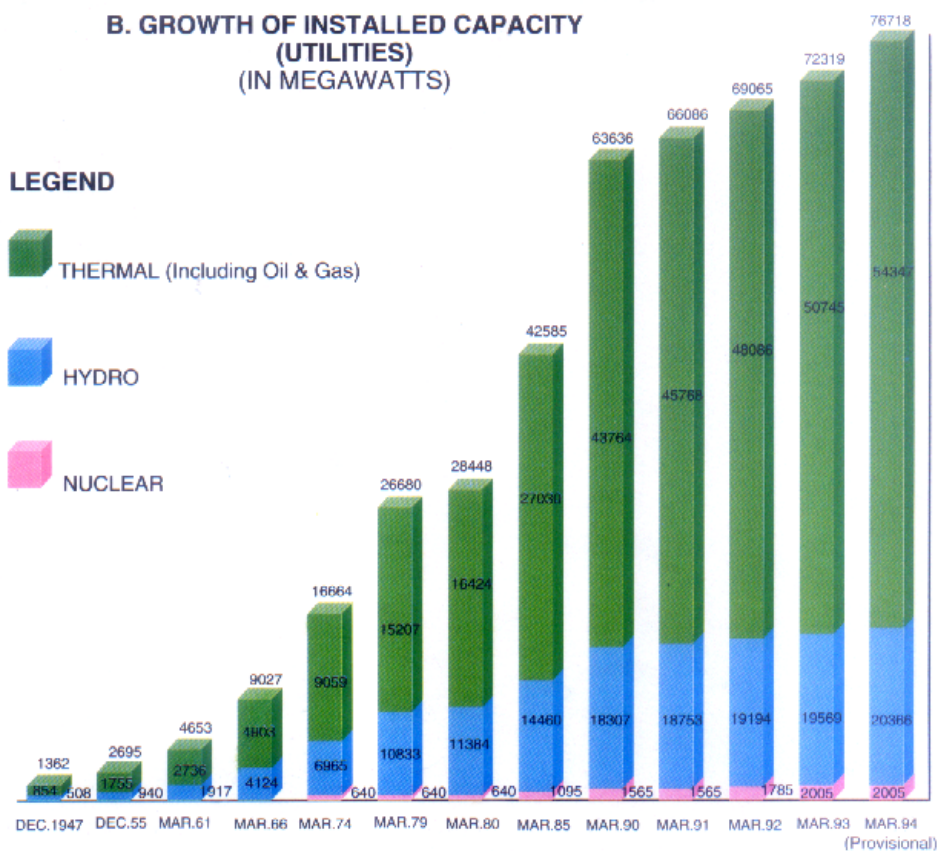
Khaperkheda-II Power Station of M.S.E.B. achieved the highest PLF of 84.5% during April, 94 - December 1994.

2.3 INSTALLED CAPACITY (AS ON 31.03.1994)

The All India installed capacity of electric power generating stations under utilities was 76718.21 MW (Provisional) as on 31.03.94 consisting of 20365.91 MW hydro, 54347.3 MW thermal and 2005 MW nuclear, the hydro-thermal mix ratio being 26.5:73.5.

2.4. INSTALLED CAPACITY (AS ON 31.12.94)

The All India installed capacity of electric power generating stations under utilities was 78709.71 MW (Provisional) as on 31.12.94 consisting of 20419.91 MW hydro, 56284.8 MW thermal and 2005 MW nuclear, the hydro-thermal mix ratio being 26.1 :73.9.





2.4.1 GENERATING PLANT INSTALLED CAPACITY AS ON 30.11.1994 ABSTRACT STATE-WISE

SI. No.	Region/ State/U.T.	Installed Capacity (MW)					Nuclear	Total
		Hydro	Steam	Gas	DSL/Wind	Sub-Total S+G+D/W		
1.	NORTHERN							
1.	Haryana	883.90	892.50	0.00	3.92	896.42	0.00	1780.32
2.	Himachal	272.07	0.00	0.00	0.27	0.27	0.00	272.34
3.	J&K	180.31	0.00	150.00	6.76	156.76	0.00	337.07
4.	Punjab	1798.94	1700.00	0.00	0.00	1700.00	0.00	3498.94
5.	Rajasthan	966.93	975.00	3.00	0.00	978.00	0.00	1944.93
6.	U.P.	1504.55	4564.00	0.00	6.19	4570.19	0.00	6074.74
7.	Chandigarh	0.00	0.00	0.00	2.00	2.00	0.00	2.00
8.	Delhi	0.00	371.00	180.00	0.00	551.60	0.00	551.00
9.	Cen. Sec. (NR)	1415.00	4980.00	1882.00	0.00	6862.00	895.00	9172.00
TOTAL (NR)		7021.70	13483.10	2215.00	19.14	15717.24	895.00	23633.94
II.	WESTERN							
1.	Goa	0.05	0.00	0.00	0.11	0.11	0.00	0.16
2.	Guj-Total	425.00	4179.00	297.00	33.67	4509.67	0.00	4934.67
	-SEB	425.00	3729.00	198.00	33.47	3960.47	0.00	4385.47
	-AEC Co.	0.00	450.00	99.0	0.00	549.00	0.00	549.00
	-Surat EC	0.00	0.00	0.00	0.20	0.20	0.00	0.20
3.	M. P.	805.09	3017.50	0.00	0.00	3017.50	0.00	3822.59
4.	Mah-Total	1584.22	6655.00	1032.00	0.00	7687.00	0.00	9271.22
	-MSEB	1308.22	5505.00	912.00	0.00	6417.00	0.00	7725.22
	-TEC	276.00	1150.00	120.00	0.00	1270.00	0.00	1546.00
	-BSES	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.	D&N Haveli	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6.	Daman & Diu	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7.	Cen. Sec. (WR)	0.00	3360.00	1037.00	0.00	4397.00	640.00	5037.00
TOTAL (WR)		2814.36	17211.50	2366.00	33.78	19611.28	640.00	23065.64
III	SOUTHERN							
1.	A.P.	2592.94	2032.50	99.00	0.00	2131.50	0.00	4724.44
2.	Kar-Total	2408.20	840.00	0.00	127.92	967.92	0.00	3376.12
	-KEB	101.00	0.00	0.00	127.92	127.92	0.00	228.92
	-KPCL	2289.20	840.00	0.00	0.00	840.00	0.00	3129.20
	-Shivpur	18.00	0.00	0.00	0.00	0.00	0.00	18.00
3.	Kerala	1491.50	0.00	0.00	0.00	0.00	0.00	1491.50
4.	Tamil Nadu	1944.95	2550.00	10.00	15.58	2575.58	0.00	4520.53
5.	Pondicherry	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6.	Cen. Sec. (SR)	0.00	4170.00	0.00	0.00	4170.00	470.00	4640.00
TOTAL (SR)		8437.59	9592.50	109.00	143.50	9845.00	470.00	18752.59

Sl. No.	Region/ State/U.T.	Installed Capacity (MW)					Nuclear	Total
		Hydro	Steam	Gas	DSL/Wind	Sub-Total S+G+D/W		
IV EASTERN								
1.	Bih-Total	161.60	1603.50	0.00	0.00	1603.50	0.00	1765.10
	-BSEB	150.00	1603.50	0.00	0.00	1603.50	0.00	1753.50
	-BHPC	11.60	0.00	0.00	0.00	0.00	0.00	11.60
2.	Orissa	1271.92	680.00	0.00	0.00	680.00	0.00	1951.92
3.	W.B. - Total	46.51	3356.38	100.00	22.50	3478.88	0.00	3525.39
	-WBSEB	46.51	1020.00	60.00	22.50	1102.50	0.00	1149.01
	-WBPDC	0.00	1260.00	0.00	0.00	1260.00	0.00	1260.00
	-DPL	0.00	395.00	0.00	0.00	395.00	0.00	395.00
	-CESC	0.00	655.00	40.00	0.00	695.00	0.00	695.00
	-Deshergarh SC	0.00	26.38	0.00	0.00	26.38	0.00	26.38
4.	D.V.C.	144.00	2007.50	90.00	0.00	2097.50	0.00	2241.50
5.	Sikkim	30.89	0.00	0.00	2.70	2.70	0.00	33.59
6.	Cen.Sec. (ER)	0.00	2020.00	0.00	0.00	2020.00	0.00	2020.00
TOTAL(ER)		1654.92	9667.38	190.00	25.20	9882.58	0.00	11537.50
V NORTH-EASTERN								
1.	Ar.Pradesh	20.95	0.00	0.00	12.86	12.86	0.00	33.81
2.	Assam	2.00	330.00	224.50	20.69	575.19	0.00	577.19
3.	Manipur	2.60	0.00	0.00	9.41	9.41	0.00	12.01
4.	Meghalaya	186.71	5.00	0.00	2.05	7.05	0.00	193.76
5.	Mizoram	3.36	0.00	0.00	19.07	19.07	0.00	22.43
6.	Nagaland	3.20	0.00	0.00	3.62	3.62	0.00	6.82
7.	Tripura	16.01	0.00	32.50	4.85	37.35	0.00	53.36
8.	Cen Sec.(NER)	225.01	0.00	0.00	0.00	0.00	0.00	255.01
TOTAL (NER)		489.84	335.00	257.00	72.55	664.55	0.00	1154.39
VI ISLANDS								
1.	A&N Islands	0.00	0.00	0.00	28.03	28.03	0.00	28.03
2.	Lakshdweep	0.00	0.00	0.00	5.12	5.12	0.00	5.12
Total (Islands)		0.00	0.00	0.00	33.15	33.15	0.00	33.15
CENTRAL SECTOR- INCLUDING D.V.C. TOTAL								
		1814.01	16537.50	3009.00	0.00	19546.50	2005.00	23365.51
STATE SECTOR TOTAL		18310.40	31470.60	1869.00	327.12	33666.72	0.00	51977.12
PRIVATE SECTOR TOTAL		294.00	2281.38	259.00	0.20	2540.58	0.00	2834.58
SS+PS TOTAL		18604.40	33751.98	2128.00	327.32	36207.30	0.00	54811.70
ALL INDIA TOTAL		20418.41	50289.48	5137.00	327.32	55753.80	2005.00	78177.21
PERCENTAGE OF TOTAL		26.12	64.3	6.57	0.42	71.32	2.56	100.00

2.5 GENERATING CAPACITY

The aggregate capacity of 4439.25 MW consisting 954.65 MW hydro, 3254.60 MW thermal and 220 MW nuclear was targeted for commissioning during the year 1993-94. Against the targeted capacity, the total

generating capacity commissioned/rolled during the year 1993-94 was 4538.75 MW consisting of 797.15 MW hydro and 3741.60 MW thermal.

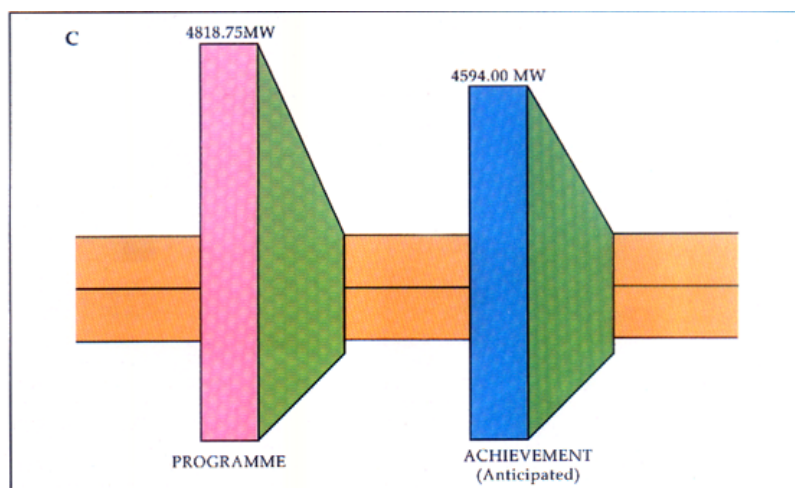
Type	Programme for 1993-94				Achievement during 1993-94			
	Cs	SS	PS	Total	Cs	SS	PS	Total
Hydro	770	184.65	-	954.65	655	142.15	-	797.15
Thermal	1213	1951.60	100	3264.60	1685	1936.60	120	3741.60
Nuclear	220	-	-	220.00	-	-	-	-
Total	2203	2136.25	100	4439.25	2340	2078.75	120	4538.75

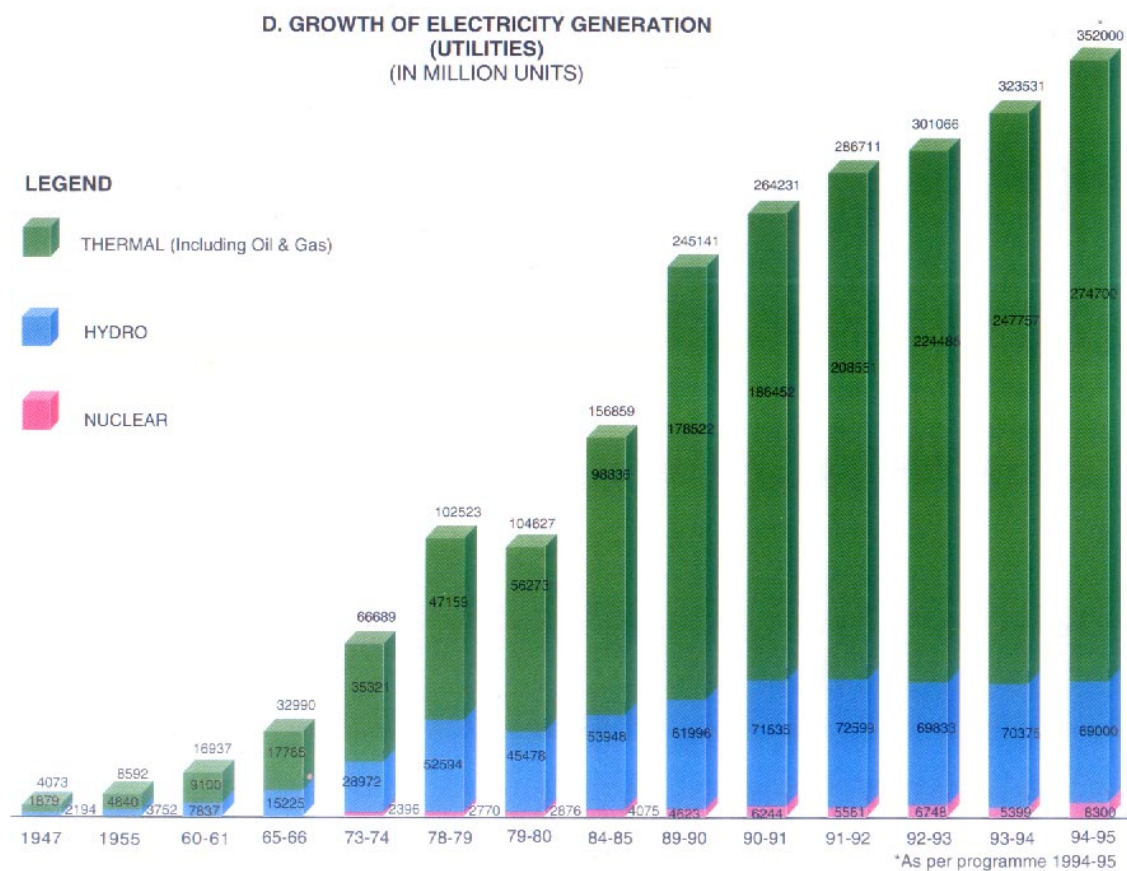
2.5.1 Generating capacity addition programme and achievement during 1994-95

Based on the status of various ongoing projects a capacity addition programme of 4818.75 MW consisting of 473.25 MW

hydro, 4125.50 MW of thermal and 220 MW of nuclear was drawn for the year 1994-95. An aggregate capacity of 1991.5 MW consisting of 54.0 MW hydro and 1937.5 MW thermal has been added during 1994-95 up to end December 1994.

2.6 CAPACITY ADDITIONS PROGRAMME & ACHIEVEMENT DURING 1994-95







2.8 GENERATING CAPACITY ADDITION PROGRAMME FOR THE YEAR 1994-95 (PROJECT/REGION WISE)

Sector	State	Impl. Agency	Unit Name	U. No.	Type MW	Unit Capacity	Actual/Expected Comm. Schedule
NORTHERN REGION							
CS	J&K	NHPC	SALAL II	3	H	115.00	01/95
SS	J&K	JKPDC	KARGIL	1	H	1.25	01/95
SS	J&K	JKPDC	KARGIL	2	H	1.25	02/95
SS	J&K	JKPDC	KARGIL	3	H	1.25	03/95
SS	J&K	JKPDC	PAMPORE ST	4	T	25.00	10/95
SS	DELHI	DESU	IPWH	1	T	34.00	01/94
SS	RAJ	RSEB	RAMGARH ST	1	T	3.00	05/94
SS	RAJ	RSEB	RAMGARH ST	2	T	35.50	12/94
SS	UP	UPSEB	ANPARA'B'	5	T	500.00	07/94
SUB-TOTAL (NR)						716.25	
WESTERN REGION							
SS	MP	MPEB	HASDEO BANGO	2	H	40.00	08/94
SS	MP	MPEB	HASDEO BANGO	3	H	40.00	11/94
CS	GUJ	NTPC	GANDHAR CCST	3	T	131.00	07/94
PS	MAH	TEC	TROMBAY CC ST	1	T	60.00	10/94
PS	MAH	BSES	DAHANU	1	T	250.00	10/94
PS	MAH	BSES	DAHANU	2	T	250.00	03/95
SS	MAH	MSEB	BHIRA PSS	1	H	150.00	03/95
SS	MAH	MSEB	SURYA	1	H	6.00	03/95
SS	MAH	MSEB	MANIKDOH	1	H	6.00	03/95
SS	MAH	MSEB	DINBHE	1	H	5.00	03/ 95
SS	MAH	MSEB	URAN WH	2	T	120.00	09/94
CS	GUJ	NPCL	KAKRAPAR	2	N	220.00	09/94
SUB-TOTAL (WR)						1278.00	

Sector	State	Impl. Agency	Unit Name	U. No.	Type MW	Unit Capacity	Actual/Expected Comm. Schedule
SOUTHERN REGION							
SS	AP	APSEB	UPPER SILERU	2	H	60.00	02/ 95
SS	AP	APSEB	RAYALSEEMA	2	T	210.00	09/95
SS	AP	APSEB	VIJAYAWADA	6	T	210.00	03/ 95
SS	KAR	KPCL	RAICHUR	4	T	210.00	10/ 94
SS	TN	TNEB	NORTH MADRAS	1	T	210.00	10/ 94
SS	TN	TNEB	NORTH MADRAS	2	T	210.00	03 / 95
SS	TN	TNEB	BASIN BRIDGE GT	1	T	30.00	02/ 95
SS	KER	KSEB	KALLADA	1	H	7.50	08/ 94
SUB-TOTAL (SR)						1147.50	
EASTERN REGION							
CS	BIH	NTPC	KAHALGAON	3	T	210.00	03/ 95
SS	BIH	TVNL	TENUGHAT	1	T	210.00	04/ 94
SS	BIH	BHPC	E. GANDAK CANAL	1	H	5.00	07/ 94
SS	BIH	BHPC	E. GANDAK CANAL	2	H	5.00	08/94
SS	BIH	BHPC	E. GANDAK CANAL	3	H	5.00	09/94
SS	ORI	OPGC	IB VALLEY	1	T	210.00	04/ 94
SS	ORI	OPGC	IB VALLEY	2	T	210.00	12/ 94
CS	ORI	NTPC	TALCHER	1	T	500.00	08/ 94
CS	WB	DVC	MEJIA	1	T	210.00	02/95
SS	WB	WBPDC	RAMMAN II	1	H	12.50	02/ 95
SS	WB	WBPDC	RAMMAN II	2	H	12.50	03/ 95
SUB-TOTAL (ER)						1590.00	
NORTH EASTERN REGION							
CS	ASSAM	NEEPCO	KATHALGURI GT	1	T	33.50	01/95
CS	ASSAM	NEEPCO	KATHALGURI GT	2	T	33.50	02/95
SS	ASSAM	ASEB	LAKWA GT II	7	T	20.00	10/94
SUB-TOTAL (NER)						87.00	
TOTAL ALL INDIA						4818.75	



2.9 SUMMARY OF GENERATING CAPACITY ADDITION PROGRAMME FOR THE YEAR 1994-95 (SECTOR/REGION WISE)

Type	Central Sec.		State Sec.		Private Sec.		Total	
	CAP(MW)	NOU	CAP (MW)	NOU	CAP (MW)	NOU	CAP (MW)	NOU
NORTHERN REGION								
Hydro	115.00	1	3.75	3	0.00	0	118.75	4
Thermal	0.00	0	597.50	5	0.00	0	597.50	5
Nuclear	0.00	0	0.00	0	0.00	0	0.00	0
TOTAL (NR)	115.00	1	601.25	8	0.00	0	716.25	9
WESTERN REGION								
Hydro	0.00	0	247.00	6	0.00	0	247.00	6
Thermal	131.00	1	120.00	1	560.00	3	811.00	5
Nuclear	220.00	1	0.00	0	0.00	0	220.00	1
TOTAL (WR)	351.00	2	367.00	7	560.00	3	1278.00	12
SOUTHERN REGION								
Hydro	0.00	0	67.50	2	0.00	0	67.50	2
Thermal	0.00	0	1080.00	6	0.00	0	1080.00	6
Nuclear	0.00	0	0.00	0	0.00	0	0.00	0
TOTAL (SR)	0.00	0	1147.50	8	0.00	0	1147.50	8
EASTERN REGION								
Hydro	0.00	0	40.00	5	0.00	0	40.00	5
Thermal	920.00	3	630.00	3	0.00	0	1550.00	6
Nuclear	0.00	0	0.00	0	0.00	0	0.00	0
TOTAL (ER)	920.00	3	670.00	8	0.00	0	1590.00	11
NORTH EASTERN REGION								
Hydro	0.00	0	0.00	0	0.00	0	0.00	0
Thermal	67.00	2	20.00	1	0.00	0	87.00	3
Nuclear	0.00	0	0.00	0	0.00	0	0.00	0
TOTAL (NER)	67.00	2	20.00	1	0.00	0	87.00	3
ALL INDIA								
Hydro	115.00	1	358.25	16	0.00	0	473.25	17
Thermal	1118.00	6	2447.50	16	560.00	3	4125.50	25
Nuclear	220.00	1	0.00	0	0.00	0	220.00	1
TOTAL (IND)	1453.00	8	2805.75	32	560.00	3	4818.75	43

NOU = NUMBER OF UNITS

2.10 DETAILS OF UNIT (S) COMMISSIONED DURING APRIL-DECEMBER, 1994

Sl. No.	Name of Project and Unit No.	Capacity (MW)		State/ Execut. Agency	Date of	
		Prog.	Ach.		Roll.	Comm.
HYDRO						
1.	Thirot U-I*	-	1.5	HP/HPSEB	28.11.94	-
2.	Hasdeo BangoU-2	40	40	MP/MPEB	18.11.94	21.11.94
3.	Hasdeo Bango U-3	40	-	MP/MPEB	-	-
4.	Kallada U-1	7.5	7.5	Ker/KSEB	19.06.94	21.07.94
5.	E. Gandak Canal U-1	5	5	Bih/BHPC	29.07.94	04.08.94
6.	E. Gandak Canal U-2	5	-	Bih/BHPC	-	-
7.	E. Gandak Canal U-3	5	-	Bih/BHPC	-	-
Total (H)		102.5	54.0			
THERMAL						
1.	Pampore GT-4	25	-	J&K/JKPDC	-	-
2.	Ramgarh GT-1	3	3	Raj/RSEB	-	15.11.94
3.	Ramgarh GT-2	35.5	-	Raj/RSEB	-	-
4.	Anpara ‘B’ U-5	500	500	UP/UPSEB	-	04.07.94
5.	Gandhar GT-3	131	131	Guj/NTPC	-	20.05.94
6.	Uran WHRU-2	120	120	Mah/MSEB	-	28.10.94
7.	Trombay CCST	60	60	Mah/TEC	-	09.12.94
8.	Dahanu U-1	250	250	Mah/BSES	31.12.94	-
9.	Rayalseema U-2	210	-	AP/APSEB	-	-
10.	Raichur U-4	210	210	Kar/KPCL	-	29.09.94
11.	N. Madras U-1	210	210	TN/TNEB	-	25.10.94
12.	Tenughat U-1	210	210	Bih/TVNL	-	14.04.94
13.	Ib-Valley U-1	210	210	Ori/OPGC	-	22.05.94
14.	Ib-Valley U-2	210	-	Ori/OPGC	-	-
15.	Talcher U-1	500	-	Ori/NTPC	-	-
16.	Lakwa GT-II-7	20	-	Assam/ASEB	-	-
17.	Kathalguri GT-1	-	33.5	Assam/NEEPCO	30.12.94 (Crank)	-
Total (T)		2904.5	1937.5			
NUCLEAR						
1.	Kakrapar U-2	220	-	Guj/NPCL	-	-
Total (N)		220	-			
Total (H + T + N)		3227.0	1991.5			

* From outside the programme of 1994-95. Information received late.



