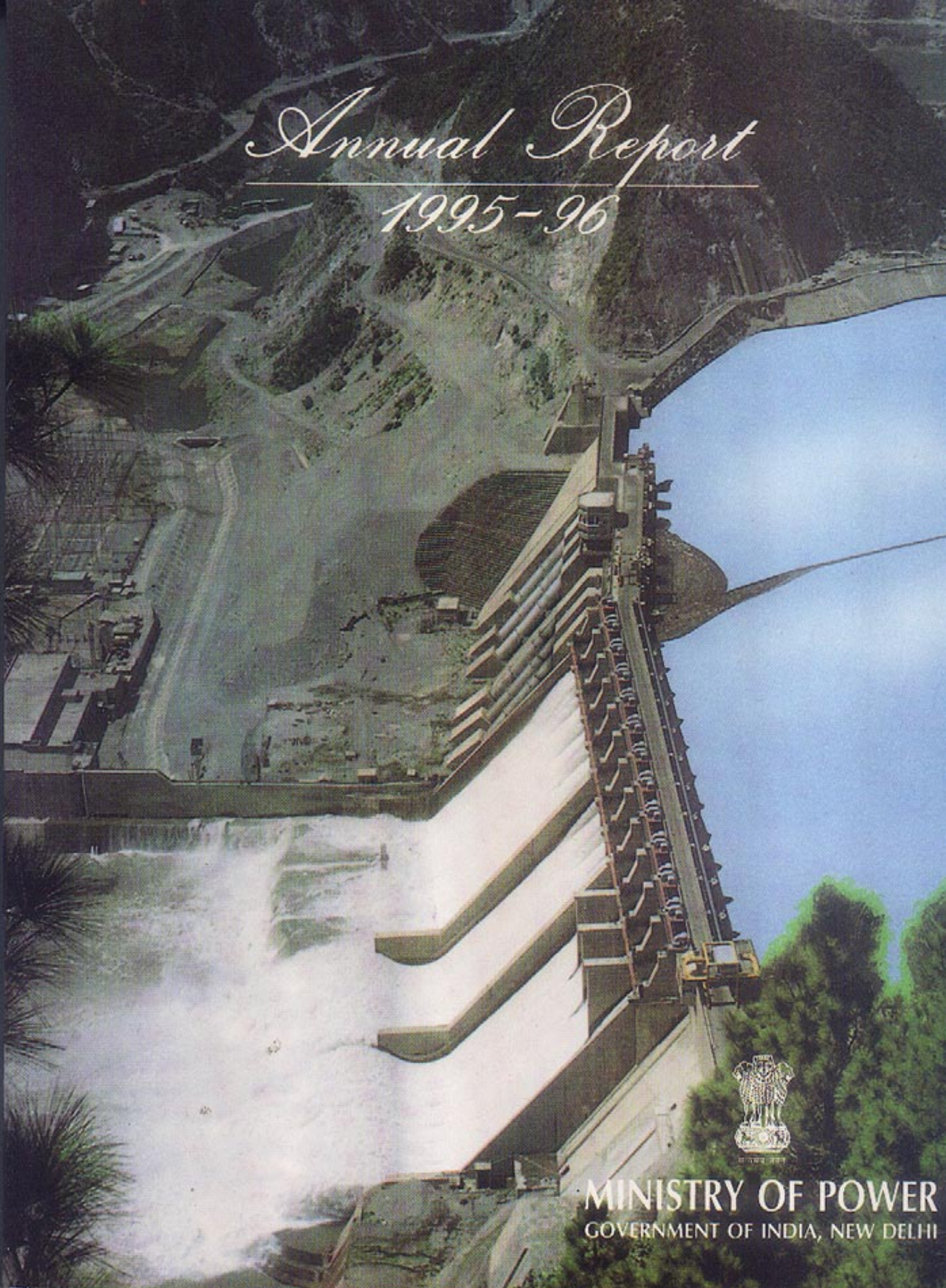
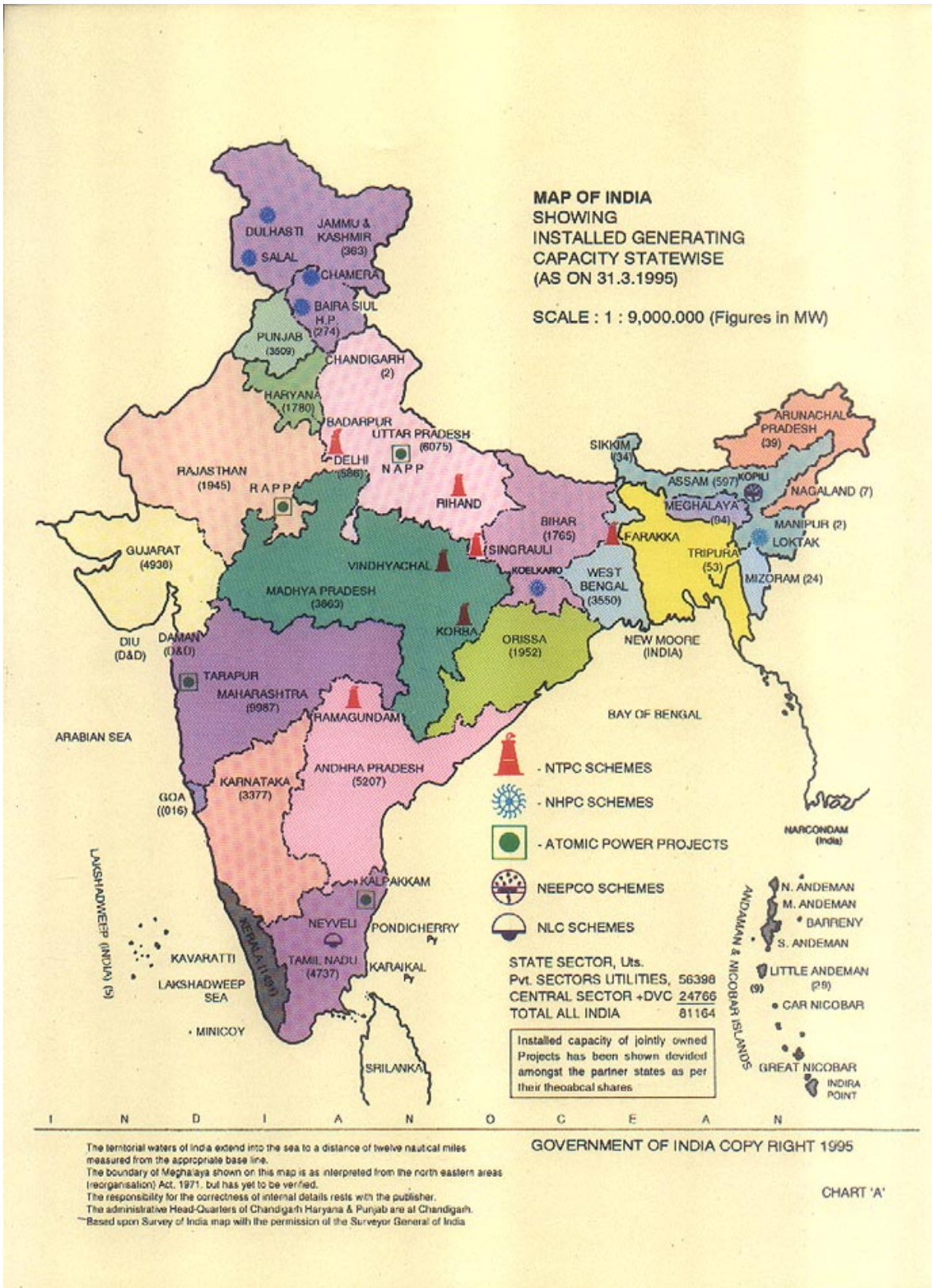


Annual Report
1995-96

MINISTRY OF POWER
GOVERNMENT OF INDIA, NEW DELHI



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

CHART 'A'

ANNUAL REPORT

1995-96

MINISTRY OF POWER

GOVERNMENT OF INDIA, NEW DELHI

CONTENTS

FRONT COVER:

Salal Dam (Jammu & Kashmir)

BACK COVER

A Panaramic view of Nathpa Jhakri Project Township at Jhakri

1. MINISTRY OF POWER

1.0 FUNCTIONS

1.1 The Ministry of Power started functioning independently with effect from the 2nd July, 1992. Earlier it was known as the Ministry of Energy comprising the Department of Power, Coal and Non-conventional Energy Sources.

Electricity is a concurrent subject at Entry 38 in the list III of Seventh Schedule of the Constitution of India. The Ministry of Power is primarily responsible for 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 in regard to Thermal and Hydel Power generation, transmission and distribution.

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

The Ministry of Power is mainly responsible for evolving general policy in the field of energy The main items of work dealt with by the Ministry of Power are as below:

1. General Policy in the Electric Power Sector and issues relating to Energy Policy
2. All matters relating to hydroelectric and thermal power except mini, micro hydel projects and below 3 MW capacity and geothermal energy and transmission system network.
3. Research development and technical assistance relating to hydroelectric & thermal power and transmission system network.
4. Administration of the Indian Electricity Act, 1910, (9 of 1910), and Electricity (Supply) Act, 1948 (54 of 1948).
5. All matters relating to Central Electricity Authority and Central Electricity Board.
6. Rural electrification, power schemes in UTs and issues relating to power supply in States and UTs.
7. All matters concerning energy conservation and energy efficiency pertaining to power sector.
8. Matters relating to following Public Sector Undertakings/Organisations etc.
   a) Damodar Valley Corporation
   b) Bhakra Beas Management Board (except irrigation matters).
   c) National Thermal Power Corporation Ltd.
   d) National Hydro Electric Power Corporation Ltd.
   e) Rural Electrification Corporation Ltd.
   f) North Eastern Electric Power Corporation
   g) Power Grid Corporation Ltd.
   h) Power Finance Corporation
   i) Tehri Hydro Development Corporation
   j) Nathpa Jhakri Power Corporation
   k) Central Power Research Institute
   l) National Power Training Institute
   m) Energy Management Centre

1.2 ORGANISATIONS UNDER MINISTRY OF POWER

In all Technical and economic matters, Ministry of Power is assisted by the Central Electricity Authority (CEA) constituted under the Electricity (Supply) Act, 1 948.

Badarpur Management Control Cell (BMCC), a subordinate office of this Ministry, is responsible for administering the Badarpur Thermal Power Station (BTPS), Management Contract between the Government of India and the NTPC.

The construction and operation of generation and transmission projects in the Central Sector are entrusted to Central Sector Power Corporations, viz., 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 (PGCIL). The Powergrid is responsible for all the existing and future transmission projects in the Central Sector and also for the formation of the National Power Grid. Two Joint Venture Power Corporations namely Nathpa Jhakri Power Corporation (NJPC) and Tehri Hydro Development Corporation (THDC) are responsible for the execution of the Nathpa Jhakri Power Project in H.P. and Projects of the Tehri Hydro Power Complex in U.P. respectively. Two statutory bodies i.e., the Damodar Valley Corporation (DVC) and the Bhakra Beas Management Board (BBMB) are also under the administrative control of the Ministry of Power. Programmes of rural electrification are provided financial assistance by the Rural Electrification Corporation (REC) under the Ministry of Power. The Power Finance Corporation (PFC) provides term-finance to projects in the power sector. Further, the autonomous bodies (Societies) i.e., Central Power Research Institute (CPRI), the National Power Training Institute (NPTI) and the Energy Management Centre (EMC) are also under the administrative control of the Ministry of Power.

1.3 ORGANISATIONAL SET-UP

During 1995-96 Shri N.K.P. Salve has been the Minister of Power since 18th January, 1993. Dr. (Mrs.) Urmila C. Patel has been the Minister of State for Power since 10.2.1995. Shri P. Abraham is the present Secretary (Power) with effect from 29.7.1995. He is assisted by a Special Secretary and six Joint Secretaries including the financial advisor. There are six wings in the Ministry of Power each headed by a Joint Secretary. These are

1 Administration & Hydel
2) Thermal
3) Policy Planning, Energy Management and Coordination & Legal Cell.
4) Systems and External Assistance
5) Finance, Budget and Grievances
6) Investment Promotion

Matters relating to reservations are dealt by SC/ST Cell. The total staff strength of the Ministry is 311.

River Satluj on which the 1500 MW Nathpa Jhakri Power Project is being implemented

2. POWER SECTOR - HIGHLIGHTS AND MAIN ACHIEVEMENTS

2.1 POWER GENERATION

The overall generation in the country has increased from 264 BUs during 1990-91 to 380.084 BUs in 199596 (CHART - B). The year wise generation is as follows:

Year	Generation (BUs)
1990-91	264
1991-92	287
1992-93	301
1993-94	324
1994-95	351
1995-96	380.084

Generation during April, 1995 - March, 1996 was 380.084 BUs which was 8.3 % more than the generation of the previous year.

2.2 INSTALLED CAPACITY

The All India installed capacity of electric power generating stations under utilities was 81,164.41 MW as on 31.3.95 consisting of 20,829.04 MW hydro, 58,110.37 MW thermal and 2,225 MW nuclear, which has increased to 83287.96 MW (Statement 1) as on 31.3.96 consisting of 20976.09 MW hydro, 60,086.87 MW thermal and 2225.0 MW nuclear (Chart-C).

2.3 GENERATING CAPACITY ADDITION

The aggregate capacity of 2161.55 MW Consisting 421.55 MW hydro, 1740.00 MW thermal was targeted for commissioning during the year 1995-96. Against the targetted capacity, the total generating capcity commissioned/rolled during the year 1995-96 was 2123.55 MW consisting of 147.05 MW hydro, 1976.50 MW thermal (Statement II and Chart-D).

2.3.1 The achievement during the year l995 - 96 against the programme is as under :

Type	Programme for 1995-96				Achievement during 1995-96			
	CS	SS	PS	TOTAL	CS	SS	PS	TOTAL
Hydro	0.00	421.55	0.00	421.55	0.0	147.05	0.00	147.05
Thermal	810.50	939.50	0.00	1740.00	987.00	659.50	330.00	1976.50
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	810.50	1351.05	0.00	2161.55	987.00	806.55	330.00	2123.55

CS - Central Sector, SS - State Sector, PS - Private Sector. (Also shown in Statement - V)

2.3.2 CAPACITY ADDITION (LAST FOUR YEARS)

In the last four years, the following new capacities have been added.

(Figures in Mega Watts)

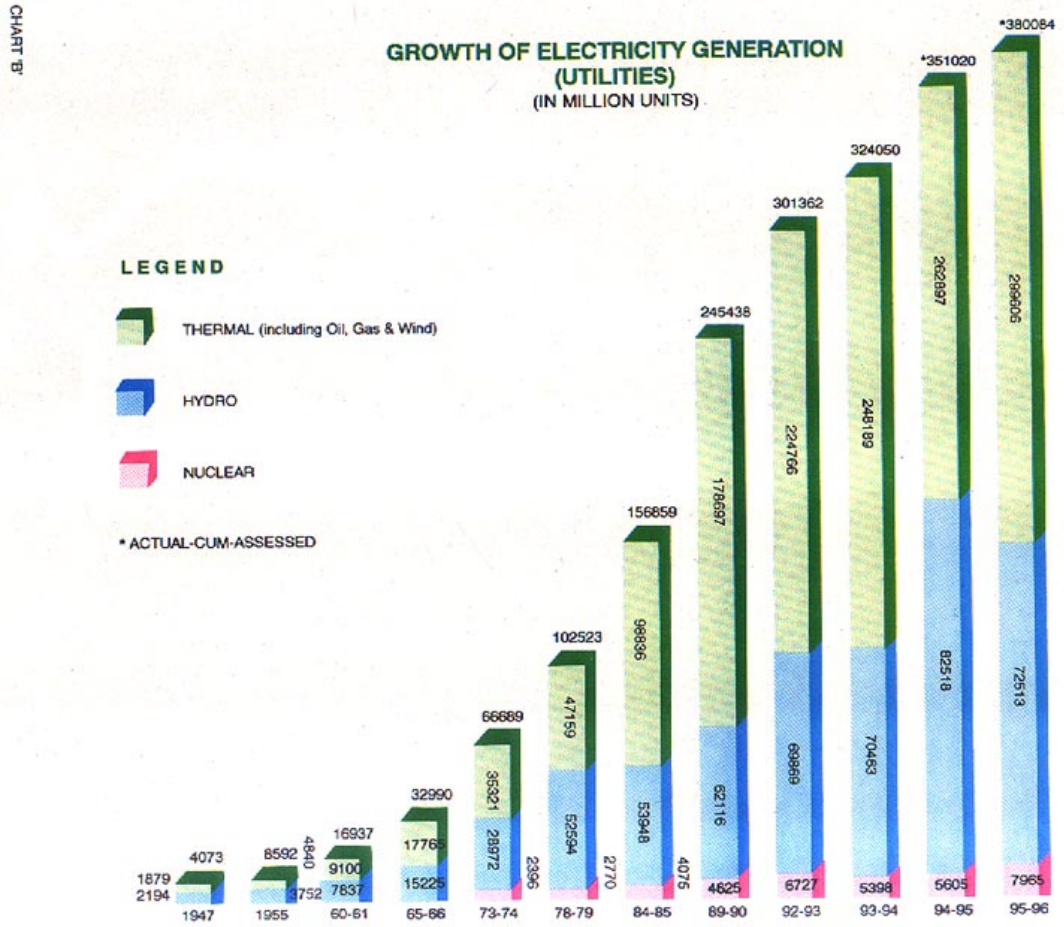
Year	Centre	State	Total
1992-93	2475	1062.27	3537.27
1993-94	2340	2198.75	4538.75
1994-95	1531.50	3067	4598.50
1995-96	987	1136.55	2123.55

2.3.3 A capacity addition programme of 2868.50 MW consisting of 835 MW hydro and 2033.50 MW of thermal has been fixed for the year 1996-97 (Statement-III).