2.11 THERMAL UNITS TARGETTED FOR COMMISSIONING DURING 1994

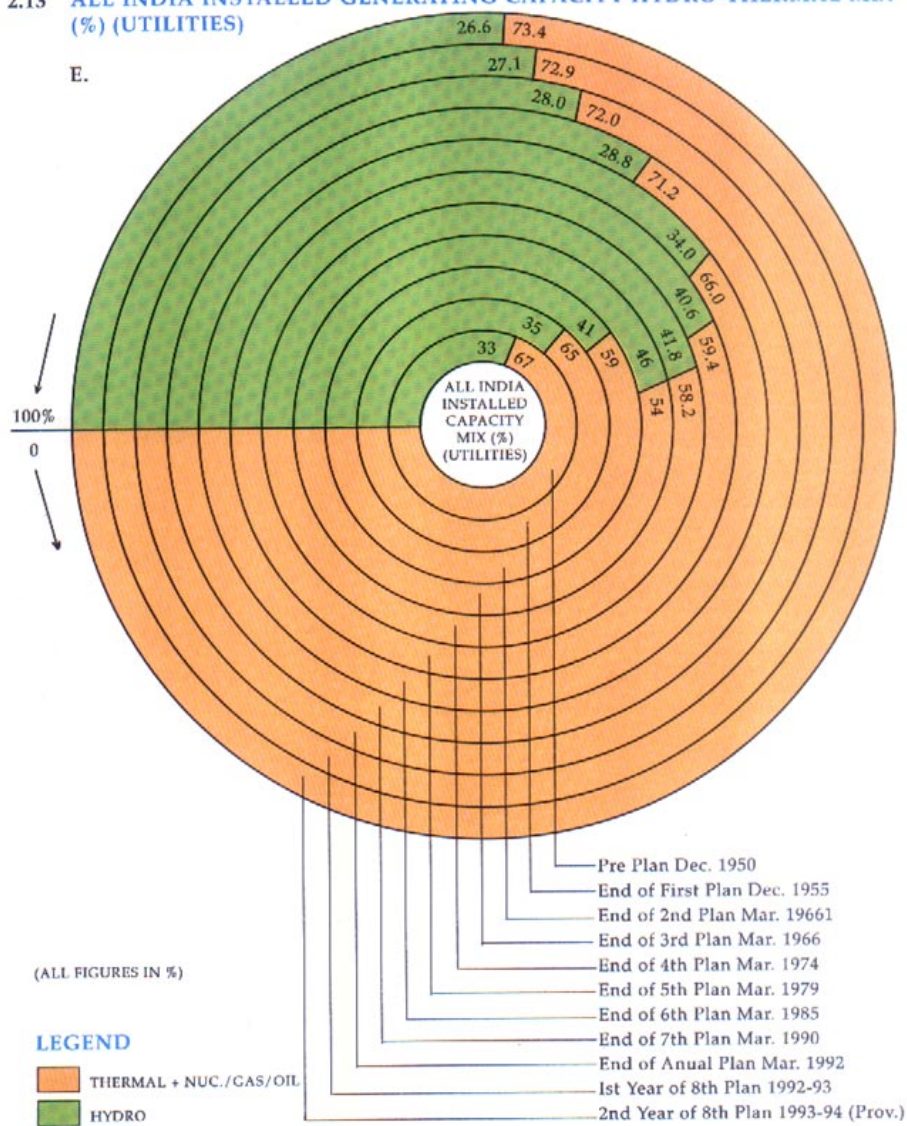
SI. No.	Name of Project/ Unit No.	State/ Orgn.	Capacity (MW)	Commissioning Schedule	
				as envisaged by CEA at beginning of the year	Actual/ Now expected
CENTRAL SECTOR					
1.	Gandhar GT-3	GUJ/NTPC	131	7/94	20.05.94 (Actual)
2.	Talcher-1	ORI/NTPC	500	8/94	2/95
3.	Kahalgaoon-3	BIH/NTPC	210	3/95	3/95 (Critical)
4.	Mejia	WB/DVC	210	295	Slipping b'yd 94-95
5.	Kathalguri GT-1	ASM/NEEPCO	33.50	1/95	2/95
6.	Kathalguri GT-2	ASM/NEEPCO	33.50	1/95	2/95
			1118.00		
STATE SECTOR					
1.	DESU WHR-1	DEL/DESU	34	1/95	1/95
2.	Pampore St.II GT4	JK/PDCL	25	10/94	12/94
3.	Ramgarh GT-1	RAJ	3	5/94	15.11.94 (Actual)
4.	Ramgarh GT-2	RAJ	35.5	12/94	3/94
5.	Anpara 'B'-5	UP	500	7/94	4.7.94 (Actual)
6.	Dahanu-1	MAH/BSES	250	10/94	12/94
7.	Dahanu-1	MAH/BSES	250	3/95	3/95 (Critical)
8.	Trombay ST	MAH/TEC	60	10/94	12/94
9.	Uran WHRP-2	MAH	120	9/94	28.10.94 (Actual)
10.	Rayalseema-2	AP	210	9/94	12/94
11.	Vijayawada-6	AP	210	3/95	3/95
12.	Raichur-4	KAR/KPC	210	10/94	29.9.94 (Actual)
13.	N. Madras-1	TN	210	10/94	25.10.94 (Actual)
14.	N. Madras-2	TN	210	3/ 95	3/95 (Critical)
15.	Basin Bridge GT-1	TN	30	2/95	3/95 (Critical)
16.	Tenughat-I	BIH/TVNL	210	4/94	14.4.94 (Actual)
17.	Ib-1	ORI/OPGC	210	4/94	25.5.94 (Actual)
18.	Ib-2	ORI/OPGC	210	12/94	3/95
19.	Lakwa GT-7	ASM	20	10/94	3/95
			3007.5		
Total (CS + SS)			4125.5		

2.12 8TH PLAN OUTLAYS

	Approved outlay during Annual plans (Rs. crores)			Approved outlay during 8th plan (Rs. crores)
	1992-93	1993-94	1994-95	1992-97
STATE SECTOR	8532.93	8958.45	9991.91	48,407.74
CENTRAL SECTOR	6411.00	7461.46	8458.54	31,181.58
Total	14943.93	16419.91	18450.45	79,589.32

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

E.



2.14 AWARDS

2.14.1 Meritorious Productivity Reward Scheme for Thermal Generation.

- (i) The Meritorious Productivity Rewards Scheme for the stations which was started in 1983-84 is being continued. The objective of the scheme is to maximise thermal generation by motivating the employees working in various thermal power stations by providing financial incentives to them for significant increase in thermal generation. For the year 1992-93, the following power stations received cash awards under the scheme

Name of Station	
1.	Vijayawada
2.	Kota
3.	Ramagundam STPS
4.	Mettur
5.	Kolaghat
6.	Bhatinda
7.	Unchahar
8.	Kutch Lignite
9.	Singrauli STPS
10.	Ropar
11.	Bokaro 'B'
12.	Anta GPP
13.	Rihand STPS
14.	Korba STPS
15.	Vindhyachal STPS
16.	Durgapur TPS(DVC)
17.	Korba (East)
18.	Korba (West)
19.	Khaperkhhera
20.	Parli
21.	Chandrapur
22.	Tuticorin
23.	Raichur
24.	Bandel
25.	Satpura (Consolation)
26.	Amarkantak (Consolation)

- (ii) Vijayawada, Singrauli STPS, Rihand STPS, Anta, Korba STPS, Ramagundam STPS, Bhatinda, Kota, Korba (West), Khaperkhhera and Mettur received a shield in addition to the Cash award.
- (iii) The Chief Executives of Vijayawada Stations were awarded Silver medals. While Chief Executive of Singrauli STPS, Rihand STPS, Korba STPS, Ramagundam STPS, Kota, Khaperkhhera and Mettur were awarded Bronze medals.

2.14.2 Award for Economic & Efficient Operation of Thermal Power Stations

- (i) A new award scheme for thermal power stations for achieving economic and efficient performance has been introduced by Ministry of Power from 1992. Under this scheme power stations which achieve more than a specified improvement in their secondary fuel oil consumption and auxiliary power consumption as compared to that of the previous year would be rewarded by the Government. Rewards under this scheme was distributed for the first time during the year 1993-94 based on the performance of participating thermal power stations during the calendar year 1992. Total reward was 314.70 lakhs out of which Rs. 212.37 lakhs was for saving in specific secondary fuel oil consumption given to 24 stations, which together saved oil of the order of 1 lakh kilolitre, and Rs.102.3 lakhs for reduction in auxiliary power consumption given to 16 stations.
- (ii) For the calendar year 1993, award under reduction in specific secondary fuel oil consumption is recommended for 34 stations while under category of reduction in Auxiliary power consumption, 11 stations have been covered.

3. RENOVATION AND MODERNISATION (R & M) PROGRAMME OF POWER STATIONS

3.1 R & M PROGRAMME (PHASE-I) OF THERMAL POWER STATIONS

- (i) With a view to improving the performance of 34 old thermal power stations, covering 163 units aggregating to 13555.5 MW, this programme was launched in 1984. The latest sanctioned cost of the schemes covered under the programme is Rs. 1174.01 crore, comprising Rs. 431.43 crore under Central Loan Assistance (CLA) and Rs. 742.58 crore under State Plan/Own Resources. The programme was anticipated to give an additional generation of 7000 MUs per annum by improving the overall PLF of units covered by 7%.

(ii) Financial Progress (Rs. crore)

	CLA	SP	TOTAL
Expenditure upto 3/94	366.65	596.02	962.67
Outlay 1994-95	6.05	83.96	90.01
Annual Expenditure/ release upto 12/94	1.33	6.95	8.28
Total expenditure upto 12/94	367.98	602.97	970.95

(iii) Physical Progress

Out of total 1163 Nos. of activities under CLA, 1094 (94.01%) have been completed and out of 600 nos. of activities under SP/OR, 470 (78.33%) have been completed. The balance activities are expected to be completed by 1995-96.

(iv) Constraints faced during implementation

- Inadequate flow of funds from State Governments.
- Non-availability due to shut-down of units.

- Accidents
- Liquidation of ABL
- Additional activities included later for pollution control measures.

(v) Achievements

Against the target of 7000 MUs, additional generation per annum by some of the units, where substantial R&M work has been carried out, is as follows :

1988-89	11000 MU
1989-90	10800 MU
1990-91	10700 MU
1991-92	9500 MU
1992-93	10462 MU
1993-94	10938 MU
1994-95 (1st QTR)	3126.5 MU (APR-JUN)
1994-95 (2nd QTR)	1930.4 MU (JUL-SEP)
1994-95 (3rd QTR)	2777.34 MU (OCT-DEC)

3.2 R&M PROGRAMME (PHASE-II) OF THERMAL POWER STATIONS

On achieving encouraging results from R&M programme (Phase-I), R&M Programme (Phase-II) was started in the year 1991-92. This programme covers 212 units of 47 old thermal power stations, with aggregated capacity of 21671.435 MW and a total latest sanctioned cost of Rs. 2105.23 crores. The programme is anticipated to give an additional generation of 8750 MUs by improving the overall PLF by 5% from 51.5% to 56%. The programme is also anticipated to extend the life of some units of Neyveli, Amarkantak, Korba-II, Satpura I and Kothagudem (B) TPS aggregating to a total capacity of 1402.5 MW by 15-20 years. The programme, on completion, will also increase the peaking capacity of certain units by a total of 100 MW.

3.2.1 Progress

(i) Physical

Out of total 1634 activities, 327 have been completed, 1307 are under progress as on 31.12.94.

(ii) **Financial**

Expenditure upto 3/94	Rs. 382.83 cr.
Outlay 1994-95	Rs. 460.97 cr.
Annual Expenditure/release 1994-95 upto 12/94	Rs. 54.53 cr.
Total Expenditure upto 12/94	Rs. 437.36 cr.

(iii) **Constraints**

Out of total 46 approved schemes, 21 are being partly funded by PFC / WB, 5 schemes are funded from their own resources. The progress of remaining 20 schemes pertaining to HSEB, UPSEB, BSEB, WBSEB, ASEB, DPL and DVC is however, very critical because of paucity of funds.

3.3 **Renovation, Modernisation and Upgrading of Hydro-electric Power Stations**

- (i) A programme for renovation, modernisation and upgrading (RM&U) of Hydro Power Stations was formulated by Central Electricity Authority and presently 55 schemes have been identified under this programme with an aggregate capacity of 9658 MW. On a preliminary assessment, the programme would yield a benefit of 340 MW by way of restoration of lost capacity; additional 519 MW capacity by way of upgrading and 1337 MW as

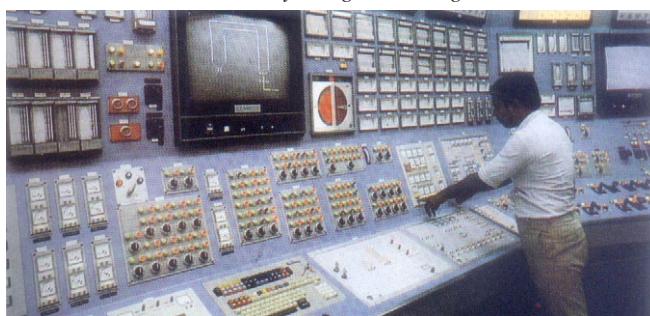
prevention of capacity loss. The Restoration, Upgrading and prevention of capacity loss efforts would yield 6709 million units of additional energy annually. The estimated cost of the programme is approximately Rs. 1260 crores.

- (ii) Out of 55 schemes, 32 schemes have already been cleared by CEA at an estimated cost of Rs. 652 crores. The benefits expected after implementation of these Renovation schemes are 1548 MW and 4050 MU per annum. Out of these 32 schemes, 4 schemes have already been implemented and balance 28 schemes are under various stages of implementation. Total estimated cost of these 28 schemes is Rs. 635 crores and the benefits expected after implementation of renovation works are 1476 MW and 3679 MU per annum.

- (iii) The DPRs for 6 schemes are under processing/examination in CEA and the DPRs for the remaining 17 schemes are yet to be received from the Utilities/SEBs.

- (iv) During the year, Desk Review Clearance of Sub-Station Equipments of Hirakud-(Burla) H.E. Power Station has been made at an estimated cost of Rs. 9.85 crores.

The country's largest training simulator at Korba.



4. TRANSMISSION

(i) 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 1994-95 in the Central and State Sector included construction of 1506 Ckm. of 400KV lines and 3100 Ckm. of 220 KV lines alongwith the associated substations.

(ii) The progress achieved during the year 1994-95 (upto Nov., '94) in the construction of transmission lines and substations is summarised below :

400KV lines	995 Ckm.
220 KV lines	1757 Ckm.
400 KV Substation	1130 MVA.
220 KV Substation	1560 MVA.

4.1 CENTRAL SECTOR TRANSMISSION SYSTEM

Central Sector Transmission lines and substations completed during the year 1994-95 (Upto Nov. '94) are listed in the following table

Transmission Line	Executing Agency	Length (Ckm.)
400 KV		
i) Durgapur-Jamshedpur S/C	Powergrid	195
ii) Kathalguri-Mariani D/C	Powergrid	324
	Total	519
220 KV		
i) Salal-Jammu S/C	Powergrid	62
ii) Hissar-Hissar D/C	Powergrid	28
iii) Salal-Kishenpur-Serna D/C	Powergrid	322
	Total	412
Substations 400/200 KV	Executing Agency	MVA
1. Hissar II	Powergrid	315

4.2 INTER-STATE TRANSMISSION LINES - CENTRALLY SPONSORED PROGRAMME

(i) At the time of Fourth 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.

(ii) Upto the end of Financial Year 1993-94, a cumulative sum of Rs. 330.69 crores were released to the States under the Programme and stringing of over 7000 ckm. of 400, 220, 132 and 66 KV transmission lines have been completed.

(iii) For the year 1994-95, the approved budget provision for releasing loan to utilities for Centrally Sponsored Inter-State Transmission Lines is Rs. 5 Crores inclusive of Rs. 1 Crore earmarked for DVC in respect of 220 KV Bokaro-Tenughat line. The requirement of funds for Inter-State links for the 8th Plan was reviewed as a part of mid-term appraisal exercise of the 8th Plan Power Programme. This exercise has taken into consideration various relevant factors such as, latest RCE, necessity or otherwise of taking up those inter-state transmission lines not desired necessary any more in the changed power scenario etc. As a result of this detailed exercise, the revised requirement of funds for the year 1994-95 was assessed as Rs. 15 crores excluding requirements if any, for the Bokaro Tenughat 220KV line for which no funds are now proposed to be released. Accordingly, the budgetary provision in Revised Estimate 1994-95 is being augmented to Rs. 10 Crores for meeting the requirement of funds for Inter-State Transmission Lines.

4.3 TRANSMISSION AND DISTRIBUTION LOSSES

(i) Due to concerted efforts, the Transmission

& Distribution losses for the country as a whole reduced from 22.83% during 1991-92 to 21.80% during 1992-93 thereby achieving a reduction of 1.03%.

- (ii) 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 with shields on the basis of their performance in reduction of Transmission & Distribution losses. Cash awards are given to Distribution Division/cities/towns of the Power Utilities which achieve a prescribed minimum reduction in T&D Losses. Individuals as-well-as institutions & 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 utilisation of T&D system or better quality of power supply or improved efficiency of electrical appliances.
- (iii) For the year 1991-92, Karnataka Electricity Board, Tamil Nadu Electricity Board, Electricity Department of Pondicherry and four best performing Distribution Divisions/cities/towns viz. Baroda City Circle (GEB), Tenali (APSEB), Indore city (MPEB), Pondicherry region (Electricity Department, Pondicherry) have been recommended for award of shields. Cash award of Rs. 3 lakhs to three Distribution Divisions of GEB. Rs. 1.23 lakhs to two Distribution Division of MPEB. Rs. 5.27 lakhs to seven Distribution Divisions of APSEB and Rs. 2 lakhs to Pondicherry region of Electricity Department of Pondicherry have also been recommended.

4.4 INTEGRATED OPERATION OF GRIDS

- (i) 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.

4.4.1 National Power Grid

- (i) 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 synchronous (HVDC) links between the regions. Already 19,747 Ckt.Kms of 400 kv lines and 6,283 Ckt. Kms of lines at 220kv level have been constructed in the Central Sector, upto November 1994. An inter-regional link (Vindhyachal 2x250 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.
- (ii) 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.
- (iii) Although the Regional Grids have already been inter-connected, paving way for formation of a National Grid, further strengthening of intra-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.

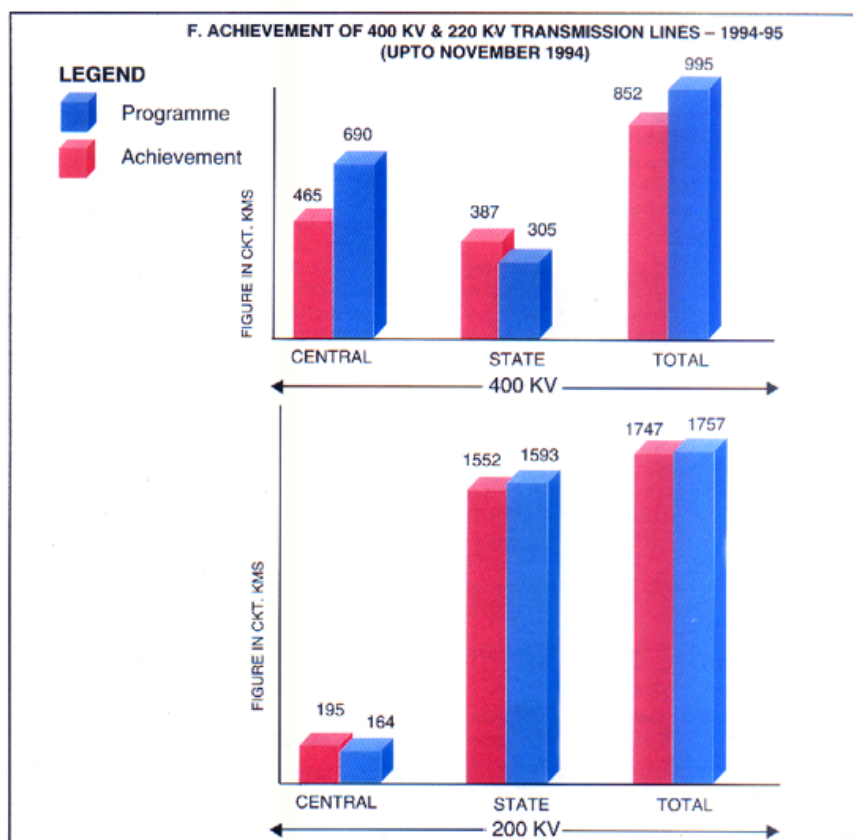
4.4.2 National HVDC Project

- (i) The first stage of National HVDC project converting existing 220KV DC-AC line between Lower Sileru (A.P.) and Barsoor

(M.P.) to 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.

- (ii) The ordering action for all main equipments has been taken up and internal orders have been issued on BHEL. Out of the total Rs. 16.75 crores received for the year 1993-94, Rs. 11.00 crores have already been paid towards advances, etc.
- (iii) The system engineering and simulator studies for dynamic performance are in the advanced stage of completion.



5. RURAL ELECTRIFICATION PROGRAMME

- (i) During the year 1994-95 (upto the end of November, 1994) 1090 inhabited villages have been declared as electrified and 1,94,177 pumpsets energised against the target of 3,708 village electrification and 2,80,119 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, 4,95,281 villages have been electrified and 10470221

pumpsets/Tubewell have been energised as on 30.11.1994 in States and Union Territories, as per details given in the Statements 'A' and 'B'.

Out of a total of 1,11,886 tribal villages in the country, 77,907 villages constituting 69.63% have been electrified as on 30.9.1994. Similarly, 2,61,849 Harijan Bastis have also been electrified so far. The Kutir Jyoti Scheme was continued during 1993-94 and 1994-95. The scheme is financed from Central grant which is routed through Rural Electrification Corporation.



**PROGRESS REPORT IN RESPECT OF ELECTRIFICATION OF VILLAGES
AS ON 30.11.1994**

Sl. No.	States/UTs	Total No. of villages (1981 census)	Achievement as on 31.3.93	Achievement during 93-94	Target for year 94-95	Achievement during 94-95 (upto Nov)	Total Achievement upto 11-94
1.	Andhra Pradesh	27379	27358	-	-	-	27358
2.	Arunachal Pradesh	3257	1759	80	140	38	1877
3.	Assam	21995	21481	14	100	Nil	21495
4.	Bihar	67546	47498	205	200	12	47715
5.	Goa	386	377	-	-	-	377
6.	Gujarat	18114	17892	-	-	-	17892
7.	Haryana	6745	6745	-	-	-	6745
8.	Himachal Pradesh	16807	16761	-	-	-	16761
9.	Jammu & Kashmir	6477	6175	6	5	4	6185
10.	Karnataka	27028	26483	-	-	-	26483
11.	Kerala	1219	1219	-	-	-	1219
12.	Madhya Pradesh	71352	65468	751	250	647	66866
13.	Maharashtra	39354	39106	-	-	-	39106
14.	Manipur	2035	1697	85	100	28	1810
15.	Meghalaya	4902	2384	23	100	Nil	2407
16.	Mizoram	721	567	50	50	8	625
17.	Nagaland	1112	1099	Nil	-	-	1099
18.	Orissa	46553	32682	226	220	26	32934
19.	Punjab	12342	12432	-	-	-	12342
20.	Rajasthan	34968	28460	711	750	146	29317
21.	Sikkim	440	405	-	-	-	405
22.	Tamil Nadu	15831	15822	-	-	-	15822
23.	Tripura	856	3228	200	220	43	3471
24.	Uttar Pradesh	112566	84256	650	1111	102	85008
25.	West Bengal	38024	28455	351	462	36	28842
Total (States)		578009	489719	3352	3708	1090	494161
Total (UTs)		1123	1120	-	-	-	1120
Total (All India)		579132 (583003)	490839 (491977)	3353	3708	1090	495281



STATEMENT 'B'

**PROGRESS REPORT IN RESPECT OF ENERGISATION OF PUMPSETS
AS ON 30.11.1994**

Sl. No.	States/UTs	Estimate Ultimate contential in terms of electric pumpsets	Achievement as on 31.3.93	Achievement during 93-94	Target for year 94-95	Achievement upto Nov. 94	Total achievement upto Nov. 94
1.	Andhra Pradesh	1600000	1398049	106926	56000	45493	1550468
2.	Arunachal Pradesh	-	-	-	-	-	-
3.	Assam	200000	3675	Nil	-	-	3675
4.	Bihar	1000000	261100	1909	1000	886	263895
5.	Goa	-	4677	406	-	243	5326
6.	Gujarat	700000	512780	18766	20000	6909	538455
7.	Haryana	430000	396639	4207	9000	2139	402985
8.	Himachal Pradesh	10000	3755	210	150	123	4088
9.	Jammu & Kashmir	15000	2920	250	100	122	3292
10.	Karnataka	850000	869461	47865	29000	33946	951272
11.	Kerala	300000	265224	10759	1000	6407	282390
12.	Madhya Pradesh	1300000	1003900	38478	12000	9005	1051383
13.	Maharashtra	1800000	1760976	65088	48000	29302	1855366
14.	Manipur	10000	45	Nil	-	-	45
15.	Meghalaya	10000	65	Nil	-	-	65
16.	Mizoram	-	-	-	-	-	-
17.	Nagaland	10000	172	4	-	-	175
18.	Orissa	500000	61428	2607	3500	412	64447
19.	Punjab	700000	639343	29520	15000	9632	678495
20.	Rajasthan	600000	439120	25429	25000	15116	479665
21.	Sikkim	5000	-	-	-	-	-
22.	Tamil Nadu	1500000	1402858	42793	40000	28350	1474001
23.	Tripura	10000	1608	90	100	25	1723
24.	Uttar Pradesh	2400000	694902	27031	192690	4949	726882
25.	West Bengal	500000	94710	2278	1000	686	97674
Total (States)		14450000	9817407	424616	280119	193745	10435768
Total (UTs)		50000	33747	274	-	432	34453
Total (All India)		14500000	9851154	424890	280119	194177	10470221

6. COOPERATION WITH NEIGHBOURING COUNTRIES IN HYDRO POWER.

6.1 INDO-BHUTAN COOPERATION IN POWER DEVELOPMENT

India and Bhutan have followed a policy of mutual cooperation towards economic development in Bhutan. Power as a basic infrastructure for development has therefore been a key area of cooperation.

6.2 CHUKHA PROJECT

The first major step in this direction had been the setting up of 336 MW Chukha Hydroelectric Project in Bhutan at a cost of Rs. 243.71 crores with Indian technical and financial assistance under an agreement signed in March, 1974. The first unit of the Project was commissioned in September, 1986 and all the four units of 84 MW in August, 1988. Since then the project has been generating power, the bulk of which has been exported to India. Bhutan has earned the entire cost of the Project in about five years time by export of power to India alone besides their internal consumption.

6.3 NEW PROJECTS BEING TAKEN UP

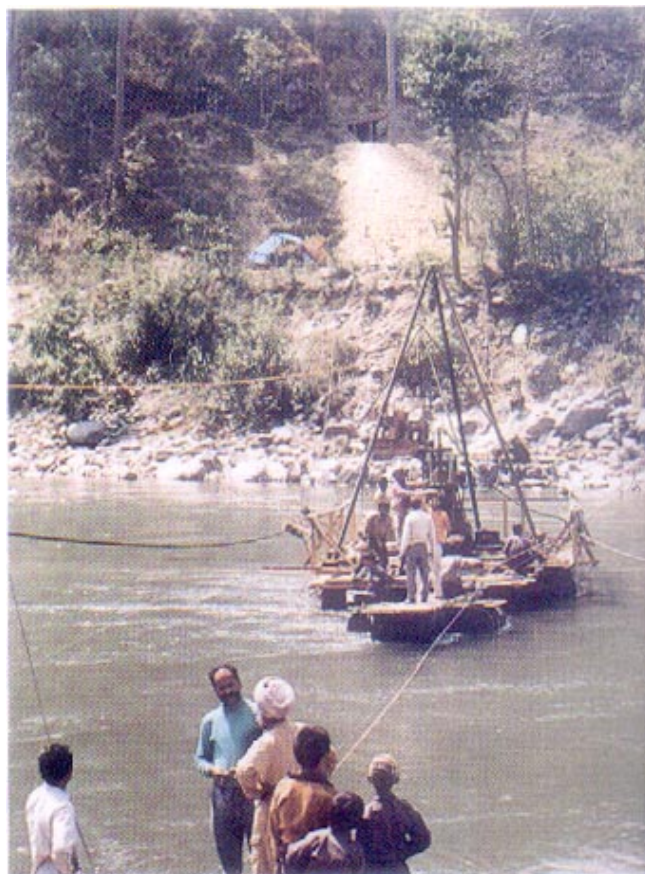
Gratified with the success of Chukha Project the Royal Govt. of Bhutan are keen on development of their Hydro Resources for the mutual benefit of the two countries. To this end, India and Bhutan have signed an agreement in February, 1994 for implementation of Kurichu Hydroelectric Project (3 x 15MW) in Western Bhutan at a cost of about Rs. 310 Crores on a turn-key basis through NHPC within a period of five years. India and Bhutan have agreed to execute Tala HE Project downstream of existing Chukha Project with an installed capacity of 1020 MW. Discussions have

been held between the two countries and modalities for implementation of this Mega Project are being worked out.

6.4 OTHER POWER DEVELOPMENT AREAS

India had constructed a number of Mini/ Micro Hydel Schemes at Thimpu (360 KW), Gidakom (1000 KW), Wangdi (300 KW), Gyesta (1500 KW), Khaling (600 KW), Chenary (750KW), Khalanzi (390 KW) and Lhuntshi (20 KW) during 1960-1980. These Projects have been identified for rehabilitation in a phased manner by the Govt. of India. Proposals for taking up implementation of new Mini/ Micro Hydel Schemes at Ungrichu, Yonglachu, Dongdichu and Chhalori are under consideration.

NHPC Investigation work in progress at Kurichu H.E. Project site (Bhutan)



7. ENERGY CONSERVATION

- (i) India's per capita commercial energy consumption is one of the lowest compared to not only the developed countries but among the developing countries as well. The demand for energy will continue to grow very rapidly with the increasing growth in GDP and population. The development strategy till recently has been biased towards the augmentation of production/capacity of energy sources. However, this strategy has led to widening of gap between demand and supply of energy. This gap can be bridged to a large extent by simultaneous emphasis on the efficient use of energy at the user's end.
- (ii) Before liberalization of the economy, energy security and minimizing energy imports were the main factors responsible for taking up energy conservation activities. With liberalisation of the economy improving competitiveness through minimising energy costs, better returns on investment and limiting adverse environmental impact of energy production have also become important for energy conservation activities.
- (iii) A number of organisations are working in the country towards achieving energy conservation. However, their efforts are fragmented and need to be coordinated for achieving large scale energy savings. With this in view, the Government had set up an Energy Conservation Cell in the Ministry of Power in 1985 to formulate policy, to design the energy management programme and to ensure effective coordination between the various ministries and other entities. The Energy Management Centre is the executive agency under this policy function, designed to implement and monitor the energy conservation programmes and to provide policy guidance and advise on energy efficiency.
- (iv) The energy conservation measures initiated

by the Ministry of Power with the Energy Management Centre, acting as its Executive Agency has resulted in development of a network of Energy Management Advisory Service Centres through Lead Agencies to undertake energy audit services in the country. General awareness on Energy Conservation through information, dissemination and promotional campaigns has been achieved. Various Energy audit programmes taken up by these agencies and other studies have shown considerable energy saving potential. This potential can be realized by adopting low cost house keeping and minor process/technological improvement measures. The 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 campaigns.

- (v) Awareness campaigns have led 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 domestic and Industrial Sectors have also been printed and widely circulated.

7.1 INTERNATIONAL COOPERATION IN ENERGY CONSERVATION

- (i) Ministry of Power has implemented 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 Groups (ESCAP)

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|-------|---|--------|---|
| (ii) | As a result of implementing the above International Cooperation Projects, 7 Energy Management Advisory Centres have been developed through Lead Agencies to undertake energy audits and the findings of the energy audits have been disseminated to the target group through seminars and promotional campaigns. | | |
| (iii) | <p>The following international cooperation projects have been approved for implementation. :</p> <ol style="list-style-type: none"> 1. Indo-German Technical Cooperation on Energy Conservation in Indian Industries in the State of Karnataka.
The project is to be implemented within a period of four years. 2. India-European Economic Communities Energy Management Cooperation Programme
The first phase of the programme has already been completed. The second phase of the programme has been approved for implementation for a period of two years. | (vi) | Constant thrust towards reduction of fuel oil consumption in the thermal power stations all over the country is being given and as a result of efforts by Central Electricity Authority, Ministry of Power, State Electricity Boards and Power Generating Companies, the outcome has been encouraging. Central Electricity Authority is also managing the scheme of Incentive Awards for Reduction of Secondary Fuel Oil Consumption (SFDC) and Auxiliary Power Consumption (APC) in thermal power stations and all SEBs are responding very well. |
| (iv) | <p>Other international cooperation projects, which are at different stages of processing for approval are :</p> <ol style="list-style-type: none"> 1. Indo-Finnish energy cooperation programme in paper & pulp sector. 2. Industrial energy efficiency in India with ODA funding. 3. Demonstration project fund for energy conservation and environmental improvement in India (ADB). 4. Programme for Asian Cooperation on Energy and the Environment (PACE-E). | (vii) | To tackle the problems of high T&D losses and to reduce them in a planned way, Central Electricity Authority has prepared comprehensive guidelines for "Reduction in T&D losses" and "Energy Audit in Power System". Based on these guidelines, Power Utilities have formulated a number of system improvement schemes such as installation of Shunt capacitors for power factor correction, addition of new lines and sub-stations, optimum conductor loading, use of energy efficient equipment/metering and stepping-up of voltage level etc. The T&D losses have been reduced @ 1 per cent each year as targeted under the National Energy Efficiency Programme (NEEP). |
| (v) | Based on the successful development of seven self sustaining energy audit units under the two international cooperation programmes namely India-UNDP Project on Energy Audits in Selected Areas and India-EC Bus Programme, Government of India have approved the programme for developing energy audit agencies under the PROBE programme and four lead agencies | (viii) | With a view to improving the performance of existing old power stations by replacement/ repair/ renovation of the system elements, a massive Renovation & Modernisation Programme-II for thermal power stations has been launched for implementation in the Eighth Plan and the benefits accrued so far are much more than the stipulated target. After completion of this scheme during the Eighth Plan an additional generation of 8750 MU (equivalent to new additional capacity of 1600 MW) at an estimated cost of Rs. 2005.49 crores is expected. |
| | | (ix) | Due consideration has also been given in |
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the design of various system/sub-systems itself to promote the use of energy efficient technologies. In addition to cogeneration, various technologies developments such as Integrated Coal Gasification Combined Cycle (IGCC), development of Fluidised Bed Combustion (FBC) boilers, use of gas turbine based combined cycle plants having high overall efficiency and enabling the use of low grade fuel oil instead of costly premium fuels in conventional coal fired boilers etc. are also being promoted in the field of generation of electrical energy.

- (x) Ministry of Power have sanctioned a number of schemes of Demonstration projects for rectification of pumpsets, system improvement in installation of energy efficient pumping system, installation of LT switched capacitors in Agricultural Sector, Energy Audit Schemes in industries and thermal power stations for reduction of fuel oil consumption and T&D losses by system improvement which resulted in saving of Energy from 25% to 30%.

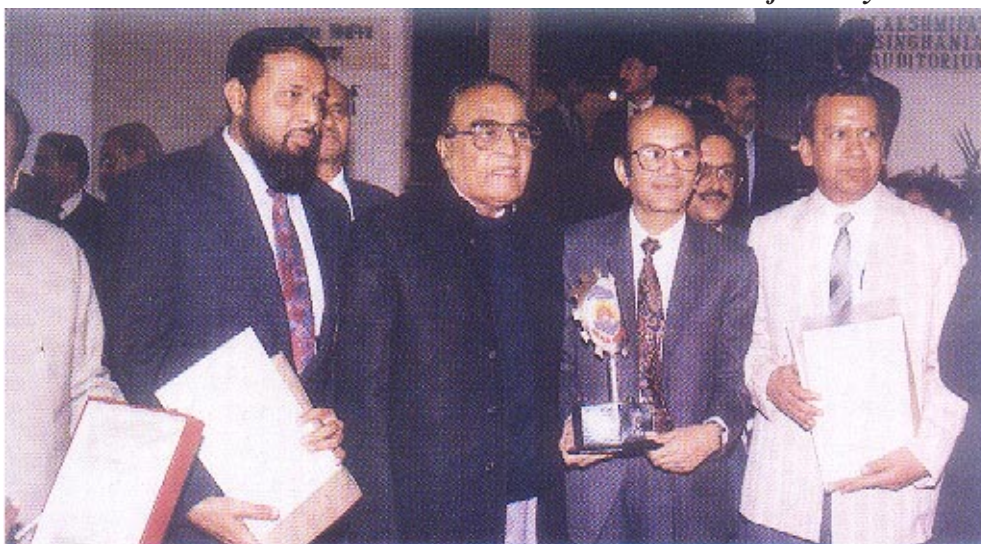
7.2 ENERGY CONSERVATION DAY: 14TH DECEMBER

- (i) 14th December every year is being observed as the National Energy Conservation Day to set forth fresh targets for energy

conservation and rededicate ourselves to the motto “URJA BACHAO, URJA BADHAO”.

- (ii) As in the past, National Energy Conservation Day was organised on 14th December, 1994 also and awards were given to industrial units which have done commendable work in the field of energy conservation.
- (iii) Improving the end-use energy efficiency in all sectors of economy has been high on the Government’s Agenda. Industrial Sector, consuming 50% of the commercial energy, has been given special attention. Many of the industrial units in sub-sectors like Steel, Chlor-alkali, Petro-chemicals, Textiles, Fertilizers, Pulp & Paper etc. are highly energy intensive. However, a number of units in these sub-sectors have been doing excellent work in improving their end use energy efficiency. To give such units national recognition, thereby projecting them as models to be emulated, the Ministry of Power introduced a scheme in 1989 for granting of “National Energy Conservation Awards” to such units.
- (iv) The Awards for the year 1994 were bagged by units in the Textile, Chlor-alkali, Refinery, Integrated Steel Plant, Chemical, Petrochemical and Pulp & Paper subsectors.

Awards for the year 1994



8. PRIVATE SECTOR PARTICIPATION IN POWER GENERATION AND DISTRIBUTION

- (i) The policy to encourage greater private sector participation in electricity generation, supply and distribution was introduced in 1991 with amendments to the 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 137 offers have been received for setting up power plants for a total capacity of 59,866 MW involving an investment of approx. Rs. 2,20,312 crores. 41 of these offers are from foreign private firms including NRIs and Joint Venture proposals. 13 of these proposals have been approved by the Government from the 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.
- (ii) 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 1342 MW which is likely to be commissioned during the 8th plan. In addition, some of the gas based new proposals may also be commissioned during the 8th plan. 1775 MW is estimated to be added from such projects. Thus approx. 3117 MW can be expected to be added in private sector by the end of 8th plan.

- (iii) Based on the experience gained with the initial batch of Power Purchase Agreements (PPAs) for private power projects, Govt. has circulated detailed Principles for negotiating PPAs for Indian Private Power Projects by the State Govts./SEBs with a view to strengthen their capabilities in negotiating the PPAs. To add more clarity to the policy the tariff notification has been amended from time to time and the recent one is being done on 12.1.95 wherein interalia liberalised tariff norms for hydroelectric projects have been notified. To add transparency to the system of finalising private power projects, the Government has decided in January, 95 that no Power Project proposal would be considered by CEA, if the Project is not awarded through competitive bidding. Detailed guidelines have also been issued to the State Governments for adopting competitive bidding. Government is also working on guidelines for encouraging private sector participation in renovation and modernisation and transmission and distribution Sectors.

8.1 PRIVATE SECTOR COMPANY: ACC-BABCOCK LIMITED (ABL)

- (i) ACC-Babcock Limited (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.
- (ii) The manufacturing range of ABL, apart from Power and Industrial Boilers, includes Cement manufacturing machinery, Pressure vessels, Electrostatic Precipitators (ESPs), Air quality control systems, machinery for chemical, metallurgical, sugar, defence and mineral ore processing industry, miscellaneous engineering 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 (BWIL) located in Calcutta, which specialises in erection and commissioning.

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 & West Bengal have extended concessions regarding collection of Central Sales Tax from ABL's Units located in these states.

- (iv) 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. BIFR accorded

their sanction to the revised schemes of Rehabilitation of ABL prepared by IDBI on 15.10.93.

- (v) During the year under review, ABL achieved an all time high Sales turnover of Rs. 204.64 crores with a net profit of Rs. 10.13 crores which is a matter of great satisfaction. However, the Order Book position of the Company has dwindled considerably as no major order for Power Station, Boiler could be secured through Govt. of India as envisaged in the sanctioned Rehabilitation Scheme. Since the State bank of India also did not increase the Working Capital requirement of the Company as per Rehabilitation package, a serious cash crunch has been caused in the resources of the company, adversely affecting the current year's production and operation results. Efforts are being made to improve the working results. Despite the adverse circumstances the Company is aiming at achieving a still higher sales turnover of Rs. 220 Crores with a net profit of Rs. 15 crores during the current year.
- (vi) The proposal of ABB for equity participation in the ABL has been considered by the BIFR, and the draft scheme has been publicised by them. The matter is scheduled for final hearing by BIFR in March, 1995.

9. CENTRAL ELECTRICITY AUTHORITY (CEA)

(i) The Central Electricity Authority is a statutory Organisation constituted under the Electricity (Supply) Act 1948. It is an attached office of Ministry of Power. 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.

(ii) In all technical, financial and economic matters, the Ministry of Power is assisted by the Central Electricity Authority (CEA). CEA is responsible for technical coordination and supervision of programmes and is also entrusted with a number of statutory functions.