2.4 PLANT LOAD FACTOR (PLF)

The actual All India PLF of thermal power utilities during April, 95 to March, 1996 was 63.0% which was 7% higher than the target of 62.3%.

CHART 'B'


GROWTH OF ELECTRICITY GENERATION
(UTILITIES)
(IN MILLION UNITS)
LEGEND
THERMAL (including Oil, Gas & Wind)
HYDRO
NUCLEAR
* ACTUAL-CUM-ASSESSED
1879
2194
4073
1947
8592
3752
4840
1955
16937
9100
7837
60-61
32990
17765
15225
65-66
66689
35321
28972
2396
73-74
102523
47159
52594
2770
78-79
156859
98836
53948
4075
84-85
245438
178697
62116
4625
89-90
301362
224766
69869
6727
92-93
324050
248189
70463
5398
93-94
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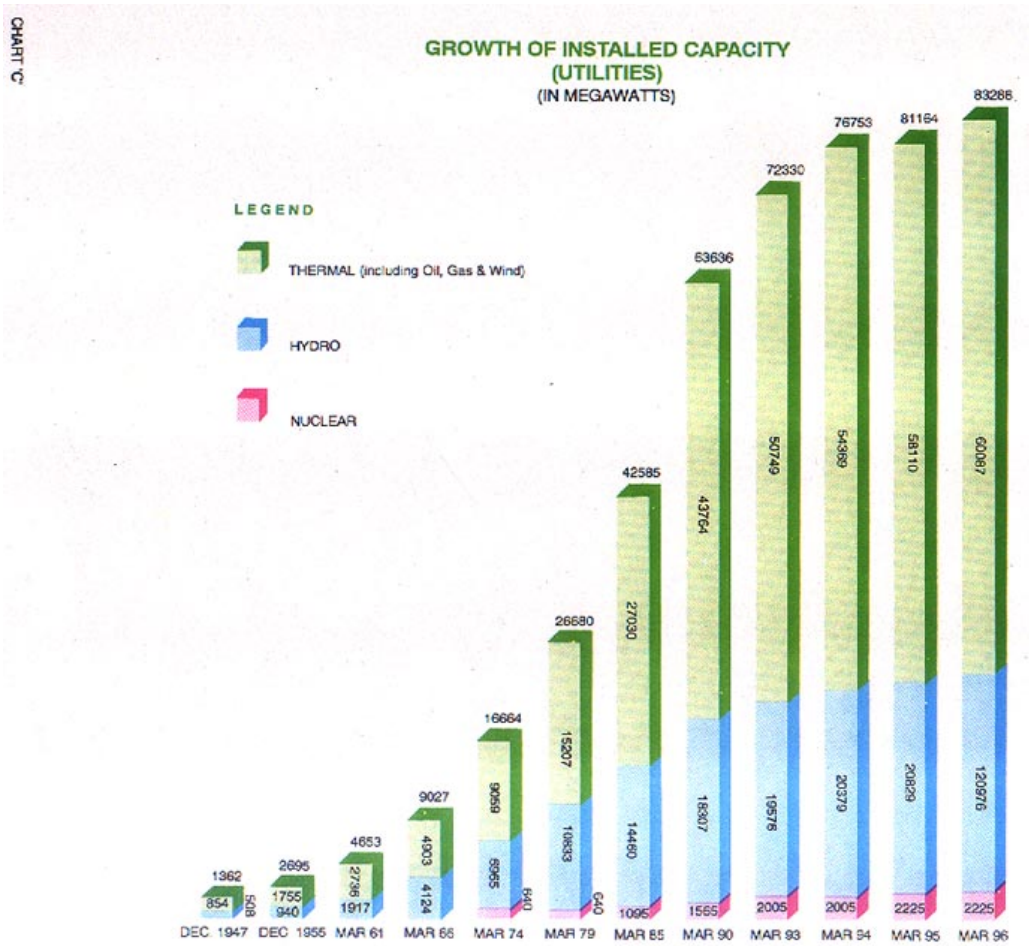
262897
82518
5605
94-95
*380084
299606
72513
7965
95-96

CHART 'C'


GROWTH OF INSTALLED CAPACITY
(UTILITIES)
(IN MEGAWATTS)
LEGEND
THERMAL (including Oil, Gas & Wind)
HYDRO
NUCLEAR
1362
854
508
2695
1755
940
4653
2736
1917
9027
4903
4124
16664
9959
6965
640
26680
15207
10833
640
42585
27030
14460
1095
63636
43764
18307
1565
72330
50749
19576
2005
76753
54369
20379
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81154
58110
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2225
83288
60087
20976
2225
DEC. 1947
DEC. 1955
MAR 61
MAR 66
MAR 74
MAR 79
MAR 85
MAR 90
MAR 93
MAR 94
MAR 95
MAR 96

STATEMENT - I

1/2

ALL INDIA INSTALLED CAPACITY AS ON 31.03.96 (PROVISIONAL)
REGION/STATEWISE

SL. NO.	REGION/ STATE/UT	INSTALLED CAPACITY (MW)						
		HYDRO	STEAM	GAS	DSL/WIND	SUB-TOTAL S+G+D/W	NUCLEAR	TOTAL
1.	**NORTHERN**							
	1 . Haryana	883.90	892.50	0.00	3.92	896.42	0.00	1780.32
	2. Himachal	288.57	0.00	0.00	0.13	0.13	0.00	288.70
	3. J & K	184.06	0.00	175.00	6.76	181.76	0.00	365.82
	4. Punjab 1798.94	1710.00	0.00	0.00	1710.00	0.00	3508.94	
	5. Rajasthan	967.58	975.00	38.50	0.00	1013.50	0.00	1981.00
	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	439.60	214.00	0.00	653.60	0.00	653.60
	9 . Cen. s. (N R) -Total	1530.00	4980.00	1882.00	0.00	6862.00	895.00	9287.00
	- NTPC	0.00	4980.00	1882.00	0.00	6862.00	0.00	6862.00
	- NHPC	1530.00	0.00	0.00	0.00	0.00	0.00	1530.00
	- NPC	0.00	0.00	0.00	0.00	0.00	895.00	895.00
	TOTAL(NR)	7157.60	13561.10	2309.50	19.00	15889.60	895.00	23942.20
II.	**WESTERN**							
	1. Goa	0.05	0.00	0.00	0.11	0.11	0.00	0.16
	2. Guj. -Total	487.00	4179.00	627.00	35.47	4841.47	0.00	5328.47
	- SEB	487.00	3729.00	198.00	35.27	3962.27	0.00	4449.27
	- AE Co.	0.00	450.00	99.00	0.00	549.00	0.00	549.00
	- Surat EC	0.00	0.00	0.00	0.20	0.20	0.00	0.20
	- Essar	0.00	0.00	330.00	0.00	330.00	0.00	330.00
	3. M. P.	845.86	3017.50	0.00	0.00	3017.50	0.00	3863.36
	4 . Mah. -Total	1780.22	7155.00	1092.00	0.00	8247.00	0.00	10027.22
	- MSEB	1354.22	5505.00	912.00	0.00	6417.00	0.00	7771.22
	- TEC	426.00	1150.00	180.00	0.00	1330.00	0.00	1756.00
	- BSES	0.00	500.00	0.00	0.00	500.00	0.00	500.00
	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. S. (WR) - Total	0.00	3360.00	1292.00	0.00	4652.00	860.00	5512.00
	- NTPC	0.00	3360.00	1292.00	0.00	4652.00	0.00	4652.00
	- NPC	0.00	0.00	0.00	0.00	0.00	860.00	860.00
	TOTAL (WR)	3113.13	17711.50	3011.00	35.58	20758.08	860.00	24731.21
III.	**SOUTHERN**							
	1 . A.P. 2655.94	2452.50	99.00	0.00	2551.50	0.00	5207.44	
	2. Kar. - Total	2409.55	840.00	0.00	127.92	967.92	0.00	3377.47
	- KEB	102.30	0.00	0.00	127.92	127.92	0.00	230.27
	- 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	1947.70	2970.00	130.00	19.35	3119.35	0.00	5067.05
	5. Pondicherry	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6. Cen. S. (SR) - Total	0.00	4170.00	0.00	0.00	4170.00	470.00	4640.00
	- NTPC	0.00	2100.00	0.00	0.00	2100.00	0.00	2100.00
	- NLC	0.00	2070.00	0.00	0.00	2070.00	0.00	2070.00
	- NPC	0.00	0.00	0.00	0.00	0.00	470.00	470.00
	TOTAL(SR)	8504.69	10432.50	229.00	147.27	10808.77	470.00	19783.46

Contd....

STATEMENT- I

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SL. NO.	REGION/ STATE/UT	INSTALLED CAPACITY (MW) As on 31.3.96 (Provisional) HYDRO	STEAM	GAS	DSL/WIND S+G+DM	SUB-TOTAL	NUCLEAR	TOTAL
IV.	**EASTERN**							
	1. Bih - Total	164.90	1603.50	0.00	0.00	1603.50	0.00	1768.40
	- BSEB	151.65	1393.50	0.00	0.00	1393.50	0.00	1545.15
	- BHPC	13.25	0.00	0.00	0.00	0.00	0.00	13.25
	- TVNL	0.00	210.00	0.00	0.00	210.00	0.00	210.00
	2. Ori - Total	1271.92	420.00	0.00	0.00	420.00	0.00	1691.92
	- OSEB	1271.92	0.00	0.00	0.00	0.00	0.00	1271.92
	- OPGC	0.00	420.00	0.00	0.00	420.00	0.00	420.00
	3. W. B. - Total	96.51	3356.38	100.00	22.50	3478.88	0.00	3575.39
	- WBSEB	96.51	1020.00	60.00	22.50	1102.50	0.00	1199.01
	- 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
	- Deshargarh SC	0.00	26.38	0.00	0.00	26.38	0.00	26.38
	4. Sikkim	30.89	0.00	0.00	2.70	2.70	0.00	33.59
	5. Cen S. (ER) - Total	144.00	6127.50	90.00	0.00	6217.50	0.00	6361.50
	- NTPC	0.00	3910.00	0.00	0.00	3910.00	0.00	3910.00
	- DVC	144.00	2217.50	90.00	0.00	2307.50	0.00	2451.50
	TOTAL(ER)	1708.22	11507.38	190.00	25.20	11722.58	0.00	13430.80
V.	**NORTH EASTERN**							
	1. Ar. Pradesh	23.55	0.00	0.00	15.81	15.81	0.00	39.36
	2. Assam	2.00	330.00	244.50	20.69	595.19	0.00	597.19
	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	3.37	0.00	0.00	21.07	21.07	0.00	24.44
	6. Nagaland	3.20	0.00	0.00	3.62	3.62	0.00	6.82
	7. Tripura	16.01	0.00	48.50	4.85	53.35	0.00	69.36
	8. Cen.S. (NER) - Total	255.01	0.00	167.50	0.00	167.50	0.00	422.51
	- NHPC	105.00	0.00	0.00	0.00	0.00	0.00	105.00
	- NEEPCO	150.01	0.00	167.50	0.00	167.50	0.00	317.51
	TOTAL (NER)	492.45	335.00	460.50	77.50	873.00	0.00	1365.45
VI.	**ISLANDS**							
	1. A&N Islands	0.00	0.00	0.00	29.47	29.47	0.00	29.47
	2. Lakshdweep	0.00	0.00	0.00	5.37	5.37	0.00	5.37
	TOTAL (ISLANDS)	0.00	0.00	0.00	34.84	34.84	0.00	34.84
A.	Cen. Sec. - Total	1929.01	18637.50	3431.50	0.00	22069.00	2225.00	26223.01
	- NTPC	0.00	14350.00	3174.00	0.00	17524.00	0.00	17524.00
	- NHPC	1635.00	0.00	0.00	0.00	0.00	0.00	1635.00
	- DVC	144.00	2217.50	90.00	0.00	2307.50	0.00	2451.50
	- NLC	0.00	2070.00	0.00	0.00	2070.00	0.00	2070.00
	- NEEPCO	150.01	0.00	167.50	0.00	167.50	0.00	317.50
	- NPC	0.00	0.00	0.00	0.00	0.00	2225.00	2225.00
B.	STATE SEC.	18603.08	32128.60	2119.50	339.19	34917.29	0.00	53520.37
C.	PVT. SEC. 444.00	2781.38	649.00	0.20	3100.58	0.00	3544.58	
	SS+ PS	19047.08	34909.98	2768.50	339.39	38017.87	0.00	57064.95
	ALL INDIA (A+B+C)	20976.09	53547.48	6200.00	339.39	60086.87	2225.00	83287.96
	% OF TOTAL	**25.19**	**64.29**	**7.44**	**0.41**	**72.14**	**2.67**	**100.00**

The PLF figures during the first four years of the 8th Plan are as under

Year	Centre	State	Overall
1992-93	62.7%	54.1%	57.1%
1993-94	69.2%	56.5%	61.0%
1994-95	69.2%	55.0%	60.0%
1995-96	71.0%	58.1%	63.0%

A target of 63.2% has been fixed for the year 1996-97 (tentative).

Vijayawada TPS of ASEB achieved the highest PLF of 89.4% during April, 1995 - March, 96.

2.5 TRANSMISSION AND DISTRIBUTION LOSSES

Presently, the Transmission and Distribution losses in the country are on the higher side. Due to concerted efforts, the transmission and distribution losses for the country has been coming down. It has come down from 22.83% during the year 1991-92 to 21.41% during the year 1993-94, resulting in a reduction of 1.42% and to 20.85% (Provisionally) during 1994-95. The yearwise details of transmission and distribution losses in the country are given below:

Year	T & D Losses (%)
1991-92	22.83
1992-93	21.80
1993-94	21.41
1994-95	20.85 (Prov.)

The reduction has been only 1.98% in the first four years of Eighth Plan as against a targetted reduction of 1 % per year.

2.6 RURAL ELECTRIFICATION

Rural Electrification Programme has picked up in the country and now more than 86% of the total villages had been electrified. Upto March, 1995, 500602 villages had been electrified and 11064389 pumpsets energised. In the Kutir Jyoti Programme, 16 lacs household living below the poverty line in rural areas have been provided electricity connections.

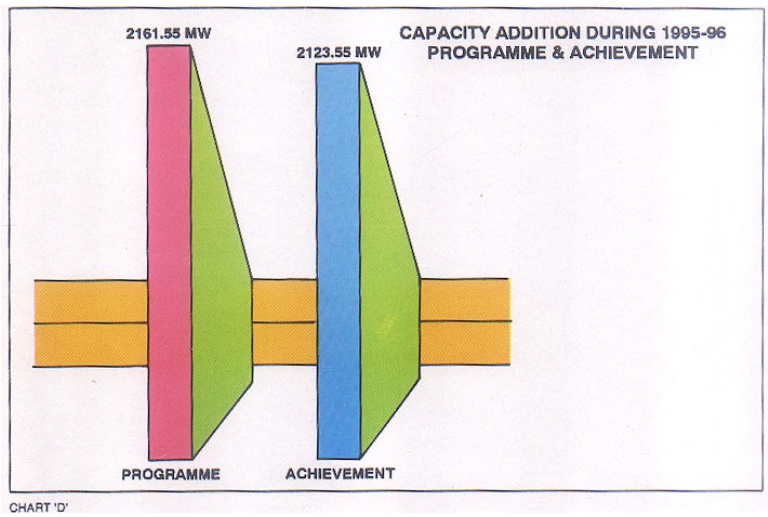


CHART 'D'

STATEMENT - II

CAPACITY ADDITION DURING 1995-96

Sl. No.	Name of Project/Unit No.	State/Organisation	Capacity (MW)	Actual Commissioning Date
THERMAL				
	CENTRAL SECTOR			
	Eastern Region			
1.	Mejia Unit-1	WB/DVC	210	22.12.95
2.	Talcher-2	Ori/NTPC	500	27.03.96
	North Eastern Region			
1	Kathalguri GT-4	Assam/NEEPCO	33.5	30.07.95
2.	Kathalguri GT-5	- do -	33.5	02.03.96
	STATE SECTOR			
	Northern Region			
1.	DESU WHRU-2	Del/DESU	34	31.10.95
2.	DESU WHRU-3	Del/DESU	34	26.03.96
3.	Ramgarh GT-2	Raj/RSEB	35.5	12.01.96
	Western Region			
1.	Hazira CCGT-Stage I GT-1	Guj/Essar	110	10.08.95
2.	Hazira CCGT GT-2	do -	110	10.08.95
3.	Hazira CCGT GT-3	do -	110	13.11.95
	Southern Region			
1.	North Madras-3	TN/TNEB	210	24.02.96
2.	Basin Bridge GT-1	do -	30	12.02.96
3.	Basin Bridge GT-2	do -	30	25.02.96
4.	Basin Bridge GT-3	do -	30	26.03.96
5.	Basin Bridge GT-4	do -	30	31.03.96
	Eastern Region			
1.	Kahalgaon STPP-4	Bihar/NTPC	210	18.03.96
2.	lb Valley-2	Ori/OPGC	210	22.10.95
	North Eastern Region			
1.	Rokhia Ph.-III GT-3	Tripura	8	16.07.95
2.	Rokhia Ph.-III GT-4	- do -	8	15.12.95
	Total		1976.5 MW	
HYDRO				
1.	Kargil U-1	J&K, JKPD	1.25	12.10.95
2.	Kargil U-2	J&K, JKPD	1.25	12.10.95
3.	Kargil U-3	J&K, JKPD	1.25	12.10.95
4.	Thirot U-2	HP, HPSEB	1.50	11.08.95
5.	Thirot U-3	HP, HPSEB	1.50	07.08.95
6.	Baner U-1	HP, HPSEB	4.00	-
7	Baner U-2	HP, HPSEB	4.00	-
B.	Baner U-3	HP, HPSEB	4.00	-
9.	Rammam-II U-1	WB, WBSEB	12.50	14.01.96
10.	Rammam-II U-2	WB, WBSEB	12.50	16.02.96
11.	Surya U-1	Mah. ID, GOM	6.00	-
12.	Sone Eastern U-1	Bih. BHPC	1.65	29.02.96
13.	Sone Eastern U-2	Bih. BHPC	1.65	-
14.	Kadana PSS Extn.	Guj. GEB	60.00	-
15.	Bhandardara	Mah. ID, GOM	34.00	-
Total			147.05	
GRAND TOTAL			2123.55	