CEA is headed by a Chairman, who is also Ex-officio Secretary to the Government of India and has six full time Members, who are of the rank of Ex-officio Additional Secretaries to the Government of India. These are Member (Thermal), Member (Hydro), Member (Economic and Commercial), Member (Power Systems), Member (Planning) and Member (Grid and Operation).

(iii) 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.

(iv) Under the provisions of Electricity (Supply) Act, 1948, the Central Govt. has further added a few more functions to the Central Electricity Authority. These are :

- Co-ordination of research and development in the power generation field;
- Evaluation of financial performance of the SEBs constituted under Section 5 and undertaking of studies concerning the economic and commercial aspects of the power industry as well as analysis of the tariff structure in the power industry;
- Techno-economic appraisal of power projects;
- Promotion of inter-State and joint sector power projects.

(v) Apart from the above functions provided under the Electricity (Supply) Act, 1948, the CEA also undertakes design and engineering of power projects with a view to developing in-house technical know-how and also to assist the State Electricity Boards, Generating Companies & State authorities requiring such assistance under

Section 3(l)(v) of the Electricity (Supply) Act, 1948.

(vi) Following are the 15 Subordinate Offices of the CEA :

1. Southern Regional Electricity Board, Bangalore.
2. Western Regional Electricity Board, Bombay.
3. Eastern Regional Electricity Board, Calcutta.
4. Northern Regional Electricity Board, New Delhi.
5. North Eastern Regional Electricity Board, Shillong.
6. Power Systems Training Institute, Bangalore.
7. Hot line Training Centre, Bangalore.
- 8-11 Regional Power Survey Organisations at New Delhi, Bangalore, Bombay, Calcutta.
- 12-15 Regional Inspectional Organisations at Madras, Goa, New Delhi, Shillong

As per a notification issued on 19.10.1994 energy schemes estimated to involve a capital expenditure exceeding Rs. 100 crores shall be submitted to the Central Electricity Authority for its concurrence.

9.1 TECHNO-ECONOMIC APPRAISAL OF SCHEMES BY CEA

(i) Techno economic appraisal formation is responsible for examination of the schemes for proposed thermal power stations from techno economic angle. The schemes are cleared with a view to yielding benefits during different plan periods. This includes inspection of sites proposed for TPP, tying up of necessary inputs like coal, water, environmental clearances, civil aviation clearance etc and techno economic appraisal of thermal power projects before submitting any scheme to CEA for

according approval. CEA is also responsible for establishing the need for captive projects in public sector undertakings and to recommend the same whenever required and their analysis. Techno economic clearance of revised cost estimates in respect of earlier cleared/ ongoing schemes of public sector undertakings/SEBs is also the responsibility of formation.

(ii) During the year 1994-95 upto 30th November, 1994, 8 nos of new thermal power generating schemes/RCE were cleared from techno-economic angle of CEA. The break-up of schemes which were cleared by CEA from utilities is as under

Type of scheme	: Utility/Licensee
Total capacity (MW)	: 3693
No. of schemes	: 7 in public sector and 1 in Private sector
Estd. cost (Rs. Lakh)	: 1128717

Break-up details of the schemes cleared by CEA:

A New Thermal Schemes

Sl. No.	Name of Scheme	Capacity (MW)	Date of CEA clearance	Estimated cost (Rs. Lakhs)
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Public Sector

1.	Gandhinagar Extn.	1x210	14.06.94	68200
2.	Faridabad CCGT Ph.1-NTPC	400	11.10.94	118144
3.	Kozhikode DGPP	120	11.10.94	35500
4.	Kayamkulam CCGT-NTPC	400	10.11.94	127160
5.	Kawas GTCC-NTPC (Revised cost estimates)	656	19.5.94	142222
6.	Jhanor-Gandhar CCGT NTPC (Revised cost estimates)	657	31.10.94	250000
7.	Talcher STPS Stage I (NTPC)	2x500	12.8.94	254980

Private Sector

8.	Neyveli (Zero Unit) TPS by M / s ST-CMS Electric Co.	250	19.8.94	132511
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B. New Thermal Schemes (Under Private Sector) Cleared by CEA during 1994-95 (Upto 12th December, 1994)

Sl. No.	Name of the State/ project	Capacity (MW)	Date of CEA clearance
1.	Maharashtra Dabhol CCGT TPS by M/s Dabhol Power Co. M/s Enron Development Corpn.)	2015	26.11.1993 & 14.7.1994
2.	Tamil Nadu Neyveli (Zero Unit) TPS by M/s ST-CMS Electric Co. (Promoted by M/s ST Power Systems, USA and CMS Generation, USA).	1x250	19.8.1994
3.	Orissa Ib Valley TPS by M/s Ib Valley Power Ltd. (A joint Venture between AES Transpower - a Subsidiary of AES Corpn. USA & OPGCL).	2x210	19.8.94

Schemes Accepted in Principle by CEA during 1994-95 (Upto 12th December, 1994)

Sl. No.	Name of the Project/ State	Capacity (MW)
1.	Rajasthan Dholpur TPS by M/s RPG Enterprises	2x350
2.	Uttar Pradesh Rosa TPS by M/s Indo Gulf Fertilizers and Chemicals Corpn. Ltd.	2x250
3.	Maharashtra Bhadravati TPS by M/s Nippon Denro Ispat Ltd., GEC, UK and EDF, France.	2x500
4.	Gujarat Mangrol TPS by M/s GIPCL.	1x250
5.	West Bengal Gouripore TPS by M/s Gouripore Power Co. Ltd. (Promoted by WBSEB and BTS).	2x67.5 2x67.5
6.	Balagarh TPS by M/s CESC LTD.	2x250

(iii) The thermal design organisation of CEA provided services for projects regarding design and engineering activities during the year 1994-95 for the following projects (consultancy).

Sl. No.	Name of the projects	Capacity (MW)
1.	Anpara 'B' TPS Extn. CEA as principal consultant	(2x500)
2.	Kathalguri gas based combined cycle power plant	6x30+3x30)
3.	Basin Bridge gas turbine power plant	
4.	Talcher TPS	(2x250)
5.	Agartala Gas Turbine power project	(4x21)
6.	Karaikal combined cycle power plant	(3x5 GT)
	Pondichery (as CEA Retainer Consultant)	(1x7.5 GT)
7.	Waste heat recovery units of DESU gas turbine units	(3x34.7)
8.	N.D.M.C. gas turbine project	(2x30)
9.	Bawana gas turbine power project	(600)
10.	Assam gas turbine power station and transmission line construction project	(6x30 GT)
	Group 'A' Generation	(3x30 ST)
11.	Diesel engine power project for Pondichery region	(50-60)
12.	Tenughat TPS Review consultancy	



A. List of Hydro projects for which design & consultancy were provided during the year 1994-95

S. No.	Name of the Project	State	Installed Capacity (MW)	S. No.	Name of the Project	State	Installed Capacity (MW)
NORTHERN REGION				EASTERN REGION			
	Upper Sindh Stage-II	J&K	105.00		Upper Indravati	Orissa	600.00
	Kargil	J&K	3.75		North Koel	Bihar	24.00
	Ranjit Sagar	Punjab	600.00		Eastern Gandak Canal	Bihar	15.00
	Tehri Stage I	U.P.	1000.00		Sone Eastern Link Canal	Bihar	3.30
	Nathpa Jhakri	U.P.	1500.00		Chandil Dam Power House	Bihar	8.00
	Total NR		3208.75		Teesta Canal Falls	W.B.	
WESTERN REGION					Teesta Canal Falls	W.B.	67.50
	Pugal	Rajasthan	1.50		Teesta Canal Falls	W.B.	
	Chananwala	Rajasthan	1.20		Total ER		717.80
	Hasdeo Bango	M.P.	120.00	NORTH EASTERN REGION			
	Kadana PSP Stg.II	Gujarat	120.00		Doyang	Nagaland	75.00
	Indira Sagar	M.P.	1000.00		Ranganadi	NEEPCO	405.00
	Sardar Sarovar Canal Head	Gujarat	250.00		Kopli Extn.	NEEPCO	100.00
	Sardar Sarovar River Bed	Gujarat	1200.00		Tipaimukh	Manipur/Mizoram	1500.00
	Koyna St. IV	Mah.	1000.00		Pagladiya	Assam	0.25
	Rajghat	M.P.	45.00		Khuga	Manipur	0.75
	Anoopgarh Ph-I	Rajasthan	4.50		Kamilong	Manipur	60.00
	Anoopgarh Ph-II	Rajasthan	4.50		Sessiri	Manipur	100.00
	Anjunem	Goa	0.90		Thoubal Manipur	7.50	
	Total WR		3747.60		(Total NER)		2254.00
SOUTHERN REGION				All India (37 Schemes)			
	Pykara Ultimate	T.N.	150.00	G. Total			
	Srisailem PSS	A.P.	900.00	10978.15			
	Total SR		1050.00				

10. PUBLIC SECTOR UNDERTAKINGS & OTHER ORGANISATIONS

A PUBLIC SECTOR UNDERTAKINGS

10.1 NATIONAL THERMAL POWER CORPORATION LTD. (NTPC)

- (i) Since its inception in 1975, NTPC has contributed addition of 14660 MW (upto end Nov. '94) to the country's generating capacity. Presently, NTPC has to its credit ten coal based 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 Balco's Captive Power Station near Korba, Madhya Pradesh (270 MW), which was also constructed by NTPC. The total approved investment of the corporation as on end Nov. 1994 stands at Rs. 19756.79 crores (excluding the investment on Transmission Systems which have since been transferred to Powergrid).

(ii) NTPC's Power Stations/Projects

The details of completed/ ongoing projects of the NTPC are given below :

DETAILS OF NTPC PROJECTS

Name of the Region/ Project/State	Capacity in MW Approved	Actual/Expected date of commissioning
NORTHERN REGION		
1. Singrauli STPP Uttar Pradesh	2000 Stage-I (3x200) Stage-II (2x200+2x500)	Unit-1 (200) Feb. 82 Unit-2 (200) Nov. 82 Unit-3 (200) Mar. 83 Unit-4 (200) Nov. 83 Unit-5 (200) Feb. 84 Unit-6 (500) Dec. 86 Unit-7 (500) Nov. 87
2. Rihand STPP Uttar Pradesh	1000 Stage-I (2x500)	Unit-1 (500) Mar. 88 Unit-2 (500) July 89
3. National Capital Thermal Power Project (Dadri) Uttar Pradesh	840 Stage-I (4x210)	Unit-I (210) Oct. 91 Unit-2 (210) Dec. 92 Unit-3 (210) Mar. 93 Unit-4 (210) Mar. 94
4. Dadri GBPP Uttar Pradesh	817 Stage-I (4x131+2x146.5)	Gas Turbine Unit-1 (131) Feb. 92 Unit-2 (131) Mar. 92 Unit-3 (131) June 92 Unit-4 (131) Oct. 92 Steam Turbine Unit-5 (146.5) Feb. 94 Unit-6 (146.5) Mar. 94



Name of the Region/ Project/State	Capacity in MW Approved	Actual/Expected date of commissioning
5. Unchahar TPP Uttar Pradesh	420 Stage-I (2x210)	Unit-1 (210) Nov. 88 Unit-2 (210) Mar. 89
6. Auraiya GBPP Uttar Pradesh	652 Stage-I (4x112+2x102)	Gas Turbine Unit-1 (112) Mar. 89 Unit-2 (112) July 89 Unit-3 (112) Aug. 89 Unit-4 (112) Sept. 89 Steam Turbine Unit-5 (102) Dec. 89 Unit-6 (102) June 90
7. Anta GBPP Rajasthan	413 Stage-I (3x88+1x149)	Gas Turbine Unit-1 (88) Jan. 89 Unit-2 (88) Mar. 89 Unit-3 (88) May 89 Steam Turbine Unit-4 (149) Mar. 90
SOUTHERN REGION		
8. Ramagundam STPP Andhra Pradesh	2100 Stage-I (3x200+1x500) Stage-II (2x500)	Unit-1 (200) Nov. 83 Unit-2 (200) May 84 Unit-3 (200) Dec. 84 Unit-4 (500) June 88 Unit-5 (500) Mar. 89 Unit-6 (500) Oct. 89
EASTERN REGION		
9. Farakka STPP West Bengal	2100 Stage-I (3x200) Stage-II (2x500) Stage-III (1x500)	Unit-1 (200) Jan. 86 Unit-2 (200) Dec. 86 Unit-3 (200) Aug. 87 Unit-4 (500) Sept. 92 Unit-5 (500) Feb. 94 Unit-6 (500) <i>The project not taken up due to low demand of Electricity in Eastern Region</i>
10. Kahalgaon STPP Bihar	840 Stage-I (4x210)	Unit-1 (210) Mar. 92 Unit-2 (210) Mar. 94 Unit-3 (210) Mar. 95 Unit-4 (210) June 95

Name of the Region/ Project/State	Capacity in MW Approved	Actual/Expected date of commissioning
WESTERN REGION		
11. Talcher STPP Orissa	1000 Stage-I (2x500)	Unit-1 (500) Feb. 95 Unit-2 (500) Nov. 95
12. Korba STPP Madhya Pradesh	2100 Stage-I (3x200+1x500)	Unit-1 (200) Mar. 83 Unit-2 (200) Oct. 83 Unit-3 (200) Mar. 84 Unit-4 (500) May 87
	Stage-II (2x500)	Unit-5 (500) Mar. 88 Unit-6 (500) Mar. 89
13. Vindhyachal STPP Madhya Pradesh	1260 Stage-I (6x210)	Unit-1 (210) Oct. 87 Unit-2 (210) July 88 Unit-3 (210) Feb. 89 Unit-4 (210) Dec. 89 Unit-5 (210) Mar. 90 Unit-6 (210) Feb. 91
14. Kawas GBPP Gujarat	645 Stage-I (4x106+2x110.5)	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
15. Gandhar GPP Gujarat	648 (3x131+1x255)	Gas Turbine Unit-1 (131) March 94 Unit-2 (131) March 94 Unit-3 (131) May 94 Steam Turbine Unit-IV (255) Sept. 95
Total Approved	16835 MW	

- NB :** 1. Capacity commissioned upto March, 1994 is 14529 MW.
2. Capacity planned to be commissioned during 1994-95 is 631 MW of which Capacity commissioned in 1994-95 till January, 95 is 131 MW (Gandhar Unit 3). In addition to Unit 1 (500 MW) of Talcher STPP the NTPC also expect to commission 3rd unit (210 MW) of Kahalgaon STPP during 1994-95.

(iii) **Generation**

As on November, 1994 a total capacity of 14660 MW was under operation at various NTPC Stations. This comprises of 28 Units of 200/210 MW each at Singrauli, Korba, Ramagundam, Farakka, Vindhyachal, NCTPP, Unchahar & Kahalgaon, 12 units of 500 MW at Singrauli, Korba, Ramagundam, Rihand and Farakka and 24 Gas/Steam turbine Units of various capacities operating at gas based combined cycle plants at Anta, Auraiya, Kawas, Dadri and Jhanor Gandhar Gas Power Projects.

The generation performance of NTPC stations has consistently been at a high level. Against the target of 67500 MUs for

the year 1994-95, till end November, 1994 the gross generation from NTPC stations was 49057 MUs whereas the pro-rata target for the same period works out to about of 45000 MUs. for the period April-November, 1994. The generation during the previous year (1993-94) was 76,478 MUs against a target of 62,900 MUs constituting 23.7% of the total generation and 31% of thermal power generation in the country.

Till the end of November, 1994, the coal based units under commercial operation generated 41,570 MUs at a plant load factor of 71.70%.

The following coal based units of NTPC attained a Plant Load Factor (PLF) in excess of 70% during the current year, upto November, 1994 :

*The youngest member of the NTPC family
–Jhanor Gandhar Gas Power Project*



Sl. No.	Station	Capacity MW	Unit No.	PLF (%)
1.	Singrauli	200	1	84.33
2.	Singrauli	200	2	72.99
3.	Singrauli	200	3	81.27
4.	Singrauli	500	5	84.29
5.	Singrauli	500	6	84.25
6.	Korba	200	1	81.64
7.	Korba	200	2	75.41
8.	Korba	500	4	88.13
9.	Korba	500	5	74.69
10.	Korba	500	6	79.10
11.	Ramagundam	200	3	77.09
12.	Ramagundam	500	4	74.34
13.	Ramagundam	500	6	74.28
14.	Farakka	200	1	84.56
15.	Farakka	200	2	77.52
16.	Rihand	500	1	71.54
17.	Vindhyachal	210	1	74.60
18.	Vindhyachal	210	2	71.52
19.	Vindhyachal	210	3	71.54
20.	Vindhyachal	210	4	87.57
21.	Vindhyachal	210	6	83.96

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- (iv) **Budget Utilisation and Financial aspects**
The authorised share capital of the Corporation is Rs. 8000 crores. As of Nov. 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 1993-94, the NTPC earned a net profit of Rs. 1057.97 crores. The return on capital employed and return on net worth were 11.57% and 11.73% respectively (excluding prior period income).

- (v) **INTERNATIONAL FINANCIAL ASSISTANCE**

World Bank Loan for “NTPC Power Generation Project” Under Time-Slice Concept.

During the year, the World Bank approved a time slice loan to support NTPC’s investment programme. The agreement for first tranche of US \$ 400 million, was signed in June’ 93 and the loan has become effective from June’ 94. This is the first of a series of time-slice-loans from the World Bank for the cumulative amount of US \$ 1.2 billion.

ADB Loan for Feroze Gandhi Unchahar TPS Stage-II (2 x 210 MW)

The ADB have approved NTPC as the implementing agency for Stage-II of the project under their loan for US \$ 160 million consequent upon take over of the Feroze Gandhi Unchahar Thermal Power Project by NTPC.

OECF Assistance for Faridabad GPP (400MW)

An Agreement for financial assistance for Faridabad Combined Cycle Gas Based Power Project (400MW) has been signed with OECF, Japan. Under the agreement OECF has agreed to extend financial assistance of Japanese Y 23.536 billion (including assistance for associated transmission system to be implemented by

POWERGRID). The loan has been made effective from March’94. This is the first tranche of OECF loan for the project and it is envisaged that further loan tranches will be extended by OECF to cover upto 85% of the project cost.

- (vi) **Consultancy Services**

Total value of orders received by the Company for consultancy services during the year was Rs. 67.29 crores. Amidst stiff international competition, the company was able to secure two major overseas contracts for Turnkey execution of 132KV Substations at Awir & Hatta, UAE for the Dubai Electricity & Water Authority valued at UAE Dirhams 44.81 million. (Equiv. Rs. 38.25 Crores) and Turnkey execution of 21 nos. 33 / 66 / 132KV Substations in Nepal for the Nepal Electricity Authority valued at US\$4.97 Mln. + Nepalese Rs. 56.97 Mln. (Equiv. Rs. 19.10 crores). Other orders from international clients during the year include ASIAN DEVELOPMENT BANK (ADB), for providing consultancy to TNEB in Thermal Design & Maintenance Management and SARGENT & LUNDY, USA for EIA Studies for Lapanga TPS, Orissa.

- (vii) **joint Venture Projects**

The Godavari GBPP which was earlier proposed to be implemented by NTPC is now being implemented by M / s. Spectrum Power Generation Company Ltd., (SPGL) in a joint Venture with NTPC, Spectrum Technology, USA & Jaya Food Industries, Hyderabad as promoters. NTPC and Oman Oil Company Ltd. (OOC) have entered into Memorandum of Understanding (MOU) to promote a joint stock public limited company with the intent of both parties alongwith other associates to subscribe to equity to set up gas based power projects under the latest guidelines issued by the Govt. of India for private sector participation in power generation and distribution.

(viii) Memorandum of Understanding

The Memorandum of Understanding (MOU) for the year 1994-95 was signed between NTPC and the Ministry of Power on 26.7.1994. MOU targets for the year 1994-95 in respect of major performance parameters are given below:

Sl. No.	(Target)*
1. Capacity Addition (MW)	631
2. Generation (MUs)	67500
3. Availability Factor %	78
4. Heat Rate (Kcal/Kwh)	2525
5. Gross Margins (Rs. Cr.)	2465.82
6. Net Profit to Capital employed	6.59
7. Consultancy turn over (Rs. Cr.)	4.0

*(Corresponding to Very Good rating)

(ix) Research and Development

R&D Centre started functioning from its permanent establishment at NOIDA from 1st Jan. '93. Fourteen laboratories have been set up with specialized equipment and facilities.

Another significant development was the establishment of "Centre for Power Efficiency and Environmental Protection" (CENPEEP) at the R&D complex. This Centre is likely to receive assistance through USAID.

Prime Minister's Shram Awards for 1993

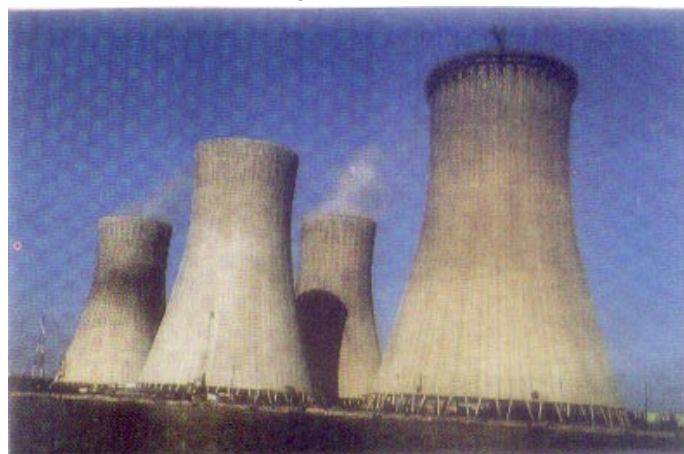
Three workers from Anta Station were given the prestigious Prime Minister's Shram Bhushan Award and four workmen from Rihand received the Shram Vir Award for their meritorious service to the company. This is the ninth consecutive year that the employees of the company were honoured with the Prime Minister's Shram Awards.

(xi) Badarpur Thermal Power Station (BTPS)

Badarpur Thermal Power Station (BTPS) consists of 3x100 MW and 2x210 MW coal fired units with an installed capacity of 720MW. The station is owned by Government of India and is being managed by NTPC since April, 1978. During the year 1994-95, till end November, 1994 the station generated a total of 2904 MUs at a PLF of 70.34% against the target of specific oil consumption, auxiliary power consumption during the year upto November, '94 are 3.53 ml/kwh, 9.99% respectively.