STATEMENT- III

CAPACITY ADDITION PROGRAMME FOR 1996-97 - HYDRO & THERMAL

Sl. No.	Project	Unit	Capacity (MW)	State	Implementing Agency	Expected DOC
NORTHERN REGION						
1.	Uri (H)	1	120	J&K	NHPC	Dec/96
2.		2	120	J&K	NHPC	Jan/97
3.		3	120	J&K	NHPC	Mar/97
4.	Sobla (H)	1	3	U.P.	State	Oct/96
5.		2	3	U.P.	State	Oct/96
6.	Suratgarh (T)		250	Raj.	State	Mar/97
7.	Gaj		10.5	H. P.	State	May/96
	Sub-total		**626.50**			
WESTERN REGION						
1.	Kadana(H)	4	60	Guj.	State	Jan/97
2.	Dimbhe (H)	1	5	Mah.	State	Sep/97
3.	Warna (H)	1	8	Mah.	State	Mar/97
4.	Kutch Lignite (T)-3		75	Guj.	State	Dec/96
5.	Hazira CCGT (T)		185	Guj.	Pvt.	Dec/96
	Sub-total		**300.00**			
SOUTHERN REGION						
1.	Singur (H)	1	7.5	A. P.	State	Dec/96
2.		2	7.5	A. P.	State	Feb/97
3.	Kalinadi St.-II (H)		50	Kar	State	Mar/97
4.	Lower Periyar (H)	1	60	Ker	State	Jan/97
5.		2	60	Ker	State	Feb/97
6.		3	60	Ker	State	Mar/97
7.	Lower Bhawani LBC (H)	1	4	T. N.	State	Mar/97
8.		2	4	T.N.	State	Mar/97
9.	Kothagudem (T)	9	250	A. P.	State	Mar/97
10.	Jegurupadu CCGT (T)	1	45	A. P.	Pvt.	Sep/96
11.		2	45	A. P.	Pvt.	Dec/97
12.	Brahmpuram DG Sets	1	20	Ker	State	Jul/96
13.		2	20	Ker	State	Aug/96
14.		3	20	Ker	State	Sep/96
15.		4	20	Ker	State	Nov/96
16.		5	20	Ker	State	Jan/97
	Sub-total		**693.50**			
EASTERN REGION						
1.	Mejia TPS	2	210	W. B.	DVC	Feb/97
2.	Teesta Canal Falls (H)	1	7.5	W.B.	State	Jan/97
3.		2	7.5	W.B.	State	Feb/97
4.		3	7.5	W. B.	State	Mar/97
5.	Eastern Gandak	2	5	Bih	State	Sep/96
6.		3	5	Bih	State	Dec/96
7.	Tenughat	2	210	Bih	State	June/96
B.	Budge-Budge	1	250	W.B.	CESC	Jun/96
9.		2	250	W.B.	CESC	Dec/96
	Sub-total		**952.50**			
NORTH EASTERN REGION						
1	Kathaiguri GT	6	63.5	Assam	Central	May/96 Dec/96
2.	Kopili Ext.	1	50	Assam	NEEPCO	Oct/96
3.		2	50	Assam	NEEPCO	Dec/96
4.	Rokhia	1	8	Tri.	State	Sep/96
5.		2	8	Tri.	State	Dec/96
6.	Agartala GTPS		84	Tri	State	Sep/96
	Sub-total		**263.50**			
	Grand Total		**2868.5 MW**			
	Hydro(H)		**835.00 MW**			
	Thermal (T)		**2033.50 MW**			

2.7 POWER SUPPLY POSITION

Inspite of significant growth in power generation, the shortage remains. The present shortage is mainly on account of growth in demand for power outstripping the growth in generation and generating capacity addition. The power supply position in the last four years was as under:

Energy (Million Unit net)

Year	Requirement	Availability	Shortage	(%)
1992-93	305266	279824	25442	(8.3)
1993-94	323252	299494	23758	(7.3)
1994-95	352260	327281	24979	(7.1)
1995-96	389721	354045	35676	(9.2)

PEAK (MW)

YEAR	Peak Demand	Peak Demand Net	Deficit	Shortage (%)
1992-93	52805	41984	10821	20.5
1993-94	54875	44830	10045	18.3
1994-95	57530	48066	9464	16.5
1995-96	60981	49836	11145	18.3

2.8 STEPS BEING TAKEN TO MEET THE POWER SHORTAGE

1. Thrust is on getting more out of existing investment;

   a) improving PLF

   b) higher generation - emphasis on better managerial practices, improving liquidity of SEBs and CPSUS, better coordination of the fuel supply-coal and many hydrocarbons put on O.G.L. and duties lowered to facilitate use of imported fuel which are locally scarce, case of reduction of import duty as coal is under active consideration to facilitate import of coal, renovation & modernisation of old plants-priority area for PFC lending and private participation being encouraged.

   c) better load management - for higher availability better load management sought to be achieved through establishment of inter regional grids through HVDC and other lines to allow for optimal exchange of power, optimising system operations through Regional Electricity Boards/ Regional Load Despatch Centres.

   d) demand side management - the current initiatives include rationalising energy prices, general awareness build up and promotional campaigns about end use efficiency, establishment of a network of energy management advisory service centres to undertake energy audit services, reducing consumptions in energy intensive industries through R & D efforts and pilot plant/ demonstration plants, formulation of a selective legislation for energy conservation.

2. Creation of new capacity

   Several new projects have been taken up in the State and Central Sector. Private sector are being encouraged to set up generating stations.

2.9 FINANCIAL PERFORMANCE

CENTRAL PUBLIC SECTOR UNDERTAKINGS: The performance of Central Public Sector Undertakings has been constantly improving. In 1994-95, the following companies declared dividends:

CPSUS	Dividend (Rs. Crores)
NTPC	139.00
PFC	30.00
POWERGRID	5.00
NHPC	10.00

The financial profitability of these companies has improved. The profit made by these companies are as under:

(Profit Rs. in Crores)

	1992-93	1993-94	1994-95
NTPC	886	1057	1124
NHPC	41.49	70.54	93.67
DVC	-43	117	120
NEEPCO	11	15	14
REC	-93	67	100
PFC	143	147	156
POWERGRID	236	187	207

2.10 STATE ELECTRICITY BOARD - REFORMS

The critical problem area in the power sector continues to be the poor performance of SEBS, which generate and distribute power, set tariffs and collect revenues. Industry and agriculture sectors continued to be the two most important categories of consumers in terms of their relative shares, with SEB electricity charges set at much below unit cost for the agricultural sector and above unit cost for the industrial sector. Unit revenue realisation from the agricultural sector in none of the SEBs covers a reasonable fraction of the unit average cost for the SEB, leading to heavy financial losses. The commercial losses of the SEBs in absolute terms which was Rs.6332 crores in 1994-95 (RE) is projected to increase to Rs.7130 crores in 1995-96. The hidden subsidy for agriculture and domestic sectors which was Rs. 1 1,477 crores in 1994-95 (RE) is projected to go up to Rs.13,307 crore in 1995-96. The proposed minimum agricultural tariff of 50 paise/kwh, even if implemented, will still leave uncovered a substantial proportion of the subsidy provided to the sector.

In addition, the SEBs have continued to suffer from high transmission and distribution (T & D) losses. Though, there is a declining trend, these are still higher when compared with the international average of less than 10% for the advanced countries of the world. The losses are due to sparsely distributed loads over a large rural area, substantial amount of energy sold at low voltage level, under investment in the power distribution systems, inadequate billing and high pilferage of energy. Inherent losses in conductors and equipments can be brought down through system improvement schemes and pilferage and theft of energy can be reduced through appropriate administrative measures.

2.11 STATE ELECTRICITY BOARDS - RATE OF RETURN

Restoration of financial health of SEBs and improvement in their operational performance continues to remain the most crucial issue in the power sector. In terms of Section 59 of the Electricity (Supply) Act, 1948, SEBs are required to earn a minimum rate of return (ROR) of 3 per cent on their net fixed assets in service, after providing for depreciation and interest charges. In 1990-91, only 8 SEBs had a positive rate of return with five SEBs having a ROR of about 3%. By March 1994, 12 of 17 SEBs had a rate of return of above 3%.The position has been improving. Only five SEBs now have a negative rate of return i.e. Bihar, Harayana, Punjab, Assam and Meghalaya, with subsidy during 1993-94. The commercial losses of SEBs which were Rs.32.73 Crores in 1991-92 have steadily declined and in 1993-94 the combined profit was Rs. 717.59 Crores. Rationalisation of tariff, levy of a minimum agricultural tariff and commercialisation of operations can improve the financial health of the SEBS. Some of the states have already fixed a minimum tariff of 50 paise per unit for the agricultural sector, but most of them are applying the rate only for metered supply.