BTPS is 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 of modernisation programme for all units at BTPS. The R&M phase-II has been techno economically cleared by CEA and is to be considered by PIB.

Cooling Towers at Dadri Gas Plant



10.2 NATIONAL HYDROELECTRIC POWER CORPORATION LIMITED (NHPC)

- (i) The National Hydro-Electric 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.
 - (ii) The Authorised Share Capital of the Corporation stands at Rs. 2500 crores. The paid-up share capital which was Rs. 2255.23 crores as on 31.3.93 increased to Rs. 2499.08 crores at the end of October, 1994. The turnover of the Corporation during the year 1993-94 was Rs. 236.47 crores, registering an increase of 32.18% over the previous year's turnover. The profit during the year ending 31.3.1994 was Rs. 70.54 crores as against Rs. 41.49 crores in the previous year.
 - (iii) The generation capacity of the Corporation increased from 883 MW to 1538 MW during the year with the commissioning of the 540 MW Chamera HE Project (Stage-I) and a 115 MW Unit of Salal HE Project (Stage-II). The operating projects of the Corporation, namely the Loktak HE Project (105MW) in Manipur, the 198 MW Baira Siul HE Project in H.P., the 345 MW Salal HE Project (Stage-I) in J&K, the Tanakpur HE Project (120MW) in U.P. and a 115 MW unit of Salal HE Project (Stage-II) in J&K generated 3587 MUs of electricity during 1993-94. With the commissioning of Chamera Stage-I and another 115 MW unit of Salal Stage-II, the cumulative generation by NHPC power stations during 1994-95 (upto Jan 95) was 5422.23 MUs against a target of 4753 MUs an achievement of 114.32% over the target.
- 10.2.1 Apart from Chamera HE Project (Stage-I), NHPC had been engaged in the execution of the following Hydro-electric Projects during the year.

(1) Dulhasti HE Project (3x130MW) J & K

The French Consortium (FC) which was executing the project on turnkey basis had suspended the work at site with effect from 24th Aug. 1992 contending that the security environment at site was not conducive to fulfillment of their contractual obligations. After prolonged negotiations and intervention at the level of the Govt. it has been agreed between NHPC and the French Consortium that the member of the Consortium executing the civil works will be allowed to withdraw and the balance civil works of the project shall be taken over by the NHPC, while the remaining four members of the Consortium will continue with their obligations relating to supply of equipment and technical services for the project. Necessary agreements/ amendments to this effect have been signed between NHPC and the French Consortium on 10.12.94. NHPC has also initiated the process of pre-qualification of contractors for execution of the balance civil works so as to resume work during 1995.

(2) Uri HE Project (4 x 120MW) J & K

The project is being executed by a Swedish - UK Consortium on turnkey basis. The diversion of the river has been successfully carried out. In surface works about 97.7% excavation and 67% concrete placement have been completed out of 38.4 lac Cu.M and 3.30 lac Cu.M respectively till the end of January 95. Excavation of the 10.664 Km of Head Race Tunnel has been completed and concrete lining work is in progress. In Tail Race Tunnel about 58% has been bored out of the total length of 2 Kms. Overall, about 21.7 Kms of tunneling has been done in various underground works against the total length of 22.5 Kms. In underground power house caverns, about 98% excavation and concrete placement work is in progress. Fabrication and supply of hydromechanical and electrical equipment is progressing satisfactorily as per schedule.

(3) Salal (Stage-II) (3x115MW) J & K

Two of the three units of the Project had been synchronised by March, '94. The third unit has been rolled successfully on 24.01.95 and is likely to be synchronised/ commissioned during February 1995. Work on the construction of the Tail Race Tunnel II has been under progress and in all about 95% heading, 66% benching, 54% overt concreting and 41% grouting has been completed out of a total length of 2.504 kms.

(4) Rangit HE Project (3 x 20MW) Sikkim

During the year 1993-94 work on the Rangit HE project in Sikkim has been in progress. A cumulative boring of 581 M (19.4) has been done in Head Race Tunnel till Nov. '94 out of a total length of 3 Kms. Excavation of surge shaft has been completed and that of pressure shaft is in progress. Excavation of Power House Pit has been completed and concreting is in progress. Necessary action has also been taken by NHPC to resolve the contractual problems that had arisen in regard to major civil works.

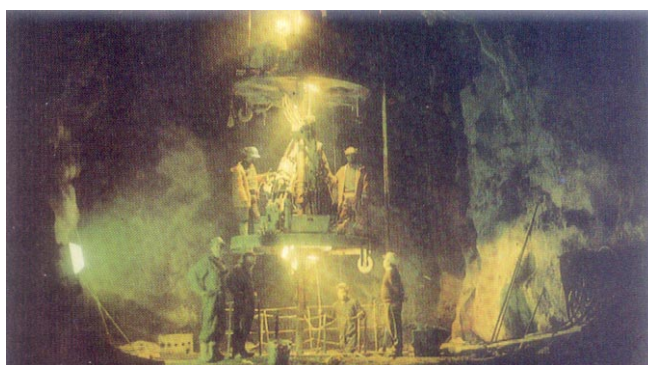
10.2.2 New Schemes of NHPC

(i) Dhauliganga HE Project (Stage-I) (4 x 70MW) U.P.

Work on the project could not be commenced during 1993-94 due to paucity of funds. Presently, the land acquisition is being processed with the concerned authorities. Work on improvement of Tanakpur-Tawaghat Road is expected to start shortly. Infrastructure work like temporary accommodation and access roads at various project sites is also being taken up. Japanese (OECD) financial assistance for the project is being explored.

(ii) Chamara HE Project (Stage-II) (3 x 100MW) H.P.

Work on most of the approach roads, widening of Chamba - Kharamukh road, erection of workshop sheds and explosives magazine has been completed. Development work for construction of residential buildings at Karian has also been completed.



NHPC had floated Global tender inviting offers for turn-key execution of the project with 100% financing. The technical as well as the price bids are under evaluation.

(iii) Koel Karo HE Project (710 MW) Bihar

Work on the project could not be started due to constraint of funds.

(iv) Kurichu HE Project (3x15 MW) Bhutan

NHPC has been selected as the executing agency for setting up the Kurichu Project in Bhutan. The Govt. of Bhutan has handed over land to the Corporation for infrastructure works. The work of construction of the main project road from Kurigampa to project site (7.5 km.) has been entrusted to BRO as a deposit work. Major works like Diversion tunnel, Concrete Dam, Power House and civil works of switchyard are being processed for tendering.

10.2.3 Investigation Projects

(a) Dhauliganga HE Project (Intermediate Stage) (4 x 50 MW) U.P.

NHPC is pursuing the matter for Techno economic clearance of the Detailed Project proposal with the dam site at Nyu, as the alternative dam site at Dar suggested by the CEA is not being considered feasible on environmental consideration.

(b) Goriganga HE Project, Stage-I (3 x 20MW)

Stage-II (4x40MW) and Stage-III (3x40MW + 2 x 10MW) U.P.

The investigation works had been completed by NHPC and the Detailed Project Report submitted to CEA for techno-economic appraisal. CEA has suggested that the planning process of the Stage-I & II may be deferred till the Detailed Project Report of Pancheswar Multi-purpose project is completed. Appraisal for the Stage-III proposal is in progress.

10.3 RURAL ELECTRIFICATION CORPORATION (REC)

(i) 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, energisation of pumpsets, provision of power for small and agrobased 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 subtransmission and distribution system and small hydel projects.

(ii) The authorised share capital of the Corporation is Rs. 600 crores. The paid-up capital of the Corporation upto the year 1993-94 stands at Rs. 442.60 crore. During the year 1994-95 (upto November, 1994), the Central Govt. have contributed Rs. 44 crore towards the share capital of the Corporation, increasing its equity base to Rs. 486.60 crore.

(iii) During the year 1993-94, the REC approved 1623 new projects involving a loan assistance of Rs. 737 crore. During the current year (upto November, 1994) REC approved 113 new projects involving financial assistance of Rs. 79 crore (provisional). Cumulatively Upto November, 1994 REC sanctioned 27,239 RE projects involving financial assistance of Rs. 10159 crore (Provisional).

(iv) Loans advanced by REC to the SEBS, State Govts. and RE Coop. Societies during the year 1993-94 amounted to Rs. 692 crore. Inclusive of this, the total loan amount advanced at the end of 1993-94 aggregated to Rs. 7171 crores. During the current year, 1994-95 (April-November 1994), the



A Sub-Station financed by REC for providing stable supply of electricity to rural areas.

Corporation has disbursed Rs. 259 crores (Provisional) as loans taking the cumulative disbursement of Rs. 7430 crore upto November, 1994.

- (v) During the year 1993-94, against the target of electrification of 2756 villages and energisation of 232030 pumpsets, 3217 villages were reported electrified and 323429 pumpsets energised. The target of pumpsets was exceeded by 39%. During the year 1994-95 (upto No. '1994) 1143 villages have been electrified and 171788 pumpsets (Provisional) energised.

10.3.1 Kutir Jyoti Programme

- (i) The Kutir Jyoti Programme which provides for release of single point light connections to the households of the rural poor below the poverty line, including Harijan Bastis and Adivasis families was given a special thrust. Under this programme during the year 1993-94, 3.74 lakh single point light connections were provided with a grant of Rs.12 crore. For the current year 1994-95, a target for release of 1.25 lakh connections with an outlay of Rs. 5.0 crore has been earmarked. Schemes for release of about

10,000 connections have already been sanctioned upto the end of November, 1994.

- (ii) The level of rural electrification in the country which stood at 12.8% at the time of establishment of the Corporation has risen to 85% (approx) at the end of March, 1994. Similarly the number of pumpsets energisation which stood at 11 lakh at the time of setting up the Corporation has crossed 1 crore mark.

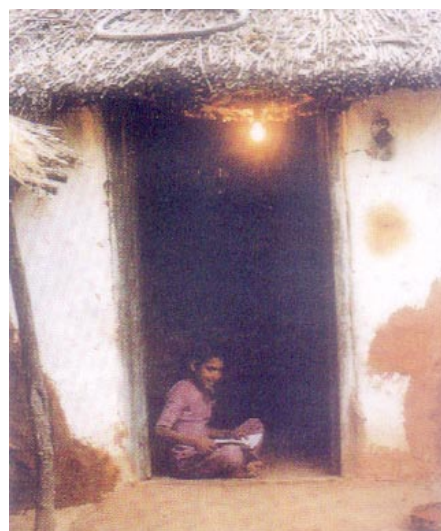
10.3.2 System Improvement Project

- (i) Under this programme, REC had, during 1993-94, sanctioned 148 new SI Projects involving financial outlay of Rs. 155 crore and disbursed Rs. 102 crore. For the year 1994-95 a provision of Rs. 145 crore has been made in the plan outlay during the current year 1994-95. Eight new projects with a financial outlay of Rs. 17 crore have been sanctioned upto November, 1994. With this, total number of Projects sanctioned under the programme upto November, 1994 has gone upto 1057, and financial outlay involved is of the order of Rs. 893 crore and disbursement level has gone upto Rs. 624 crore.

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- (ii) 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 294 standards comprising of 71 specifications for equipment and material and 223 construction standards have been evolved by the REC till 31st March, 1993. During the year 1994, (upto Nov. 1994) the Corporation has also finalised 9 standards comprising 1 specification for equipment and material and 8 Construction standards. The Corporation has in participation with Indian transformer Manufacturers Association jointly organised recently on 7th-8th December, 1994 an International Colloquium on Transformers for technology up-gradation, Remote Controlled Load Management, Introduction of Amorphous Core Distribution Transformer and to disseminate information on the latest technological developments within and outside the country.
- (iii) The Corporation has also signed the Memorandum of Understanding (MOU) for the year 1994-95 with the Ministry of Power to achieve the planned targets for which the Ministry would ensure timely flow of allocated funds required for implementing the RE Programme. The Corporation has also signed another Memorandum of Understanding (MOU) with MNES and MRECA for development of institutional frame work for Decentralised Distribution Projects, identifying suitable sites for utilising Mini/Micro and small hydel power potential, solar and wind energy etc. All the three organisations agreed to set up a Task Force to develop and monitor action plan for implementation of tasks envisaged in the Memorandum of Understanding. REC is to act as coordinator of the Task Force.
- (iv) The Corporation during the current year has also organised a Workshop on

‘Decentralised Power Distribution Systems’ from 30th July to 1st August 1994 under the aegis of Ministry of Power in which experts from Power Sector in India and abroad participated. The workshop welcomed private entrepreneurship and local organisations managed by beneficiaries themselves for power distribution in rural areas. It recommended that power cooperative societies and informal organisations should be promoted for managing small generation sources for supply to remote, far-flung and difficult areas far away from the grid. It was also emphasised to provide proper training to the local people for the upkeep and maintenance to power systems.

- (v) The Corporation was able to turn around during the year and as against the loss of about Rs. 93 crore in the previous year, it made a profit of Rs. 67 crore during 1993-94. This has become possible mainly on account of increased thrust by the Corporation on recovery of its dues from the SEBs and effective execution of RE programmes.



10.4 THE NORTH EASTERN ELECTRIC POWER CORPORATION LTD. (NEEPCO)

The North Eastern Electric Power Corporation Ltd. (NEEPCO) was constituted in 1976 under the Company's Act 1956 with the objective of developing the large power potential of the North Eastern Region of the country.

10.4.1 Mission

To harness the power potential of the North Eastern Region through planned development of power generation projects.

10.4.2 Objectives

(i) In consonance with the Corporation's mission and directives issued by the Government from time to time, the Corporation's objectives are as follows :

1. To add to the power generating capacity in the North Eastern Region by installing hydro and thermal power plants within optimum time schedule and cost.
2. To ensure optimum utilization of commissioned Generation Projects so as to achieve targets projected exceeding the designed capacity based on the availability of water.
3. To generate adequate internal resources by ensuring justifiable return on investment and to continue sustained efforts to obtain the receivables from State Electricity Boards/Departments.
4. To undertake long term feasibility studies for optimum development of hydro power resources of river basins in North Region with a view to improving the share of hydro in country's powermix.

(ii) Out of a total installed capacity of 1141 MW in the Region, NEEPCO is contributing 150 MW through its Kopili Hydro Electric Projects under O & M. Inspite of having only 15% of the total installed capacity in the region the Corporation has been able to meet more than 30% of the peak demand/ energy needs of the region. The Corporation proposes a capacity addition of 635 MW within the 8th Five Year Plan in a phased manner through its projects under execution and another 320 MW in the beginning of the 9th Five Year Plan as indicated below:

Year	Name of Projects	Capacity Addition (MW)
1994-95	Assam Gas Based Power Project Kathalguri (4 G.T. Units)	130
1995-96	Assam Gas Based Power Project Kathalguri (2 G.T. Units + 3 S.T. Units)	161
	Kopili H.E. Project Ist Stage Extension (2x50 MW)	100
	Agartala G.T. (4x21MW)	84
1996-97	Doyang H.E. Project (1x25MW)	25
	Ranganadi H.E. Project (1x135MW)	135
1997-98	Doyang H.E. Project (2x25MW)	50
	Ranganadi H.E. Project (2x135MW)	270

10.4.3. Projects Under Operation and Maintenance (Completed)

(i) **Kopili Hydro Electric Project (150MW) Assam**

This Project, having an installed capacity of 150MW, is located in 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 25MW) and from Umrong Reservoir to the Kopili Power House (2x50MW).

The Khandong Power Station was commissioned in March/April '84, While Kopili Power Station in March, 88 and started commercial generation from June/ July 1988.

During the last three years, generation from this Project surpassed its rated capacity of 806 MU, with an all time high of 905 MU during 1993-94. During 1994-95, against the annual target of 850 MU, the actual generation from April '94 to Dec 94 was

793.5 MU. With this trend of generation, it is expected that the target fixed for 1994-95 will also be surpassed.

The cumulative generation since inception till Dec 94 was 5673.6 MU. The total earnings in terms of sale of power come to Rs. 320.00 crores.

(ii)

Doyang Hydro Electric Project (75 MW) (3x25 MW) Nagaland

This Project is located in the Wokha District of Nagaland. The latest Cost of the Project at Feb. '93 price level stands at Rs. 331.59 Crs. The annual generation targetted is 227 MU at the rated capacity.

Present Status

Land Acquisition : Land acquisition process for the entire Project has been completed.

Assam Gas based Power Project Kathalguri



Law and order Problems : The Project area at present is peaceful. Full strength of CISF personnel have been posted at site.

Diversion Tunnel : Boring of the entire length of 633 M tunnel has been completed. Lining works are in progress and programmed for completion by March '95. Work order for fabrication and erection of the Intake gate for Diversion Tunnel has been placed. The Diversion Tunnel will be completed in Aug. '95.

Power House : On completion of excavation works, Civil works for Power House Building have been started and Ist stage concreting for lowering D.T. Liner have been completed. D.T. Liner is under erection.

The T.G. Unit of the Power Station are being manufactured by M/s BHEL and substantial parts have already been despatched by them and received at site. Manufacturing works are proceeding satisfactorily.

Plan Allocation : Against a requirement of Rs. 75.00 Crs. for the year 1994-95, the approved allocation stands at Rs. 30.00 Crs.

(iii) **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 updated upto Feb. '93 price level and stands at Rs. 675.74 crs. The Project envisages to generate 1874 MU annually at rated capacity. The Ist 135 MW Unit of the Project is scheduled for commissioning within the VIIIth Plan period, i.e. March, 1997 and the project is expected to be fully commissioned by July 1997.

Infrastructural Development

All infrastructural development like roads & buildings construction, power and land acquisition have been completed.

Major Works

Diversion Tunnel : Work of Diversion Tunnel has been completed.

Main Tunnel : The work of Main Tunnel is progressing satisfactorily. Initial geological problems have been overcome and the bad geological stretch has been crossed. Boring of 4220 M of Tunnel length has been completed out of 10271 M. Imported Tunnelling Equipments such as Drilling jumbos, Rock Bolters and Shotereting equipments have been deployed in different faces for expediting the work.

Diversion Dam : 4 (four) bidders have been techno commercially qualified for the work and for opening of their price bids which is due on 20.12.1994. Order for Diversion Dam is scheduled to be placed by February, 95. The work is scheduled to take 48 months for completion.

Plan Allocation : Rs. 56 Crores was allocated for the year 1994-95 against proposal of Rs. 130.00 Crores.

(iv) **Assam gas based combined cycle power project (291 MW) Assam**

This Project is located in Dibrugarh District of Upper Assam. The Project was administratively approved in November 1987 for installing 6 (six) units of Gas Turbines and 3 (three) units of Steam Turbine to utilise the waste heat with a total installing Capacity of 291 MW. The latest cost as per November, 1994 price level works out to Rs. 1209.26 crores.

The required gas I MCMD shall be supplied by M/s. Oil India Ltd. from its Kathalguri Off Take Point which is 8 K.M. away from the Project site.

The Govt. of India has tied up with the Overseas Economic Corporation Fund (OECF) Japan, for loan assistance for implementation of the Project. M/s. Mitsubishi Corporation and M/s. BHEL

have been entrusted with supply and execution of the machineries as Turn-Key Contract. The Project will be fully commissioned in March, 1996 'M/s. EPDCI Japan are the Retainer Consultants for the Project.

Present Status

With the present trend of progress of erection works, the first Gas Turbine is scheduled for commissioning by February 1995 while the remaining 5 Gas Turbines subsequently at an interval of one month thereafter. The steam turbine units 1, 2 & 3 are scheduled for commissioning from November, 1995, January 1996 and March 1996 respectively.

Erection of Switchyard structures almost completed. Cable laying is in progress.

All other connected works like 8 k.m. Gas Pipe line, L.C.R. etc, are nearing completion.

(v) Kopili H.E. Project (2x50MW) - Ist Stage Extension, Assam

This Project is located in N.C. Hill District of Assam. It will involve laying of additional penstock and extension of the existing Power House Building of the Kopili H.E. Project under O&M for installation of 2(two) more T.G. Units of 50 MW each. Investment approval to the Project was accorded in May 1993 at an estimated cost of Rs. 101.97 crs. The Project, on completion, will generate 502 MU of energy annually at 90% dependable year. The Project is scheduled to be fully commissioned in August 1996.

10.4.4 NEW SCHEMES

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

This Project is located at Ramachandranagar in West Tripura District in the state of Tripura, 15KM away from Agartala. The

Project envisages installation of 4 Gas Turbine Units of 21MW each at a cost of Rs. 264.72 Crs. Clearance for the Project has been accorded in Nov. '94.

Present Status

The Govt. of Tripura has allocated 141.86 acres of land for the Project. Contour survey of the project area and subsoil investigation have been completed & design/ preparation of specification for civil structures for inviting tenders are under finalisation. Site development work is in progress. Letter of Award for Main Plant alongwith credit package has been issued to M/s European Gas Turbine, Gmbh, Germany on 10.12.1994. The Credit package includes a long-term loan of 660,72,000 DM from Deutsche Bank, Germany and a medium term loan of 65,90,000 DM from Deutsche Bank, Singapore. These loan packages correspond to Rs. 143.29 Crores in equivalent Indian Currency.

10.4.5 Investigation Schemes

Collection of Hydrometeorological data and other investigation works for the following schemes of NEEPCO are being continued.

1. Ranganadi H.E. Project (Stage-II) 100MW - Arunachal Pradesh
2. Papumpam H.E. Project (100 MW) Arunachal Pradesh
3. Dikrong H.E. Project (100 MW) Arunachal Pradesh
4. Kopili H.E. Project (Stage-II) 25 MW, Assam
5. Pakke H. E. Project (75 MW) Arunachal Pradesh
6. Dhaleswari H.E. Project (120MW) Mizoram
7. Upper Lohit Hydro Electric Project (500 MW) - Arunachal Pradesh

8. Tuivai H.E. Project (210 MW) Mizoram
9. Kameng H.E. Project (600 MW) and Damwe H. E. Project (520 MW) Arunachal Pradesh

10.4.6 Financial

The authorised share capital of the Corporation is Rs. 500 crores. Due to substantial increase in capital outlay to cope up with financial requirement for the ongoing projects it is proposed to raise the authorised share capital from Rs. 500.00 crores to Rs. 15000 crores. A loan of Rs. 10.00 crores was raised from LIC during 1993-94. The total paid up capital and loan as on 31st March, 1994 stood at Rs. 643.36 crores and Rs. 372.91 crores respectively including deferred credit of Rs. 9.84 crores and bonds of Rs. 43.50 crores. The company has received loan from Govt. of India during the year 1993-94 to the extent of Rs. 86.84 crores. A sum of Rs. 9.98 crores has been repaid during the year (1993-94) as per agreement.

The net profit against Khandong and Kopili Power House generation during 1993-94 worked out to Rs. 15.91 crores against a net profit of Rs. 11.55 crores during 1992-93, thus registering an increase of 27.4%.

View of Division Tunnel lining already finished



10.5 POWER FINANCE CORPORATION LIMITED (PFC)

- (i) The Power Finance Corporation Limited (PFC) was incorporated on July 10, 1986 with the objective of providing term finance to Power Utilities and to 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. In view of the fact that the Power Sector in the 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), State Generation Corporations (SGCS) and to State Power Departments. The funds provided by the Corporation are in the nature of additionality to Plan allocation and based on the merits of the individual projects.
- (ii) The following major areas have been identified by the Corporation for providing financial assistance on priority basis :
 - a) Power System improvements, such as installation of capacitors;
 - b) Improvement in Power Distribution in the urban areas;
 - c) i) Renovation & Modernisation of Transmission Systems.
ii) New Transmission Systems.
 - d) Renovation & Modernisation of Generation Projects.
 - e) Generation Projects.
- (iii) In addition, PFC has also been giving loans for ancillary activities such as systems for better metering, billing and collection of dues, communication projects, computerisation of power operations etc.

Lending Criteria

PFC lends to projects that meet the following criteria :

- (a) are economically justified, with a rate of return of not less than 12%;
- (b) are technically sound;
- (c) are technical solutions proposed must be least-cost;
- (d) are compatible with existing expansion plans;
- (e) solutions proposed should meet Central Government's or State Government's environmental impact standards, whichever are more stringent;
- (f) schemes should have all the clearances required by the State and Central agencies; and
- (g) utilities which have prepared OFAPs (plans for improvement of their operational and financial activities), to the satisfaction of PFC and have obtained the approval of the Board of the borrower and the concerned State Govt. to such a plan.

10.5.1 Highlights of Operations

The operations of the Corporation, as on 30th November, 1994, included new loan Sanctions during the year 1994-95 of the order of Rs. 1288.29 crores, for a wide variety of power projects in the various parts of the country, and progressive disbursements of loan installments. As on the 30th November, 1994, the authorised capital and the paid-up (equity) capital of the Corporation stood at Rs. 2000 crores and Rs. 1030.45 crores respectively. The profit (provisional), as on 30.9.94, was about Rs. 61.96 crores.

10.5.2 External Assistance

(i) Loan from World Bank

Significant progress was made during the

year in approval of schemes, initiation of procurement action and placement of orders with regard to the loan of US\$ 265 million from the World Bank for Power Utilities Efficiency Improvement Project, routed through the Government of India, which loan had become effective from 18.3.1992. During the year, orders for packages worth US\$ 63 million were placed by the various beneficiaries of the loan.

(ii) Loan from Asian Development Bank

The loan of US\$ 250 million from ADB under the Power Efficiency (Sector) Project routed through the Government of India, had become effective from the 22nd July, 1992. The loan is to be used for financing sub-projects of selected SEBs in certain specified categories. Significant progress was made, during the year, in approval of schemes, initiation of procurement action, issue of LOI etc. Upto 30.11.94, total amount of sub-loans sanctioned under the above loan for 99 projects was Rs. 899.79 crores, having an ADB share of Rs. 535.99 crores.

(iii) Complementary Loan from ADB

The complete loan amount of US\$ 60 million and Japanese Yen 7500 million had been drawn and disbursed to the two beneficiaries viz. APSEB and TNEB for Rayalseema Thermal Power Project and North Madras Thermal Power Project respectively.

(iv) French Credit

Out of the total loan amount of FF 304.74 million, an amount of FF 302.62 million had been utilised upto 30.11.94. For the utilisation of the small remaining amount, French authorities were requested to further extend the utilisation period upto 31.12.94.

(v) U. K. Grant

Govt. of United Kingdom had offered financial resources in the form of grant to

Govt. of India for utilisation in power projects. Out of these, proposal of PFC for earmarking 27 million for a major project was agreed to. The Overseas Development Agency (ODA)/ British High Commission signed an agreement with Govt. of India on 17.9.93 for Energy Efficiency Programme under which renovation of Hirakud Hydroelectric project of OSEB was approved. The grant, which will be provided by Govt. of India to PFC as loan, will be further on-lent to OSEB. PFC has since approved a loan of Rs. 78.80 crores to OSEB on 17.5.94 and would start progressively disbursing the loan amount in 1994-95. In the mean time, PFC has posed to ODA, a number of other power projects for further utilisation of the grant.

(vi) German Loan

Significant progress has been made in obtaining financial assistance from KFW of Germany. Renovation & Upgradation scheme of Koyna Hydro-electric project of MSEB has been already approved for this purpose, and negotiations are underway for finalisation of KFW loan.

10.5.3 EMCAT Project

A Project on Energy Management Consultation and Training (EMCAT) by PFC was made operational in March, 1992, with the objective to bring about overall improvement in the efficiency of the energy supply component of the power sector. This is being implemented with funding amounting to US\$14 million from USAID. The main activities of this project are training of power sector personnel, both in India and USA, and technical studies and services by Indian and U.S. Consultants. Under this project, the Corporation organised a number of training programmes for personnel of State Power Utilities and PFC within the country. Preliminary action was also taken to organise similar courses on specialised

subjects for such personnel in USA. In addition, the Corporation organised workshops on the following critical areas of the power sector :

- (i) Power Thefts.
- (ii) Transmission & Distribution Losses.
- (iii) Metering, Billing and Collection.

These workshops were organised through Base Papers formulated by Consultants, and generated a wide participation from the State Power Utilities, the State Energy Departments, Central Power Undertakings and international funding agencies, among others. The recommendations stemming out of these workshops were sent to all the concerned agencies for consideration and implementation.

10.5.4 Institutional Development of Borrowers

PFC continued its endeavour to improve the operational and financial health of the borrowing entities through the formulation and implementation of Operational and Financial -Action Plans (OFAPS) for them. PFC had identified efficiency improvement and institutional strengthening as the key areas which need to be given impetus in the State Power Utilities. With this end in view, diagnostic studies to find out the weaknesses in technical, financial, managerial and also structural areas, had been conducted. Based on these findings, OFAPs had been formulated and accepted by the respective State Governments for 18 SEBs/SGCs. An OFAP has also been formulated in respect of one municipal power utility. The exercise for revision of OFAPs has also been taken up for seven Utilities, where these plans had been formulated long back. Revised OFAPs have been prepared for three utilities viz. APSEB, GEB and MPEB, and sent to the respective State Govts. for approval. Similar exercise for revision of existing OFAPs has been taken up for four other utilities viz. TNEB, KEB, MSEB and HPSEB.

10.5.5 Life Extension Studies

PFC has drawn up ambitious plans to help infuse new life into obsolete power generating units which had completed more than 1,00,000 working hours. PFC has identified 26 such Thermal Power Stations (TPS). The plan is aimed at augmenting the PLF of such old power stations with minimum investment as well as to extend their life by 15 to 20 years. Renovation of existing power generating units has been found to be a very cost-effective and feasible solution to bridge the gap between the demand and supply of power. The Corporation has already taken the initiative of coordinating a Model Life-Extension Study at Chandrapura TPS of Damodar Valley Corporation. This study is being carried out by Tennessee Valley Authority of USA, under the EMCAT programme of USAID.

10.5.6 Cell For Pre-Investment Supports

In line with the present scenario, PFC, apart from project financing that it had been undertaking, established two loans with the World Bank assistance viz. the Technical Assistance Project (TAP) for Private Power Development and the Pre-Investment Fund (PIF), amounting to US\$20 million and US\$14 million, respectively. The former had been established primarily to give an impetus to the Private Power Development through providing financial assistance to the State Electricity Boards (SEBS) for hiring the services of consultants to assist and advise the SEBs in negotiating Power Purchase and other related agreements with the independent Power Producers and to help them privatise any existing facilities. The PIF, on the other hand, will provide financial assistance to SEBs and SGCs for Project Preparation and other preinvestment actions. In order to handle the above two loans effectively, a Cell for Preinvestment Supports (CPIS) has been set up within PFC. The Cell has been assisting

the Power Utilities in identifying the need for undertaking various types of studies through the hiring of consultants, formulation of loan proposals, making available information about the consultant's competence to assist and advise the Utilities on the various objectives stated above, and help them in the selection of consultants. The Cell has been closely interacting with the Utilities and helping them in processing the loan applications and obtaining approvals of the World Bank wherever required. As on November 30, 1994, 34 loan schemes amounting to Rs. 45.87 crores had been sanctioned under the PIF and 4 loan proposals for Rs. 15.20 crores had been sanctioned under the TAP for Private Power Development.

10.5.7 Concern For Environment

In order to identify and help Power Utilities initiate time-bound Environment Upgradation Action Plans, pollution control measures and other plant-specific proposals to improve the environment, an Environmental Assessment and Monitoring Unit had been set-up in PFC. High priority is being attached in these action plans to the environmental awareness and control of such emissions and discharges from thermal stations as lead to environmental hazards. In all, 12 Thermal Power Stations have been reviewed from the environmental impact angle. World Bank has reconducted environmental review of one of the sample stations, which was earlier done by PFC, and was fully satisfied with the concept and procedure adopted by PFC.

10.5.8 Future Plans

With over Rs. 7,000 crores sanctioned (till November, 1994) as term loans for various Power Projects in about seven 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 implementation of OFAPS. In the immediate future, PFC intends to assume a large role for itself in the power sector, both in the category of its borrowers as well as in the areas of 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. As regards the additional services to be offered to its beneficiaries, PFC intends to progressively offer the following facilities after mobilising additional resources and making institutional arrangements :-

- a) Leasing of power equipment, for which a scheme has been drawn up;
- b) Foreign exchange services, for which PFC has obtained permission from RBI.

*Tiruchengodu 110/22 KV SS 110 KV
Switchgears & Transformers*



10.6 POWERGRID CORPORATION OF INDIA LIMITED (POWERGRID)

POWERGRID

Powergrid was incorporated in 1989 with an initial authorised share capital of Rs. 5.0 crores as an outcome of the restructuring process of the Indian Power Sector. It evolving as an amalgamating force, policy the best of transmission expertiser available for various organisations in the power sector.

10.6.1 Mission

Establishment and operation of regional and national power grids to facilitate transfer of power within and across the regions with reliability, security, economy and on sound commercial principles.

10.6.2 Objectives

The corporation has set out the following objectives in line with its mission.

- Efficient operation and maintenance of transmission system.
- Strengthening of regional power grids and establishment of inter-regional links leading to the formation of a national power grid.
- Establishment/ augmentation of regional system co-ordination centres (RSCC) and communication facilities.
- Introduction of a rational tariff structure for the exchange of power.
- Establishment of power pools to facilitate exchange of power between states/regions.
- Achievement of constructive cooperation and building of professional relations with stakeholders, peers and other related organisations.

10.6.3 Towards a National Power Grid

- (i) In accordance with the Government's decision of transferring the transmission systems from various Central/ Centre-State

joint Venture organizations, an Ordinance was promulgated by Government of India on January 8, 1993, for the de-jure transfer of assets from National Thermal Power Corporation Limited (NTPC), National Hydro-electric Power Corporation Limited (NHPC) and North Eastern Electric Power Corporation Limited (NEEPCO) with effect from April 1, 1992. The ordinance was replaced by the 'NTPC, NHPC and NEEPCO, Transfer of Assets Bill 1993', which was passed both in the Lok Sabha and the Rajya Sabha on March 16, 1993 and March 23, 1993, respectively and assented to by the Hon'ble President of India, and has also been published in the Gazette of India on April 2, 1993 as Act No. 24 of 1993. Similarly, the transmission system associated with Neyveli Lignite Corporation Limited (NLC) has been transferred to POWERGRID by way of Act No. 56 of 1994 dated September 14, 1994 with retrospective effect from April 1, 1992.

- (ii) While in the case of NJPC, no separate agreement was required as their transmission work was handled by NHPC, the transmission business of Nuclear Power Corporation including ongoing and new projects has also been taken over by POWERGRID on August 28, 1991. The Memorandum of Understanding (MOU) for transfer of assets with THDC was signed on October 27, 1993. However, the manpower associated with the transmission system was transferred with effect from August 1993.

10.6.4 Organisational Development and Consolidation

After successful completion of the first phase of POWERGRID's establishment and development, comprising taking over of the transmission assets of all Central Generating Companies in 1993, POWERGRID has now embarked on the second phase of its development. The management of the Southern Regional Load Despatch and Communication Centre (SRLDC) located at

Bangalore, was taken over by POWERGRID on January, 1, 1994. Accordingly, Eastern & North-Eastern Regional Load Despatch and Communication Centres (ERLDC & NERLDC) and Northern & Western Regional Load Despatch and Communication Centres (NRLDC & WRLDC) are scheduled to be transferred to POWERGRID by January 1, 1995 and by January 1, 1996 respectively.

10.6.5 Construction Performance

- (i) Construction performance for the year 1993-94, has been commendable and surpassed the MOU target set for the year by stringing 1,115 Circuit Kms of transmission lines and commissioning of 2,140 MVA of transformation capacity against targets of 1,088 Circuit kms of stringing and 1,890 MVA of transformation capacity respectively. With the above achievements, POWERGRID earned the "Excellent" Rating as per its MOU with the Ministry of Power for the year 1993-94.
- (ii) During 1993-94, POWERGRID completed/commissioned six 400 KV lines and one 220KV line. It also completed/commissioned six new sub-stations. Most of these lines have been completed well ahead of their respective linked generation units. The timely/ahead of schedule completion of POWERGRID's Transmission Lines and sub-stations has come as a result of the effective project management including special monitoring done by top management at the critical stages.

10.6.6 Construction Programme for 1994-95 and the Progress is as follows :

S. Activity	Target 1994-95	Achvmt. 01/95	Addn/ Likely Achvmt. 02/95	Total Likely Achvmt Till 03/95 (antici- pated)
1. Stringing (CKM)	1230	1215	30	1250
2. No. of Transformers	1	1	-	2
3. Transformation Capacity in MVA	315	315		630

Following Lines/substations have been completed till end of Nov. 94

1. Salal - Kishenpur - Sama 220 KV, D/C
2. Hissar - Hissar, 220 KV, D/C
3. Salal - Jammu, 220 KV, S / C
4. AT-2 at Hissar S/S (315 MVA)
5. Kathlguri-Mariani 400 KVDC

Following additional Lines are expected to be completed till end of March., 95.

1. Dimapur - Imphal, 132 KV, S/C
2. Dimapur - Misa, 220 KV, D/C

10.6.7 Operational Performance

- (i) As on March 31, 1994, a total of 23,500 Circuit kms. of 400/220/132 KV transmission lines and a total transformation capacity of 20,600 MVA which includes capacity of

Converter Transformers in HVDC system, distributed over 47 sub-stations, are under operation. The operational performance of POWERGRID transmission system has been very impressive in all the five power Regions. Overall Regional average availability of transmission lines during the year 1993-94 was 97.58%, excluding NER.

Yearly Percentage Line Availability

year	Total Excluding NER	NER
1990-91	96.36	88.40
1991-92	97.67	88.50
1992-93	98.28	95.60
1993-94	97.57	96.35
1994-95 (April'94 - October'94)		
(Anticipated upto 31.03.95)	97.80	94.20

TRANSMISSION LINES AND SUB-STATIONS UNDER O&M AS ON 22.11.94

Region	No. of Substations	Total Ckt. Kms.			Total	Transformation Cap. (MVA)
		400Kv	220Kv	132Kv		
NRI	5+3#	6063*	1546		7609	7279*
NR II	4	1190	609	-	1799	2010
SR	15	5457	64	-	5521	5999
ER	13	2572	1158	-	3730	6060
WR	3	4234	828	-	5062	630
NER	6	-	218	695	913	25
Total	49	19516	4423	695	24634	22003

* Includes 1630 KM of 500kv HVDC Rihand Dadri Line

Includes three HVDC terminals

* Includes 4344 MVA in HVDC systems

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- (ii) POWERGRID has developed adequate expertise for Hot Line maintenance of transmission lines. This technique has been presently 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 was the main reason for transmission line breakdowns. These measures have enabled POWERGRID to achieve higher availability figures for the transmission system.

10.6.8 Financial Performance

- (i) The Financial Performance of the Corporation has been satisfactory for the Financial Year 1993-94. During the year the finances of the Corporation got streamlined with reconciliation of accounts with the transferor organisations namely NTPC, NHPC and NEEPCO, as also the transfer of assets from NLC, and Salal-I Project of NHPC located in the state of Jammu & Kashmir. Government of India approval was obtained for Capital Restructuring of the Organisation by converting Rs. 567.50 crores of GOI loans into equity, and consequent reconciliation of interest payments with the Controller of Accounts of the GOI. As a result of this capital restructuring, the debt-equity of the company has improved to a healthy ratio of 44:56.
- (ii) The Gross Block of the Corporation increased by Rs. 708 Crores during 1993-94 which includes Rs. 366 Crores of Gross Block transferred from NLC. The revenue for 1993-94, however, has grown marginally to Rs. 648.76 crores, compared to Rs. 634.06 crores during the last financial year 1992-93. The profits of the Corporation during 1993-94 works out to Rs. 187.88 crores. During the year an amount of Rs. 200 crores has been transferred to the General Reserve Account.

10.6.9 Capital Re-structuring

This Capital Restructuring has led to loans amounting to Rs. 567.50 crores being converted to equity, resulting in an appropriate debt-equity ratio of 44:56 now. This Capital Restructuring will also end to increased retained earnings of the Corporations on this account by Rs. 71 Crores every year, and increased annual internal resource generation by more than Rs. 100 Crores, leading to reduced dependence of the Corporation on the net budgetary support of the Government.

10.6.10 Funds Mobilization from International Financial Institutions

- (i) The World Bank has extended a new loan of US\$ 350.0 million directly to POWERGRID, which is the first of its kind to be granted to any Central Transmission Agency by the World Bank. The total World Bank Loan commitments to POWERGRID, including the transmission related loans transferred from NTPC and NHPC, amounts to US\$ 1,479.5 million. During the year, the process of World Bank loan transfer from NTPC and NHPC have also been completed with the signing of Loan Agreements, Project Agreements and Subsidiary Loan Agreements. Further, the World Bank has expressed happiness and reposed faith in POWERGRID, for its performance and commendable institutional growth with the excellent development progress made in all sphere of its activities and has indicated its interest in financing another project of POWERGRID to the extent of about US\$ 400 million. Presently, the World Bank is conducting pre-appraisal studies for this future loan.
- (ii) ADB also, has shown interest to extend financing to the extent of about US\$ 250 million. In the last year OECF has sanctioned J¥ 3.5 billion towards the Faridabad transmission project which takes

the cumulative amount of loans so far sanctioned to POWERGRID by OECF to ¥ 24.2 billion for the Gandhar, Kathalguri and Faridabad transmission projects.

- (iii) For financing the Chandrapur HVDC Backto-Back Project, four Loan Agreements total amounting to about FF 396 million and UK £ 59.69 million were concluded and signed during the year. This includes a soft loan from the French treasury amounting to FF 172 million. In addition, an ODA grant of 65.0 million pound sterling has also been sanctioned for financing the same project, as also to provide Technical Assistance for developing systems in certain critical areas.
- (iv) POWERGRID has also signed a loan agreement with the European Investment Bank amounting to ECU 55 million (about Rs. 198 crores) on the 17th of December, 1993. This loan to be utilized for cofinancing Southern Region Load Despatch Centre Project, is the first loan from the European Investment Bank to an Asian country and will go a long way to implement the SRLDC project in time. The European Investment Bank has further indicated its interest in funding some other projects of POWERGRID to the extent of ECU 100 million, as also its willingness to participate in the POWERGRID joint Venture equity.

10.6.11 Funds Mobilization from Domestic Financial Institutions

Subsequent to the excellent credit rating of A1(A one) assigned by Investment Information & Credit Rating Agency of India Limited (ICRA), POWERGRID came out with a Commercial Paper issue amounting to Rs. 67 crores in two tranches which was fully subscribed by the bankers. Similarly POWERGRID was successfully able to raise bonds worth Rs. 250 crores on private placement basis after they were credit rated as high safety investment instruments at LAA + (L double A plus) by

ICRA. A term loan of Rs. 150 crores has also been sanctioned to POWERGRID by UTI.

10.6.12 Project Approvals

In the last year, POWERGRID made significant investment decisions regarding various transmission projects. Major projects for which investment approvals were obtained during the year are :

- i) Kopili Stage I Extension Transmission system
- ii) Kishenpur-Monga Transmission System
- iii) Chamera-Kishenpur Transmission System
- iv) Agartala Transmission system
- v) Chandrapur HVDC Project
- vi) Ganga Valley (Tehri) Transmission System
- vii) Augmentation of Central Transition system in Northern Region
- viii) Augmentation of Central Transmission system in Southern Region
 - a) Installation of Auto Transformers
 - b) Installation of Reactors
- x) Kaiga Transmission system
- xii) Balipara-Tenga Transmission system

10.6.13 Annual Plan

The annual outlay prepared for the financial year 1994-95 for POWERGRID is Rs. 1,110.75 crores. This will fund construction of various sanctioned ongoing schemes besides some of the new schemes which are presently in the advanced stages of investment approval.

10.6.14 Design and Engineering

Foundation stone of 1,000MW (2x500 MW blocks) of HVDC back to back link at Chandrapur, one of the largest size plant of its kind in the world, was laid down by the Hon'ble Prime Minister Shri P.V.

Narasimha Rao on December 25, 1993. Since then activities relating to design and engineering of this project have commenced and this link shall become operational by end of 1996. This shall be another big step towards formation of the National Power Grid.

Design and Engineering for India's first 800 KV Line between Kishenpur and Moga and 400 KV double circuit lines in hilly and snow-bound areas associated with the Nathpa-Jhakri and Koldam were completed and technical specifications finalised.

Endeavour has been made to further improve the performance of the Rihand Delhi HVDC link by making good deficiencies in the AC system.

10.6.15 System Planning and Studies

- i) A "Manual on Transmission System Planning Criteria" was finalised in association with CEA.
- ii) Feasibility for evolving transmission system of Private sector projects viz. IB Valley TPS, Mangalore TPS, Teesta HEP and Wardha TPS was undertaken.
- iii) The scheme for evolving EHV interconnection between Indian Power system with that of Bangladesh and Nepal was studied.