2.12 RESTRUCTURING OF SEBs

A process of restructuring of the SEBs has been initiated in several states, namely Orissa, Haryana, Uttar Pradesh, Rajasthan, Bihar and Andhra Pradesh. Diagnostic studies are being undertaken by external consultants.

Organisational restructuring aims at:

i) Unbundling of Power Industry by separating generation, transmission and distribution.

ii) Bringing in competitiveness by allowing private participation in generation and distribution.

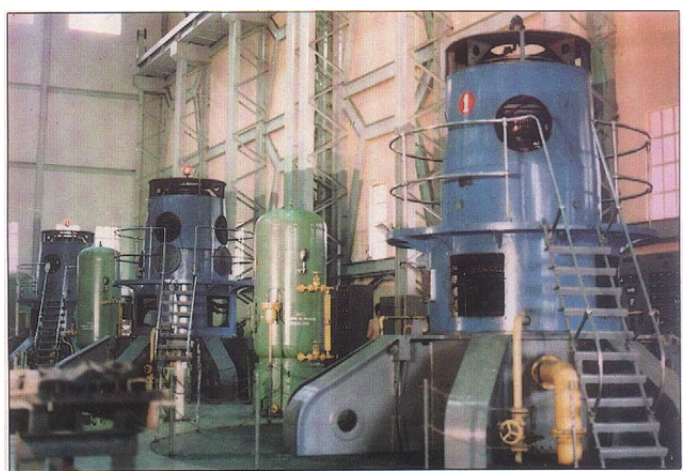
iii) Development of regulatory framework.

In Orissa, a legislation on reforms has been enacted. Separate corporation have been set up for generation and transmission. An independent Electricity Regulatory Commission is being set up which will, inter-alia, propose tariffs for each category of consumers. The State has been divided into four distribution zones and a licence has been granted to a private party for one of the zones.

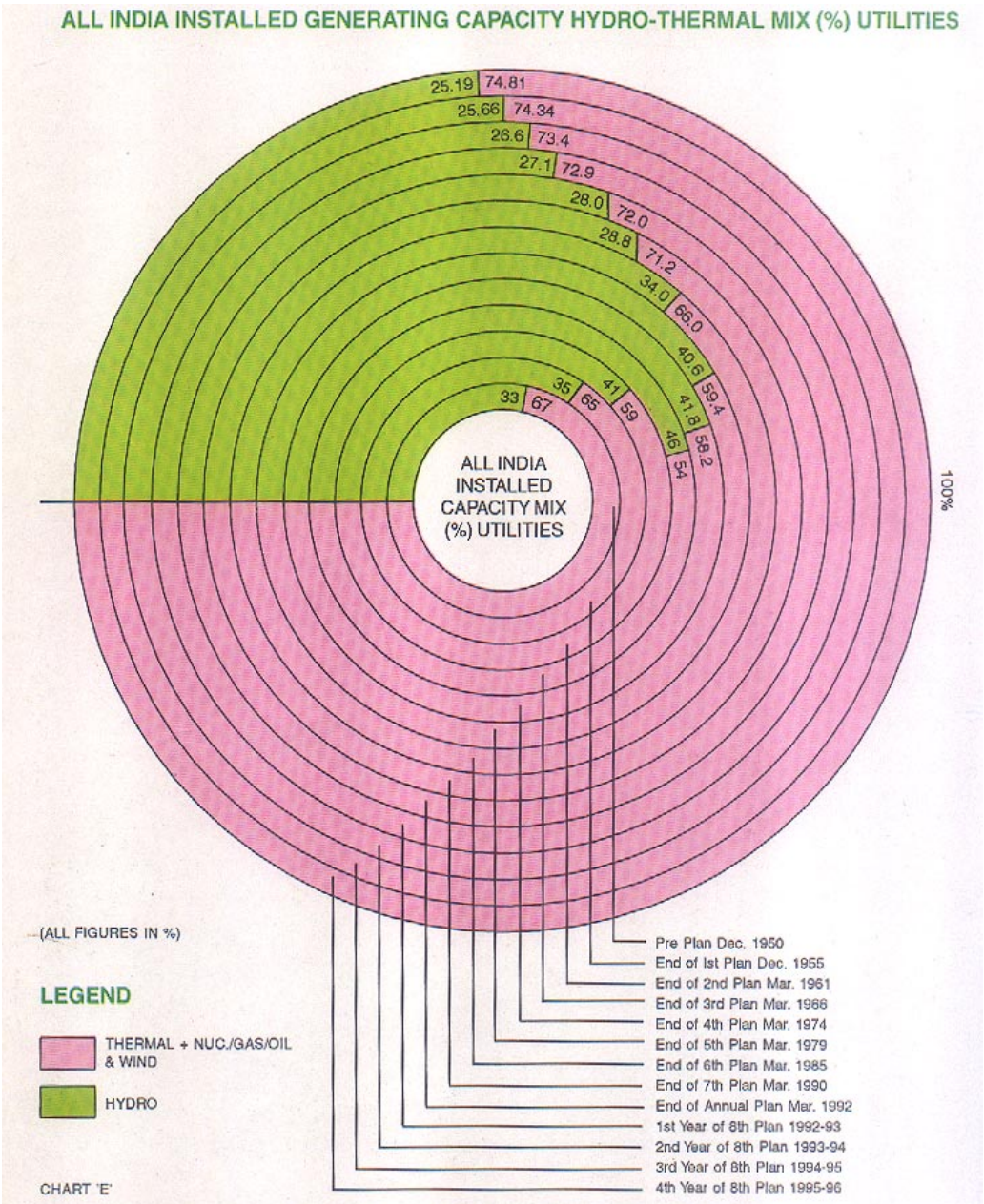
2.13 EIGHTH PLAN OUTLAYS

(Rs. Crores)

	Approved outlay during the 8th Plan	Approved outlay during Annual Plan			
	1992-97	**1992-93**	**1993-94**	**1994-95**	**1995-96**
A. STATE SECTOR (RE. STATE PLAN)	48,407.74	8532.93	8958.45	9991.91	11383.06
B. CENTRAL SECTOR	31,181.58	6411.00	7461.46	8463.54	8254.38
TOTAL	79,589.32	14943.93	16419.91	18455.45	19637.44



Power House (Loktak Project)


ALL INDIA INSTALLED GENERATING CAPACITY HYDRO-THERMAL MIX (%) UTILITIES
25.19
74.81
25.66
74.34
26.6
73.4
27.1
72.9
28.0
72.0
28.8
71.2
34.0
66.0
40.6
59.4
41.8
58.2
46
54
41
59
35
65
33
67
ALL INDIA INSTALLED CAPACITY MIX (%) UTILITIES
100%
(ALL FIGURES IN %)
LEGEND
THERMAL + NUC./GAS/OIL & WIND
HYDRO
CHART 'E'
Pre Plan Dec. 1950
End of Ist Plan Dec. 1955
End of 2nd Plan Mar. 1961
End of 3rd Plan Mar. 1966
End of 4th Plan Mar. 1974
End of 5th Plan Mar. 1979
End of 6th Plan Mar. 1985
End of 7th Plan Mar. 1990
End of Annual Plan Mar. 1992
1st Year of 8th Plan 1992-93
2nd Year of 8th Plan 1993-94
3rd Year of 8th Plan 1994-95
4th Year of 8th Plan 1995-96

3. TRANSMISSION

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 states. The programme for 1995-96 in the Central and State Sector included construction of 1898 Ckm of 400 kv lines and 2115 Ckm of 220 kv lines alongwith the associated substations.

The progress achieved during the year 1995-96 in the construction of transmission lines and substations is summarised below:

400 kv lines	2445 Ckm
220 kv lines	2545 Ckm
400 kv substations	3335 MVA
220 kv substations	57915 MVA

3.1 CENTRAL SECTOR TRANSMISSION SYSTEM

Central Sector transmission lines and substations commmissioned during the year 1995-96 upto March, 96 are listed in the following table:

Transmission line	Executing Agency	Length (Ckm)
400 KV		
i) Gandhar-Dehgaon	Powergrid	314
ii) Trichy-Madurai	Powergrid	260
iii) Talcher-Rourkela	Powergrid	342
iv) Mariani-Misa	Powergrid	446
v) Hissar-Bhiwani	Powergrid	35
	Total	**1397**
220 KV		
Dimapur-Misa	Powergrid	250
132. KV		
Itanagar-Ranganadi	Powergrid	22

Substation 400/220 kv	Executing Agency	No.
i) Dehgam	Powergrid	1

3.2 NATIONAL POWER GRID

The Union Government in 1980 approved in principle the establishment of a Centrally owned and operated National Power Grid. The National Power Grid would eventually comprise strong Regional networks with suitable asynchronous (HVDC) links between the regions. Already 19,902 Ckt. kms. of 400 kv lines and 5196 ckt. kms. of lines at 220 kv level and 766 Ckms of lines at 132 kv level have been commissioned in the Central Sector, upto March, 1996. An inter-regional link (Vindhayachal 2 x 250 MW HVDC back-to-back) connecting Western and Northern Regions is also in operation. These as well as other AC links between regions form the important components of the National Power Grid today

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.