10.6.16 R & D Activities

- i) Development of a "Real Time Digital Simulator" has been taken up in association with the Indian Institute of Technology (IIT), Kharagpur. This will help in real time monitoring of power system and provide operational support.
- ii) Design for upgradation of 132 KV double circuit line into 400 KV single circuit was developed.

- iii) The project on performance of insulator strings with failed disc insulators taken up with association of CPRI was completed. The project on electric and magnetic field measurement of AC and DC line and 400/220 KV Sub-stations taken up in association with CPRI is in progress.
- iv) Software for selection of distance protection relay settings was developed.

10.6.17 Introduction of New Technologies

All Aluminium Alloy Conductors (AAAC) and Polymer insulators are being proposed to be used for the Ramagundam-Hyderabad 400 KV AC line for trial experience. Besides, long rod insulators are also being proposed to be introduced as alternative to conventional disc insulators.

Optical Fibre Ground Wire (OPGW) is proposed to be used on some of the forthcoming 800 KV/400 KV transmission lines with a view to proving efficient and reliable communication system.





B. JOINT VENTURE CORPORATIONS

10.7 TEHRI HYDRO DEVELOPMENT CORPORATION (THDC)

- (i) 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 District of U.P. and also to plan, promote and organise the development and harnessing of such other hydroelectric sites/projects in Bhagirathi, Bhilangana valley as may be entrusted to the Corporation by the Government. The Corporation has an authorised share capital of Rs. 1200 Crores.
- (ii) The Corporation is presently engaged in the implementation of Tehri Dam Project since June 1989 after the works were transferred to it by Government of U.P. The Tehri Complex is located on river Bhagirathi envisaging construction of two dams, one just downstream of Tehri Town and other at Koteshwar, 22 Kms downstream of main dam. The components of Tehri Hydro Power Complex and their estimated cost is as under:

Components	(Rs. in Crores)	
	Base - March 93.	
	Estimated Cost	
	Irrigation	Power
(a) A 260.5 mtr. Rockfill Dam & Hydro Power Project (Stage-I of the Complex) with a concrete Spillway and a 1000 MW (4x250 MW) Hydro Power Plant.	563.00	2252.00
(b) A concrete Koteshwar Dam down-stream of Tehri with a Hydro Power Plant of 400 MW (4x100 MW).	-	725.00

- (c) A 1000 MW Pump Storage Plant at Tehri. - 1224.00
- (d) Power Transmission system for evacuation of Power from the Complex. (To be implemented by Power Grid Corporation) - 819.00

	563.00	5020.00
Total Cost (Irrigation & Power)		5583.00

10.7.1 Project Clearance

The complex was initially to be funded by erstwhile USSR to the tune of 1000 Million Roubles, as per the Indo Soviet Agreement of 1986. Due to political changes in USSR, the funds were no longer available. In view of resource constraint, Government of India has on 15.3.1994 approved implementation of Stage-I of the project only at present, i.e. Tehri Dam & HPP (1000 MW), alongwith minimum essential works of P.S.P. & ongoing commitments of Koteshwar Dam & HPP and the Associated transmission system for evacuation of power at following costs

(Rs. in Crores)	
Components	Cost
1. Tehri Dam & HPP (Stage-I)	2815.00
2. Committed works of Koteshwar Dam & HPP.	34.36
3. Essential works of Tehri PSP	114.30
Total	2963.66
4. *Associated Transmission system	371.00
Grand Total :	3334.66

*To be executed by Power Grid Corporation through its own resources.

10.7.2 Tehri Dam & HPP Stage-I

Tehri Dam & HPP, Stage-I comprises of the following major components :

- * 260.5m high earth and rockfill dam at Tehri.
- * 4 nos. diversion tunnels 11 m dia each.
Total length : 6.3 km.
- * 1000 mw underground power house having four conventional turbine generator sets of 250 mw each.
- * Water conductor system for power house comprising 2 nos. 8.5 m dia each head race tunnels, 4 nos. pressure shafts, 2 non. tail race tunnels etc.
- * A concrete chute spillway, with 3 bays of 10 m span.
- * 4 nos. shaft spillway - two ungated on the right bank and two gated on the left bank.
- * An intermediate outlet for controlled filling of the reservoir and for irrigation releases when the power house is shut down.

10.7.3 Benefits

Tehri Dam & HPP Stage-I is a multipurpose project catering to the needs of power generation, irrigation and drinking water. The main benefits from the Stage-I when completed are :

- Addition to the installed capacity in Northern Region: 1000 MW
- Annual energy availability (peaking) 3568 Million Units
- Additional irrigation in 2.7 lac hectares besides stabilisation in existing 6.04 Lac ha.
- 162.0 million gallons of water per day for drinking water supply to Delhi.
- 108.0 million gallons of water per day for drinking water supply by the towns and villages of Uttar Pradesh.

- Integrated development of Garhwal Region, including construction of a new hill station with provision of all possible facilities; improved communication, education, health, tourist traffic, setting-up of nonpolluting industries, development of horticulture, fisheries, afforestation of the Region etc. much to the advantage of the people of that region.

10.7.4 Status of Project Works

Considerable physical progress has been made on Stage-I works. The present status of the project is :

- All the four diversion tunnels have been completed and the river diverted through the two Right Bank Tunnels.
- The foundation of the main dam over the entire length of 1.1 km. has been laid and the Cofferdam as well as main dam have been raised upto 15 mtr. above the river bed level
- Various infrastructural works have been completed at the project site.
- Excavation of four numbers (two each for HPP Stage-I & PSP) Head Race Tunnels of 8.5 meters diameter each, with a total length of 5190 meters have been completed and lining work is complete in Stage-I tunnels while it is partly done in tunnels for PSP.
- Approach adits to underground power station cavern also completed.
- First Stage rural rehabilitation for the rural area coming under submergence due to construction of coffer dam has been completed. Works for establishment of New Tehri Town which is already partly inhabited, are in advance stage of construction and are expected to be ready by end of June '95.
- All the studies required by MOEF relating to environment protection have been completed and submitted to

MOEF. These indicate that no environmental damage would be caused by the construction of the project.

- As on date, Compensatory Afforestation in about 4300 ha. and Catchment Area Treatment in about 23,900 ha. have been completed.
- Work for raising of Cofferdam has been awarded and the coffer dam is expected to be ready by June 1995. Tenders for major Civil works like Dam, Power House & Spillway have been invited and works are expected to be awarded by March to June 1995. For electromechanical equipment, negotiations are going on with a Consortium of manufacturers from Russia & Ukraine under leadership of Hydro-project Institute Moscow.
- An expenditure of Rs. 931.21 crores has been incurred on the project works upto January, 1995
- The project is envisaged to be commissioned by March 1999.

DAJ ADIT to head Race Tunnel



10.8 NATHPA JHAKRI POWER CORPORATION LTD.

Nathpa Jhakri Power Corporation was incorporated on 24th May, 1988 to plan, promote, organise, execute, operate and maintain hydroelectric power projects in the Satluj river basin in Himachal Pradesh. The authorised share capital of NJPC is Rs. 1000 crores and equity-loan ratio is 1:1. This Project is a joint venture of Government of India and Government of HP both share the cost of the project in the ratio of 3:1 respectively.

10.8.1 Nathpa Jhakri Hydro-electric Project

The Nathpa Jhakri Power 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 :

- (i) 60.50 m high concrete dam on Satluj river at Nathpa to divert 405 cumecs of water through four intakes. Being a diversion dam there is neither the impoundment and resultant displacement of population, nor deforestation.
- (ii) the half a km. underground desilting complex to prevent sediment particles above 0.2 mm from entering into the head race tunnel and in-turn into the turbines, would be among the largest such complexes in the World. It will comprise of four chambers each 525 m long, 16.31 m wide and 27.5 m deep.
- (iii) a 10.15 m diameter and 27.30 km. long head race tunnel (HRT), one of the largest hydro power tunnels in the World.
- (iv) the 301 m deep orifice type surge shaft located at the intake of the penstocks would be one of the deepest surge shaft in the World.
- (v) an underground Power House with a

cavern size of 222 m x 20 m x 49 m having six Francis Units of 250 MW each would be the largest underground power complex in the country.

- (vi) 10.15 m diameter and 1080 m long tail race tunnel to lead the water back into the river Satluj.

10.8.2 Project Commissioning Schedule-benefit

The Project comprising six units of 250 MW each is scheduled to be commissioned progressively by October, 1999. 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.

10.8.3 Project Cost

The approved cost of the Project is Rs. 4337.95 crores at March, 1993 price level (this includes Rs. 648.69 crores as interest during construction). 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.

10.8.4 Major Civil Works and Electro-Mechanical Package - Award

The four major civil packages of (i) Dam, Intake and Desilting complex (ii) 16 kms HRT and works at shoulding (iii) 11 kms of HRT and Surge shaft and (iv) Power-House Complex costing Rs. 2040 crores have been awarded to three international Consortia each of whom has an Indian Construction Company as its partner. Besides the above civil packages, NJPC has also awarded a Rs. 475 crores contract for the Electromechanical package Generating equipment to an European Consortium of firms led by M/s ABB (Germany) with BHEL, as one of the partners. The contract was signed on 24th March, 1994 and has become effective after release of 15% initial advance

with effect from 1st Nov. 94 with a commissioning schedule of October, 1999.

10.8.5 Main Project Execution

Implementation of major civil works is in progress with the three joint ventures of Indian & Foreign construction companies who have been awarded the four major packages having mobilised at project site, bringing in equipment commensurate with larger scope of work.

In the dam complex area, out of the 700 mtrs. of 8 mtrs. dia diversion tunnel, 673 mtrs. have been completed which will pave the way for diverting the river facilitating the dam construction. In the desilting complex, 335 mtrs. of approach adit excavation has been completed.

In the 10.15 mtrs. dia HRT about 3 k.m. of tunnel excavation has been completed. On the surge shaft over 27 m. out of 80 mtrs. overburden excavation and first layer concreting has been completed. In the Power House Complex, crown excavation of the Power House is nearing completion. The project work has been taken up in almost all the fronts by the major civil contractors.

10.8.6 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 48 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 are in process. Out of the families who have lost their houses, 30 families have already been compensated.

C. STATUTORY BODIES

10.9 DAMODAR VALLEY CORPORATION (DVC)

- (i) The Damodar Valley Corporation (DVC) was established on July 7, 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 functions 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 hydroelectric 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 and promotion and control of navigation.
- * 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.

- (ii) The Corporation has so far constructed four multi-purpose 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.

(iii) Existing Power Plants Thermal

Bokaro 'A'	190 MW (3x50 MW) (1x40 MW)
Bokaro 'B'	630 MW (3x210 MW)
Chandrapura	750 MW (3x130 MW) (1x210 MW)

Gas Turbine	
GTP, Maithon	82.5 MW (3x27.5 MW)

Hydel	
Tilaiya	4 MW (2x2 MW)
Maithon	60 MW (3x20 MW)
Panchet	80 MW (2x40 MW)

DVC's Transmission system runs to a total length of 5256 CKT Kms long comprising of 1019 CKT Kms 220 KV lines, 3342 CKT Kms 132 KV line, 895 CKT Kms 33 KV lines.

DVC's soil conservation activities have already covered an area of three lac hectares of affected areas. More than 8,000 check-dams have already been constructed for controlling run off soil and providing small irrigational facilities.

10.9.1 Overall performance and achievements

- (i) The improved generation trend has been maintained by DVC during April-November, 1994 which touched 4578 MU against 4251 MU generated during the corresponding period of 1993-94. Turnover has also increased to Rs. 623.04 crores during April-November '94. Turnover has also increased to Rs. 623.04 crores during April-November '94 (which was Rs. 571 crores in April-November '95) and profit to Rs. 91.64 crores (against Rs. 76.67 crores during April-November '93). Sale of power during April-November 1994 was 4452 and specific oil consumption level was 13.81 ml/kwh.

(ii) Year at a glance (April-November '94)	
Generation (MU)	4578
PLF (%)	37.56
Specific Oil Consumption (ml/kwh)	13.81
Sale of Power (MU)	4452
Turnover (Rs. in crores)	623.04
Profit (Rs. in crores)	91.64
Target generation for 1994-95	7500 MU

(iii) **MEJIA TPS (3x210 MW) :**
Power House Cumulative progress upto Nov. (94)

	Civil work	Str. Steelerc.	Mill Bay: Str	Boiler Erec.	TG Erection
Unit -1	93.5%	99.2%	98.0%	67.5%	47.3%
Unit -II	79.5%	84%	50%	35.2%	-
Unit-III	67%	4 %	Started in 11/94 10% (Aux.Boiler)		

(iv) **Bokaro'B' Stage-II (2x210 MW)**

Unit - 2 : Under Commercial Operation
w.e.f. 15.12.91.

Unit - 3 : Declared as under commercial
operation w.e.f. 1.4.94.

Residual works in Rapid Coal Transportation
system are under progress.

(v) **Bermo Mines :**

Bermo Coal Mine, abandoned since 1988 and
reactivised in September '93 has been raising
coal for Supplying to Bokaro TPS. The mine
has already raised a record quantity of 2180
MT of coal on October 22nd, 1994.

(vi) **Panchet Hydel Unit-II (1x40 MW)**

(a) Actual from 4/94
to 11/94

Turbine mode : Under commercial
operation w.e.f. 11.4.91.

Tail Pool Dam : Concreting work
commenced on 20.12.93
and has been continuing
despite (for pump mode
operation) minor
interruptions.

Cumulative

progress achieved :

Earth Dam & Dyke :

Cut-off wall : 229 M out of 434 M

Earth work : 5000 M³ out of 600000
M³

Concrete spill way :
Excavation : 45000M³ out of 91000
M³

Concreting : 1800 M³ out of 60000
M³

b) Estimated/Projected
work from 12 / 94 to 3 / 95
Earth Dam & Dyke :

Cut-off wall : 40000 M³

Concrete spill way :
Excavation : 20000 M³

Concreting : 2000 M³

10.9.2 Power Generation and PLF

During April-Nov.'94 DVC generated 4577.78
MU which was around 8 per cent more than
the power generated during the corresponding
period of 1993-94. Total Thermal generation
during the period was 4200 MU while Hydel
stations contributed 362.74 MU and Gas
Turbine station 14.52. Target for generation for
the year 1994-95 is 7500 MU.

Plant wise generation and PLF of DVC achieved during
April to Nov., 94

Station	Gen (MU)	PLF (%)
BTPS 'A'	342.50	30.78
BTPS 'B'	1685.96	45.70
CTPS	1165.51	26.54
DTOS	1006.55	50.55
Total Thermal	4200.52	37.56
Total Hydel	362.74	-
Total G.T.	14.52	-
Total DVC	4577.78	37.56

(ii) **Generation & PLF to achieve in (December 1994 to march 1995) 4 Months**

	Gen (MU)	PLF (%)	Expected Gen. in Next 4 Months
BTPS 'A'	286	51.83	195
BTPS 'B'	1014	55.42	870
C.T.P.S.	1034	47.47	700
D.T.P.S.	593	60.00	630
Total Thermal	2927	52.77	2395

(iii) **R & M Programme**

A number of DVC's thermal plant units are old, ageing between 40 and 20 years. These units at Bokaro, Chandrapura and Durgapur are being attended through R&M Programmes.

(iv) **R & D Activities**

DVC have undertaken R&D project work in collaboration with other R&D Establishments such as BHEL, NTPC, NHPC, CMERI etc.

DVC's Gas Turbine Power Station at Maithon



10.10 BHAKRA BEAS MANAGEMENT BOARD (BBMB)

(i) The administration, operation and maintenance of Bhakra Nangal and Beas Projects has been entrusted to the Bhakra Beas Management Board under the Punjab Reorganisation 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. 11.

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 Plant, two Irrigation Tunnels and the Spillway.

(ii) The installed capacity of the Power Plants is as under :

Power House	Installed Capacity (MW)
1. Bhakra (Right Bank)	660
2. Bhakra (Left Bank)	540
3. Ganguwal	77.65
4. Kotla	77.65
5. Dehar	990
6. Pong	360
	2705.30

(iii) The BBMB also manages the Operation & Maintenance of a 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 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.

10.10.1 Generation

The actual generation from BBMB Power Houses during the period 1st April, 1994 to 31st January, 1995 was 10701 MUs. The estimated generation during the period February to March, 1995 would be 1449 MUs. Thus the total actual/estimated generation from BBMB Power Houses during the year 1994-95 would be about 12150 MUs against the generation target of 9505 MUs for the year 1994-95 fixed by CEA.

Training on 210 MW Replica Simulator



D. AUTONOMOUS BODIES

10.11 NATIONAL POWER TRAINING INSTITUTE (NPTI)

- (i) 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. at NPTI complex, Sector-33 Faridabad (Haryana), it has four Regional Power 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.
- (ii) 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. PETS has since 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 June, 1996.
- (iii) 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 Systems)

- * Induction Level courses for Operators (Thermal/Power System)
- * Induction level courses for Technicians

(iv) Apart from the long-term courses in Thermal, Hydro and Power Systems areas, NPTI also organises around 238 short-term courses on different specialised subjects. It also organises training courses on Simulator, training courses for in-service engineers, tailor made courses and onplant/on site training programmes etc. More than 37000 personnel have been trained upto March 1994. The number of persons trained in the various courses conducted by the Institutes under NPTI during the year 1994-95 (upto Oct. 1994) is as follows

No.	Courses	No. of persons trained
1.	Regular courses for Engineers	181
2.	Condensed courses for Engineers	133
3.	Short term courses for Engineers	220
4.	Maintenance courses for Technicians	221
5.	On-plant/on-site courses	221
6.	Simulator Courses	161
Total		1137

- (v) This works out to 8577 trainee weeks upto Oct. 1994. Till now 3396 engineers have been trained on the 210 MW Simulator since the installation in 1982 with UNDP Assistance at Badarpur Institute of NPTI.
- (vi) Apart from the above, the following specialised Residential Programmes were organised in the area of Management at NPTI complex, Faridabad under the Institute for Advanced Learning & Management Studies :

- (a) Financial Decision Making for Senior Executives of SEBs/Power Utilities from 1st - 5th August, 1994.
- (b) "Environmental Management in Power Sector" from 24th-28th October, 1994.

10.11.1 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. The orders for manufacturing/installation of 210 MW & 500 MW Simulators were placed on M/s Electronic Corporation of India Ltd., Hyderabad on 26th march, 1993 and 7th February, 1994 respectively. It is expected that these simulators would be ready for training by April, 1996 and March 1997 respectively.

10.11.2 Training Resources Unit

A Training Resources Unit (TRU) is also functioning at NPTI HQ to develop training material to meet the training needs of power sector. NPTI has published training manuals on Thermal Power Plant Metallurgy, Valve Maintenance, Ash handling Plant, Valve for Engines and Hydro Power Plant familiarisation.

10.11.3 Computer Based Self-learning packages

A three year programme has been designed for in-house faculty for development of computer aided self-learning packages. As a part of Phase-I of the programme, two faculty officers of NPTI have already been trained in U.K. and requisite facilities have already been created at NPTI complex, Faridabad. Under phase-II faculty member will be trained in the field for further strengthening of these facilities. An allocation of 3,57,565 pounds have been approved for phase-II of the project from the Technical Cooperation Fund. As a first step, self-learning packages on 'Boiler' and

'Milling system' are in the advanced stage of development.

10.11.4 Consultancy

NPTI as a national apex Organisation in the field of training have diversified into different areas of consultancy such as setting up of Training Institutes, Recruitment of Engineers for Utilities, Assessment of Training needs etc. The following proposals are in process :

- * A proposal for setting up a training Institute in Bhutan is in consideration. As requested by Ministry of External Affairs, NPTI is in the process of preparing a comprehensive preliminary report outlining the activities that would be undertaken by NPTI for preparation of detailed project report including financial proposal for establishment of training Institute in Bhutan. The proposal would be based on the assumption that all

expertise including engineering and architectural design would have to be arranged by NPTI.

- * In order to provide consultancy to Damodar Valley Corporation a proposal on formulating training needs and other associated aspects of career development of various categories of employees i.e. Engineering, Administrative, Accounts & Finance etc. has been submitted to DVC for consideration.

10.11.5 Funds

During the year 1994-95 (upto Nov., 1994) amount of Rs. 138.00 lakhs (under NonPlan) has been released by the Ministry of Power.

The training fee and other receipts during the year 1994-95 is estimated to earn a revenue of Rs. 112.50 lakhs as compared to Rs. 102.80 lakhs during the year 1993-94.





10.12 CENTRAL POWER RESEARCH INSTITUTE (CPRI)

Bhopal, Hyderabad, Nagpur, Ghaziabad, Thiruvananthapuram and Raichur.

- (i) The Central Power Research Institute was established in the year 1960. In 1978, it was re-organised into an autonomous society under the then Ministry of Energy.
- (ii) The institute, an autonomous body, is managed by a Governing body comprising members representing the Government, the electrical utilities, the industries and academic institutions etc. The Secretary (Power) to the Government of India, in the Ministry of Power, is the President of the Governing Council. The Chief Executive of the Institute is the Director General who is also Member Secretary to the Governing Council.

10.12.1 Objects

- (i)
 - * To serve as a national centre for applied research in electrical power engineering.
 - * To function as an independent and impartial authority for certification and testing of electrical equipments manufactured in the country for quality assurance.
 - * Performing tests for product development.
 - * To offer consultancy on problems referred by utilities and industries.
 - * Undertake sponsored research programmes on subjects of interest in the power systems field.
- (ii) The Institute has several research laboratories and testing facilities, and employ over 300 qualified scientists and engineers besides other supporting staff guiding and maintaining various operations. The Head Office of the Institute is at Bangalore and its other units are located at

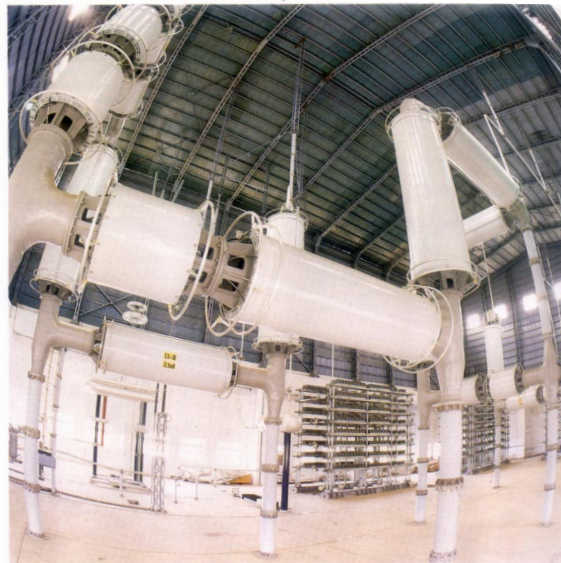
10.12.2 Over all Performance and Achievements year at a glance including future plans.