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.

3.3 NATIONAL HIGH VOLTAGE DIRECT CURRENT (HVDC) PROJECT

The first stage of NHVDC project between Lower Sileru (A. P.) & Barsoor (M. P.) has been in continuous operation since its commissioning in October, 1989. The energy so far (Sept.'95) transmitted amounts to 531 MU. The second stage of uprating the link to 250 MW at +200 kv was approved in Sept., 93 at a cost of Rs. 103.98 crores (excluding customs duty of 14.17 crores). The works are in initial stages and is to be commissioned by Sept., '97. The third stage which envisages addition of another pole to convert the monopole DC system to a bipole operation with voltage level of + or - 200 kv DC and power transfer level of 400 MW, will be taken after completion of Stage II.

The link has been quite useful in giving India an indigenous development of HVDC technology. The link has also been quite useful in coming to the rescue of the member states (AP & MP) in tiding over their difficulties in times of power crisis.

3.4 STATIC VAR COMPENSATOR (SVC)

SVCs are normally installed in transmission systems in order to provide voltage support under peak load or fault conditions and to reduce system overvoltages under light load conditions. The proposal to install SVCs of + 70/30 MVAR at a cost of Rs.80 cr. at Kanpur, Lucknow & Moradabad of UPSEB has been cleared by CEA and the commissioning of the scheme is delayed due to arrangement of funding by UPSEB. The proposal of installing SVCs of +30 MVAR and +15 MVAR in Madhya Pradesh was cleared by CEA during 1991 at an estimated cost of Rs. 158 crs. and the execution of these schemes is delayed for want of funds by MPSEB and the mode of funding.

3.5 FLEXIBLE AC TRANSMISSION SYSTEM (FACTS)

The flexible AC transmission system (FACTS) technology is intended to improve the dynamic performance of the power transmission system and achieve regulated power flow across AC transmission network. For two nos. experimental 400 KV transmission lines of MPm the FACTS implementation has been estimated to be Rs.78 crs by the committee of experts working on FACTS.

However, further work on the proposal has been held up for want of consensus on the identification of transmission lines corridor, mode of funding and sharing of cost.

3.6 AWARDS FOR REDUCTION IN TRANSMISSION AND DISTRIBUTION LOSSES

There has been a further reduction of 0.39% in the transmission and distribution losses for the country as a whole as these have come down from 21.80% during 1992-93 to 21.41 %during 1993-94.

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 Divisions/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 incentive 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.

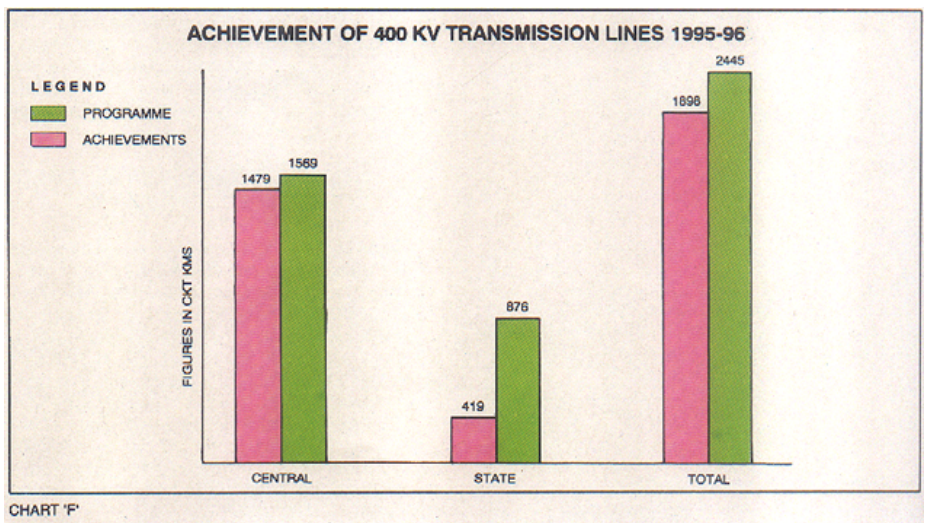


CHART 'F'

4. RURAL ELECTRIFICATION PROGRAMME

Rural Electrification involves supply of energy for two types of programmes:

a) production oriented activities like minor irrigation, rural industries etc; and

b) electrification of villages.

While the emphasis is laid on exploitation of ground water potential and energisation of pumpsets/ tubewells, which has a bearing on agricultural production, the accent in respect of areas covered under the Revised Minimum Needs Programme (RMNP), is on village electrification.

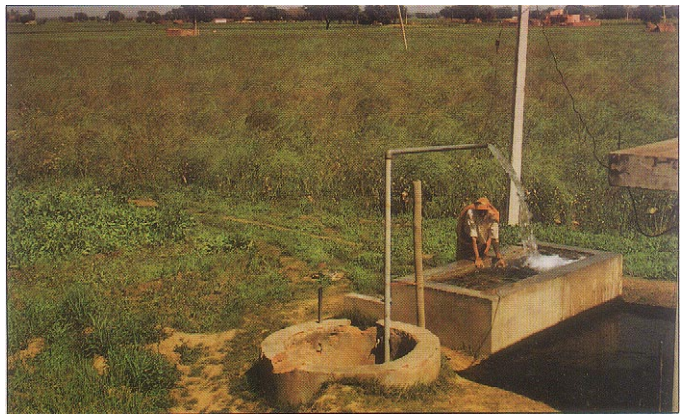
Rural electrification programmes are formulated and executed by the SEBs/State Government Departments.

During the year 1995-96, 3186 (Provisional) inhabited villages were electrified and 345823 (Provisional) irrigation pumpsets/tubewells energised as on 31.03.1996, against the target of 4,325 village electrification and 337990 pumpset energisation respectively for the year as a whole. Cumulatively 500931 (Provisional) villages have been electrified and 11067078 (Provisional) pumpsets have been energised as on 31.03.1996.

As regards electrification of tribal villages, out of a total of 111886 tribal villages in the country 79210 (Provisional) villages constituting 70.5% have been electrified as on 31.3.1996. Similarly 286057 (Provisional) Harijan Bastis have been electrified.

The Kutir Jyoti Scheme also continued during 1995-96. The scheme is financed from Central grant which is routed through Rural Electrification Corporation.

Progress report in respect of electrifications of villages and energisation of Pumpsets has been indicated in the statements.



Irrigation by Energised Pumpsets in Haryana

STATEMENT

PROGRESS REPORT IN RESPECT OF ELECTRIFICATION OF VILLAGES UPTO THE MONTH OF MARCH, 96

Sl. No.	States/UTs	Total No. of villages (1981 Census)	Achieve-vement as on 31.3.94	%age of villages Electrified	Achieve-ment during 1994-95	Target for year 1995-96	Achievement during 95-96 (PROVISIONAL) Cumulative end of 3-96	Total Achieve-ment to the end of 3-96
1.	Andhra Pradesh	27379	27358	100.0	-	-	-	27358
2.	Arunachal Pradesh	3257	1839	56.5	310	120	39	2188
3.	Assam	21995	21495	97.7	170	900	Nil	21665
4.	Bihar	67546	47703	70.6	59	400	18	47780
5.	Goa	386	377	100.0	-	-	-	377
6.	Gujarat	18114	17892	100.0	-	-	-	17892
7.	Haryana	6745	6745	100.0	-	-	-	6745
8.	Himachal Pradesh	16807	16761	100.0	-	-	-	16761
9.	J & K	6477	6181	95.4	50	65	21	6252
10.	Karnataka	27028	26483	100.0	-	-	-	26483
11.	Kerala	1219	1219	100.0	-	-	-	1219
12.	Madhya Pradesh	71352	66219	92.8	1019	350	503	67741
13.	Maharashtra	39354	39106	100.0	-	-	-	39106
14.	Manipur	2035	1782	87.6	71	75	163	2016
15.	Maghalaya	4902	2407	49.1	Nil	60	Nil	2407
16.	Mizoram	721	617	85.6	65	45	45	727
17.	Nagaland	1112	1099	98.8	-	-	-	1099
18.	Orissa	46553	32908	70.7	223	220	298	33429
19.	Punjab	12342	12342	100.0	-	-	-	12342
20.	Rajasthan	34968	29171	83.4	699	750	750	30620
21.	Sikkim	440	405	100.0	-	-	-	405
22.	Tamil Nadu	15831	15822	100.0	-	-	-	15822
23.	Tripura	856	3428	72.5	150	20	15	3593
24.	Uttar Pradesh	112566	84906	75.4	428	800	916	86250
25.	West Bengal	38024	28806	75.8	310	520	89	29205
	Total (State)	578009	493071		3554	4325	2857	499482
	Total (UTs)	1123	1120	100	-	-	-	1120
	Total	579132	494191		3554	4325	2857	500602
	(All India)	(583003)	(495329)	85.0				