- a. The laboratories of the Institute both at Bangalore and Bhopal have been accredited by the National Board for Accreditation of Testing and Calibration Laboratories (NABL) EN45000 Standards. This has opened up the global markets for the Institute.
- b. The Institute has been awarded a Patent for the invention related to “Means for field oriented control of synchronous motor for variable speed”.
- c. The Institute has been meeting its non-plan expenditure through revenue generated by testing & consultancy for the last 7 years successively. During the current year (1994-95) the Institute’s revenue is expected to cross Rs. 10 crores.
- d. The Institute has commercialised technologies through National Research Development Corporation, New Delhi.
- e. The Institute organised a total of 18 workshops/training programmes during the year. They were well attended by engineers from Power Utilities, Government Bodies and Industry. The Institute is likely to organise special training programmes for the engineers of utilities from Philippines and a special workshop on “HVDC Technology for Engineers from countries belonging to Asia - Pacific region under the aegis of D.O.E & A.P.C.T.T. CPRI also proposes to organise a workshop for utility engineers from SAARC countries.
- f. The Institute organised a tailor made 3 Day Refresher Course for the senior

engineers of Department of Space. Engineers from all the units of Department of Space, spread across the country attended the course. The course covered topics related to testing of high power equipment, Power Systems, Air Conditioning & Fire Alarm & Detection. The Institute plans to organise more such programmes in the near future.

g. During the current year, the Institute implemented a total of 99 Research & Development Projects, some of which were sponsored by other ministries and industries. The technical reports brought out after the completion of R&D Projects were well publicised among Power Utilities and Industries across the country. The technologies

Synthetic Testing Facility for EHV Circuit Breakers at Bangalore



emerging as a fall out of the R&D efforts are being commercialised through M / s N.R.D.C., New Delhi. During the year, the following technologies were commercialised :

- (i) Electronic Ballast,
 - (ii) Harmonic Analyser
- h. Out of the five capital projects being implemented by the Institute, the following four projects have been completed. R&D and commercial testing have also begun. The details of projects completed are:
- (i) 2500 MVA Short Circuit Testing Station with synthetic Test Facility, Bangalore.
 - (ii) Ultra High Voltage AC Research Laboratory, Hyderabad.
 - (iii) Regional Testing Laboratory, Muradnagar.
 - (iv) Thermal Research Centre, Koradi, Nagpur.

The project pertaining to Second Short Circuit Alternator at S.T.D.S., Bhopal is progressing. Orders have been placed for the procurement of equipment and civil works are progressing.

- i. The Institute is augmenting it's laboratories to cater to the growing demands of the electrical industry. The augmentation proposals pertaining to High Voltage Laboratory, Materials Technology and Insulation Division Switchgear Testing and Development Station, Bhopal and Short Circuit Laboratory, Bangalore have been cleared. The Laboratories are currently being augmented.

10.12.3 CESI-CPRI R&D Co-operation Programme.

The Institute has completed 6 years of technical co-operation with M / s CESI, Italy. phase-II of the co-operation programme concluded recently. A workshop has been organised on the out-come of the cooperation and a publication detailing the areas of work carried out jointly is being brought out. The Phase-III of the R&D programme is proposed to be taken up, which will be funded by the Italian grant.

10.12.4 Technology Development

The Institute has developed many technologies during the current year. Important among them are :

- (i) Conducting polymeric Rechargeable batteries
- (ii) Methyl Esterification of Rape Seed Oil
- (iii) Electrostatic Voltage Divider

10.12.5 Co-operation with other countries

- (i) The Institute has plans to organise a Training Programme for Utility Engineers of SAARC Countries during the year 1995-96.
- (ii) The Institute also undertakes Testing & Certification of electrical equipment manufactured in the neighbouring countries, upon request. The Institute has offered Bhutan, the technology pertaining to Reclamation of discarded transformer oil.
- (iii) A special training programme for the practising engineers of the Philippines Electrical Utilities will be organised at Bangalore. The Institute will also conduct a workshop on HVDC Technology for the engineers from Asia Pacific region under the aegis of A.P.C.T.T.

10.13 ENERGY MANAGEMENT CENTRE (E.M.C.)

- (i) Energy Management Centre 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.
- (ii) 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 has been designed to implement and monitor the Energy Conservation Programme.

10.13.1 Role as Coordinator

- (i) 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 on their resources. However, their efforts are fragmented and lack coordination and absence of national perspective.
- (ii) This is where the Energy Management Centre steps in as a policy group, to guide, promote and coordinate, the development of overall strategic vision, supported by quantitative analysis, and to improve energy efficiency in the country.

10.13.2 Organisation of the Centre

EMC has been registered as a Society under the registration of Societies Act, 1860, for functioning as an independent and autonomous body.

10.13.3 Activities of the Centre

The main activities of EMC could be grouped under the following:

- (i) develop a National Energy Database by collecting and analyzing data on energy supply, demand and information on prices;
- (ii) identify barriers to improving energy efficiency and propose appropriate incentives and other measures to overcome them. These include recommendations for assistance with capital investment, taxes, duties and other financial incentives;
- (iii) review laws and regulations that have an impact on energy consumption and propose modifications and formulate suitable policies and actions;
- (iv) suggest introduction of standards and labels and setting of consumption targets;
- (v) provide planning assistance to government agencies;
- (vi) organise public information and promotional campaigns on an ongoing basis;
- (vii) organise sector specific promotional campaigns for the main energy consuming sectors (industry, transport, agriculture, commercial and government buildings) and provide technical assistance in the field of energy efficiency to these sectors;
- (viii) promote energy audits in enterprises and provide recommendation to improve energy efficiency and fuel substitution;

- (ix) monitor progress made in energy conservation and fuel substitution and initiate follow-up actions where needed;
- (x) organise training for energy managers and equipment operators;
- (xi) implement multilateral and bilateral aided energy efficiency projects.

10.13.4 The Centre has carried out the following activities till-date

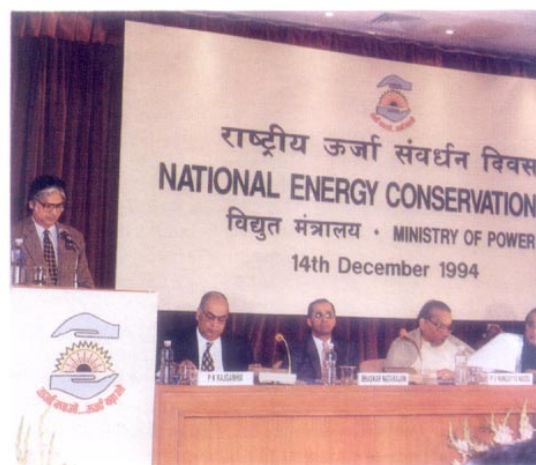
- Thirteen one-week Training of Trainers Programmes organised and Training Modules prepared for creating manpower on Rational Use of Energy Techniques.
- Institutional building and development of eleven self- sustaining professional energy management advisory service centres through training and networking for energy efficiency improvement to service small & medium scale industries.
- Development of Energy Usage Data Base through energy audits conducted under UNDP, EEC & PROBE programmes.
- In 45 energy audits under UNDP Project, potential savings of Rs. 42 crores have been identified and annual recurring savings of Rs. 12 crores achieved.
- The extensive multi-media campaign on Energy Conservation is gradually bringing in attitudinal change in consumers towards the need to conserve energy in different sectors.
- Institution of policy and sectoral studies on institutional framework, legislative procedures for Energy Conservation and technical & policy standards, fiscal incentives, etc.

10.13.5 International Cooperation Projects

- (i) EMC has successfully implemented the following projects :
 - a) India-UNDP Project on Energy Audits in Selected Areas
 - b) India-EC Energy Bus Project
 - c) TCDC Working Group (ESCAP)
- (ii) EMC have worked out the details of the India-EC energy co-operation programme for phase-II activities to be implemented in the next two years. EMC is presently finalizing the details of a technical cooperation programme with GTZ on energy conservation in the State of Karnataka.

Budget estimates for the year 1994-95

- 10.13.6 The budget estimates for the year 1994-95 for EMC is Rs. 55.00 lakhs and Agency Projects of Rs. 380.85 lakhs.



11. OTHER IMPORTANT ACTIVITIES

11.1 CONSULTATIVE COMMITTEE OF MEMBERS OF PARLIAMENT

During the year 1994-95 (i.e. upto December, 1994), the Ministry of Power coordinated and organised six meetings of the Consultative Committee of Members of Parliament attached to the Ministry of Power. The agenda items of discussion at these meetings were related to, "Rural Electrification Corporation", "Private Sector Participation in Power Generation and Distribution", "Review of Power Situation in different States", "Central Power Research Institute", "Review of functioning of Bhakra Beas Management Board", and "Nathpa Jhakri Power 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) As per 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 as well as its Attached and Subordinate Offices. The Sub Committee of the Parliament on Official Language also visited the Ministry to take stock of progress made in implementation of Official Language Act. In addition, the Sub Committee paid a visit to six offices under the control of the Ministry and appreciated

the efforts being made in the progressive use of Official Language.

- (iii) Meetings of Official Language Committee of Ministry of Power were regularly organised during the year 1994-95. Meetings of the Hindi Advisory Committee (Hindi Salahkar Samiti) of the Ministry of Power were held on 21.7.94 and 16.2.95, in which progress made by the Ministry of Power as well as other offices under its control was discussed. Measures have been taken to implement decisions taken in the above meetings.
 - (iv) Hindi workshops were organised in order to encourage and motivate the employees and officers to do their official work in Hindi and to remove their hesitation for doing official work in Hindi. Senior Officers of the Ministry also took part in Hindi workshops. Hindi week was observed in the Ministry of Power from 14.9.94 to 20.9.94 to step up the use of Hindi in Official work.
 - (v) The cash award scheme circulated by the Department of Official Languages for the promotion of the use of Hindi continued to be followed in the Ministry, its attached offices as well as public sector undertakings under the administrative control of the Ministry. The results of these schemes have been encouraging as it has been widely accepted by the officers and staff of the Ministry as well as other organisations, under the Ministry of Power.
 - (vi) To encourage the employees to acquire proficiency in Hindi, some of the employees who do not have proficiency in Hindi were deputed to take part in Probodh, Praveen and Pragya classes conducted under the Hindi Teaching Scheme. Similarly 13 Stenographers and 12 LDCs have been deputed for learning stenography and Hindi typing during the year 1994-95.
 - (vii) During the period under review the senior officers of the Ministry inspected seven
-

offices with a view to assessing the status regarding the progressive use of Hindi. Inspection reports of the above offices were prepared and guidelines issued on the basis of the inspection reports to these offices. This has been helpful in promoting the use of Hindi in official work.

11.3 ASSISTANCE TO THE STATE ELECTRICITY BOARDS

11.3.1 UTTAR PRADESH

Anpara B Thermal Power Project (2 x 500 MW)

- (i) Anpara B Thermal Power Project (2x500 MW) is being set up in Sonbhadra district of UP by the UP State Electricity Board with Japanese assistance. The first unit of 500 MW was synchronised on the 19th July, 1993 and taken on commercial load in March, 1994. The second unit of 500 MW was synchronised on 4th July, 1994 and was taken on commercial load in October, 1994. The Government of Japan have provided a loan assistance of 119.35 billion Yen in 5 instalments for the implementation of this project. In addition, the Exim Bank of Japan have provided a suppliers' credit of 27.39 billion Yen.
- (ii) At the request of the State Government, special loan assistance of Rs. 127 crores; Rs. 156 crores; and Rs. 4.25 crores was provided to the State Government during the years 1991-92; 1992-93; and 1993-94 respectively, for payment of custom duties in respect of the equipment and material imported by UPSEB from Japan for the Anpara 'B' Thermal Power Project.

11.3.2 WEST BENGAL

Bakreshwar Thermal Power Project

Bakreshwar Thermal Power Project (5x210 MW) has been sanctioned by the Planning Commission at an estimated cost of

Rs. 3052.53 crores in July, 1993. Three of its generating units, along with transmission system, are being implemented with OEFC loan assistance. A loan agreement between the Government of India and the Government of Japan, for providing a loan assistance of 27.069 billion Yen as first tranche for implementation of the first two units, was signed on 24th January, 1994. The detailed discussions with OECF Appraisal Mission for funding of Unit-3 of Bakreshwar TPP were held in May, 1994 and minutes of discussions were signed between the Government of India and the Government of Japan on 26th May, 1994. The Government of Japan have since extended a loan assistance of 8659 million Yen for the construction of Unit-3 of Bakreshwar TPP (210 MW). The scope of work includes construction of power station, including the installation of one 210 MW turbine generator set together with one boiler of matching capacity, associated auxiliaries, civil works and consultancy services. The terms and conditions of the loan agreement have since been finalised and formal Loan Agreement between the Govt. of India and the Govt. of Japan is expected to be signed shortly.

11.3.3 ANDHRA PRADESH

Life Extension of Kothagudam-A Thermal Power Station

The Government of Japan have extended a loan assistance of 5092 million Yen for the rehabilitation and life extension of Kothagudam 'A' TPS (4x60 MW) of the Andhra Pradesh State Electricity Board. The scope of work includes procurements of equipments for rehabilitation of boiler, turbine and generator, erection work for replacing and installation of equipments and consultancy services. The terms and conditions of the loan agreement have since been finalised and formal Loan Agreement between the Govt. of India and the Government of Japan is expected to be signed shortly.

11.4 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.

Name of Office	GROUP 'A'			GROUP 'B'			GROUP 'C'			GROUP 'D'		
	Total	SC	ST	Total	SC	ST	Total	SC	ST	Total	SC	ST
Ministry of Power (Proper)	33	5	1	96	13	-	110	17	-	69	34	4

11.5 GRIEVANCES CELL

The Grievances Cell working under the Senior Analyst dealt with 44 cases relating to various grievances which include 14 pending cases of the last year i.e. 1993-94. All these relate to pension cases of the employees/ex-employees of the CEA/ Public Sector Undertakings and non payment of interest on Bonds issued by REC. Out of these 44 grievances, 20 have been finally disposed off.

11.6 VIGILANCE ACTIVITIES/ DISCIPLINARY CASES

The vigilance activities of this Ministry have got a new boost. A one day seminar of the Chief Vigilance Officers of various public sector undertakings and Autonomous Bodies under this Ministry was held on the 20th October, 1994 at New Delhi, which was addressed by the then Minister of State for Power, Shri P.V. Rangayya Naidu. The Honourable Minister stressed the need for strengthening the vigilance activities in the Power sector by emphasizing the role of preventive vigilance. At the beginning of the year 1994, there were fifteen vigilance/disciplinary cases, of which three cases have been disposed off during the year and one new case has been added.

11.7 AUDIT OBSERVATIONS:

The Organisation-wise break-up of Audit observations and Inspection Report as on 30.11.94 are as under:

Audit Objection as on 30.11.1994

Sl. No	Organisation	Inspection Report	Inspection Paras
1.	C.E.A.	21	76
2.	BTTP/BTPS	62	190
3.	C.W.C.	28	129
4.	NPTI (PETS)	8	72
5.	CPRI	2	2
6.	Ministry of Power	6	81
Pay & Accounts Office/Contoller of Accounts			
7.	PAO (CEA) New Delhi	4	14
8.	PAO (BMCC) New Delhi	1	3
9.	PAO (Sectt.) New Delhi	3	14
10.	PAO (CEA) Bangalore	2	2
Total		137	583

11.8 CONTROLLER OF ACCOUNTS

11.8.1 The office of Controller of Accounts has four Pay and Accounts Officers working under him. They are PAO CEA New Delhi, PAO CEA Bangalore, PAO (Sectt.), PAO



(BMCC). These offices submit their monthly accounts to Principal Accounts Office, then it is further consolidated and submitted to Controller General of Accounts. These accounts show the clear cut picture of the financial transactions of the Ministry of Power in a detailed classified form.

During the year all the PAOs made timely payments of DCRG, pension, commuted value of pension, GPF final payments to the officials of the Ministry/ Central Electricity Authority on retirement. The Principal Accounts Office also prepares Appropriation Account, Statement of Central Transactions (SCT) and Finance Account on annual basis for submission to Controller General of Accounts (CGA). The Pr. Accounts Office timely submitted to CGA the above accounts for further consolidation by them.

11.8.2 Computerisation of Accounts

The office utilises the software packages INTEGRATED MODULE FOR PROCESSING VOUCHER ENTRIES (IMPROVE) and CONTROLLER'S ACCOUNTING (CONTACT) provided by CGA. The voucher level computerisation has been carried out in all the four PAOS. The consolidation of monthly account of all the PAOs in Department of Power is done by using the CONTACT software packages. Reports are also generated from the options provided in Report Generation menu in CONTACT. The accounts consolidated through the CONTACT PROGRAMME are then sent by the Controller of Accounts to Controller General of Accounts.

11.9 INTERNAL AUDIT WING

The Internal Audit wing ensures adoption of sound procedure, regularities and financial propriety of transactions and accounts. This wing advises the DDOs and their staff for correct implementation of

rules and maintenance of proper records. Internal Audit Wing also pursues the settlement of objections raised by the Statutory Audit.

Performance of the Internal Audit Wing during the year 1993-94 is as under

Year	No of units due to insp.	No. of paras raised	No. of paras settled	No. of paras outstanding up to 1993-94
1993-94	24/20	330	148	182

Audit Observations (Statutory Audit)

Sl. No.	Organisations	Inspection Reports	Inspection Paras
1.	PAO (CEA) N. Delhi	4	14
2.	PAO (BMCC)	1	3
3.	PAO (Sectt)	3	14
	Total	8	31

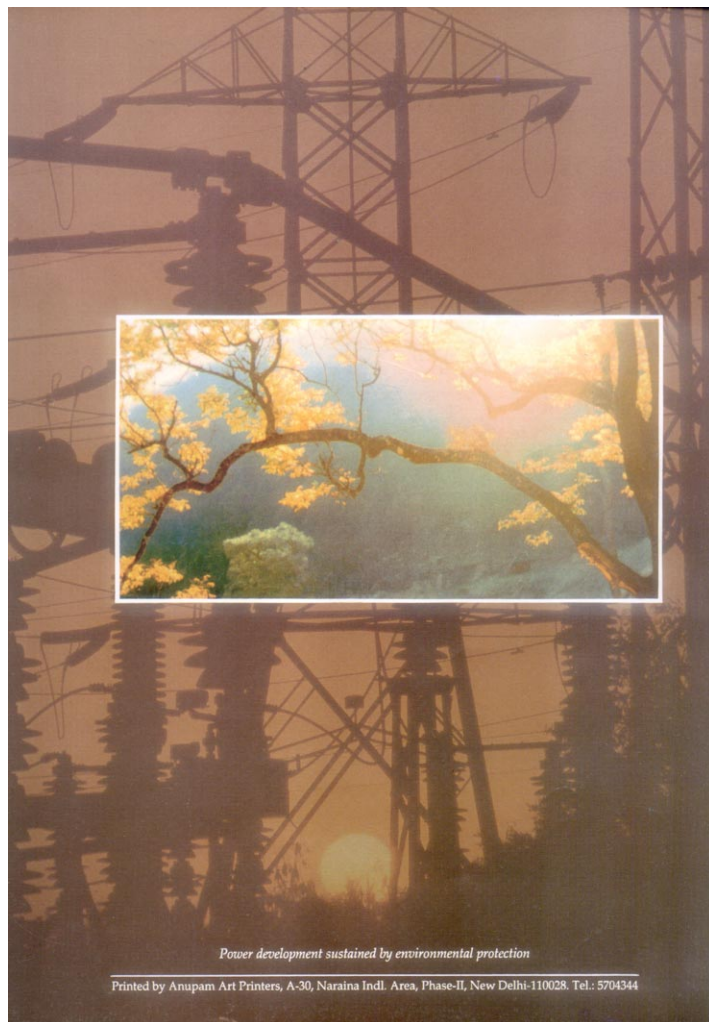
11.10 SPORTS & CULTURAL ACTIVITIES:

The Power Sports Control Board (PSCB), constituted under the aegis of this Ministry has been registered as a Society under the appropriate Act of the Government. The PSCB is arranging various tournaments all over the country with the help of member organisations. The Ministry has contributed token amounts to the PSCB funds as its annual subscription and as Corpus Fund. Besides, the Ministry also encourages the participation of its officers and staff in several other sports and cultural meets organised by the Central Civil Services Cultural & Sports Board.

G. ELECTRICITY STATISTICS AT A GLANCE

ELECTRICITY-INSTALLED CAPACITY, GENERATIONS & CONSUMPTION

	Unit	1990-91	1991-92	1992-93	1993-94*
1. Installed Capacity					
Utilities+ Non-Utilities	MW	74699	78367	82375	86900
Utilities	MW	66086	69065	72330	76750
Hydro	MW	18753	19194	19576	20378
Nuclear	MW	1565	1785	2005	2005
Thermal (Coal)	MW	43004	44792	46597	49147
Oil & Gas	MW	2764	3294	4152	5220
Non-Utilities	MW	8613	9302	10045	10150
2. Generation					
Utilities + Non-Utilities	BU	289.44	315.63	332.71	356.26
Utilities	BU	264.33	287.03	301.36	324.16
Hydro	BU	71.64	72.76	69.87	70.43
Nuclear	BU	6.14	5.53	6.73	5.40
Thermal (Coal)	BU	178.32	197.16	211.12	233.26
Oil & Gas	BU	8.23	11.58	13.64	15.07
Non-Utilities	BU	25.11	28.60	31.35	32.10
3. Consumption					
Utilities + Non-Utilities	BU	210.15	229.52	245.47	263.60
Industrial	BU	105.35	110.60	116.15	120.91
Transport	BU	4.14	4.54	5.09	5.55
Agriculture	BU	50.32	58.56	63.33	70.63
Domestic Commercial and Services (\$)	BU	50.34	55.82	60.90	66.51
3. AAuxiliary Consumption					
Utilities + Non-Utilities	BU	22.77	24.67	25.68	27.25
T&D Losses	BU	56.52	61.44	61.56	65.41
(\$)					
* Provisional					



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