STATEMENT

PROGRESS REPORT IN RESPECT OF ENERGISATION OF PUMPSETS UPTO THE MONTH OF MARCH, 96

Sl. No.	States/UTs	Estimate ultimate potential in terms of electrical pumpsets	Achieve-vement as on 31.3.94	%age	Achieve-ment during 1994-95	Target for year 1995-96	Achievement during 95-96 (PROVISIONAL) Cumulative end of 3-96	Total Achieve-ment to the end of 3-96
1.	Andhra Pradesh	1600000	1504975	94.1	100832	53000	22498	1628305
2.	Arunachal Pradesh	-	-	-	-	-	-	-
3.	Assam	200000	3675	1.8	-	-	-	3675
4.	Bihar	1000000	263009	26.3	1746	1000	2234	266989
5.	Goa	-	5083	-	358	-	291	5732
6.	Gujarat	700000	531546	75.9	20005	30000	15169	566720
7.	Haryana	430000	400846	93.2	3261	11000	2118	406225
8.	Himachal Pradesh	10000	3965	39.7	207	150	269	4441
9.	J&K	15000	3170	21.1	667	300	755	4592
10.	Karnataka	850000	917326	107.9	55962	60000	41630	1014918
11.	Kerala	300000	275983	92.0	14130	15000	14622	304735
12.	Madhya Pradesh	1300000	1042378	80.2	47109	12800	41948	1131435
13.	Maharashtra	1800000	1826064	101.4	95382	47000	102977	2024423
14.	Manipur	10000	45	0.5	-	-	-	45
15.	Meghalaya	10000	65	0.7	-	-	-	65
16.	Mizoram	-	-	-	-	-	-	-
17.	Nagaland	10000	176	1.8	-	-	-	176
18.	Orissa	500000	64035	12.8	2889	3500	1052	67976
19.	Punjab	700000	668863	95.6	15608	10000	23584	708055
20.	Rajasthan	600000	464549	77.4	25208	25000	25001	514758
21.	Sikkim	5000	-	-	-	-	-	-
22.	Tamil Nadu	1500000	1445651	96.4	42518	40000	34867	1523036
23.	Tripura	10000	1698	17.0	40	100	26	1764
24.	Uttar Pradesh	2400000	721933	30.1	16387	25500	11529	749849
25.	West Bengal	500000	96988	19.4	2266	3640	1978	101232
	Total (States)	14450000	10242023	70.9	444575	337990	342548	11029146
	Total (UTs)	50000*	34021	68.0	636	-	586	35243
	Total (All India)	14500000	10276044	70.9	445211	337990	343134	11064389

*Includes the potential of Arunachal Pradesh, Goa and Mizoram states.

5. ENERGY CONSERVATION AND RENOVATION & MODERNISATION

The power programme during the Eighth Five Year Plan as approved by the Government, inter alia, lays emphasis on Energy Management, Energy Conservation and end use efficiency improvement in order to bridge partly the gap between the demand and supply. Keeping in view the resource constraints and likely short-fall in the new capacity addition with reference to the need based requirement, it becomes imperative that energy conservation measures in the areas of generation, transmission, distribution and end-use consumption are given immediate attention. With this view, it is envisaged that a saving of 5,000 MW generation capcity and 6 million tonnes of petroleum products under the National Energy Efficiency Programme would be made by the terminal year of Eighth Five Year Plan through Conservation efforts.

Operating power stations at low efficiency makes the power generation costly and also entails extra quantity of coal and fuel oil which could otherwise be conserved. In this context, constant thrust towards reduction Of secondary fuel oil consumption in the thermal power stations all over the country is being given. Study for reduction of secondary fuel oil consumption was carried out in six thermal power stations in 1994-95 and energy audit studies is being carried out in other thermal power plants. The specific secondary fuel oil consumption which was 6.77 kl/kwh in 1991-92 i.e. before the beginning of the 8th Plan (1992-93 to 1996-97) came down to 5.01 kl/kwh in 1994-95. As a result, savings of the order of about 4.09 lakhs kilo litres of fuel oil worth Rs.204.5 crores at existing prevalent price was effected during 1994-95 as compared with secondary fuel oil consumption level of 1991-92.

5.1 ENERGY AUDIT

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 conductors loading and stepping of voltage level etc. These steps have effected in reduction of T & D losses. There has been reduction of T & D losses by 1.42% in the first two years of 8th Plan against a targetted reduction of 1% per year as per National Energy Efficiency Programme (NEEP).

Due consideration has also been given in the design of various system/sub-systems itself to promote the use of energy efficient technologies. In addition to cogeneration such as Integrated Coal Gasification Combined Cycle (IGCC), development of Fluidised Bed Combustion (FBC) boilers, use of gas turbine based combine cycle plants having high overall efficiency etc., are also being promoted in the field of generation of electrical energy.

5.2 INTERNATIONAL ASSISTANCE IN ENERGY CONSERVATION

Ministry of Power has implemented some Energy Conservation Projects in cooperation with international agencies.

Ministry of Power had also sanctioned a number of schemes on demonstration projects for rectification of agricultural pumpsets, improvement in installation of energy efficient pumping system, energy audit schemes in industries and thermal power stations for reduction of fuel oil consumption and T & D losses by system improvement, saving of energy during peak hours in the evening.

5.3 ENERGY CONSERVATION DAY - 14TH DECEMBER

14th December 1995 was 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".

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.

As in the past, National Energy Conservation Day was organized on 14th December 1995. Awards were given to 21 industrial units which have done commendable work in the field of energy conservation. The energy intensive sub-sectors, which these units represented are Aluminium, Chemical, Chlor-alkali, Fertilizer, Integrated Steel Plant, Oil Refinery, Petrochemical and Pulp & Paper.

5.4 R & M PROGRAMME

With a view to improving the performance of existing old power stations by replacement/repair/renovation of the system elements, Renovation and Modernisation Programme (Phase-I) launched in Sept., 1984 covering 163 Nos. of thermal units installed at 34 Nos. of thermal power stations aggregating to a total capacity of 13570.5 MW has since been completed and an expenditure of Rs. 1066 crores has been made by March, 1996. As against the target of 7000 MUs of additional generation, on an average, additional generation of about 10,000 MUs/annum has been achieved which is equivalent to 1900 MW of additional capacity at 60% PLF.

5.4.1 R & M PROGRAMME (PHASE - II)

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 210 units of 46 old thermal power stations with aggregated capacity of 21644.00 MW and a total latest sanctioned cost of Rs.2533.00 crs. The programme is anticipated to give an additional generation of 8750 MUs by improving the overall PLF by 5% from 51.5% to 56.5%. The programme is also anticipated to extend the life of some units of Neyveli, Amarkantak, Korba-II, Satpura-I and Kothagudem (B) TPSs 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.

5.4.2. PROGRESS

(A) FINANCIAL PROGRESS

An amount of Rs. 597.28 crores has been incurred by the PFC/World Bank and project authorities as per details given below:

	(Rs. in crores)
PFC	115.08
World Bank	123.72
State Plan own resources	358.42
Total Expenditure upto March 1996	597.28
Proposed outlay for 1996-97	550.00

(B) PHYSICAL PROGRESS

Out of a total 1637 works, 338 have been completed, 362 are under progress as on 31.3.1996.

5.4.3 CONSTRAINTS FACED DURING IMPLEMENTATION

Out of a total 46 approved schemes, 23 are being partly funded by PFC/WB, 5 schemes are funded from Project authorities' own resources. The progress of remaining 18 schemes pertaining to UPSEB, BSEB, WBSEB, ASEB, DVC etc. is very tardy because of paucity of funds with these SEBs/ SGCs and their ineligibility for availing loan from Power Finance Corporation.

5.4.4 PROGRAMME FOR 1996-97

Based on the recent discussions held by C EA with various SEBs/SGCs, a provision of about Rs.550 crores is required for the year 1996-97 for various R & M schemes. During the year about 260 Nos. of R & M works are expected to be completed and about 30 Nos. of units are likely to meet stack emissions standards stipulated by Pollution Control Board. However, the above targets can be achieved only if required funds are made available for the R & M works by concerned SEBs/ SGCs either from own resources or loan from Power Finance Corporation/Other lending agencies.

5.5.5 PFC's ROLE IN R & M PROGRAMME

PFC took up financing of the Central loan assistances with effect from 1 st April, 1988. They also started assisting the State Governments in financing their portion of activities as well as some critical and complementary activities from the year 1990-91 onwards as per details given below:

	Stations	Sanctioned	Disbursement (Rs. in crores)
Central loan Assistance	25	114.26	104.75
State Plan	10	58.63	49.32

Most of the work for the schemes financed by PFC under Central loan assistance programme have been completed.

PFC is extending loan assistance to ongoing R & M Phase-I Programme upto 70% of the total cost of

scheme. It has sanctioned loan assistance to 9 eligible borrowers for their 23 schemes as well as selected environmental activities of 2 ineligible borrowers - HSEB and WBSEB - under relaxed conditions.

Based on the anticipated progress of the ongoing R & M schemes, PFC is likely to disburse about Rs.1 35 crores during the year 1996-97. Further, PFC, has projected to lend/sanction about Rs.300 crores for R & M Programme during the year 1996-97.

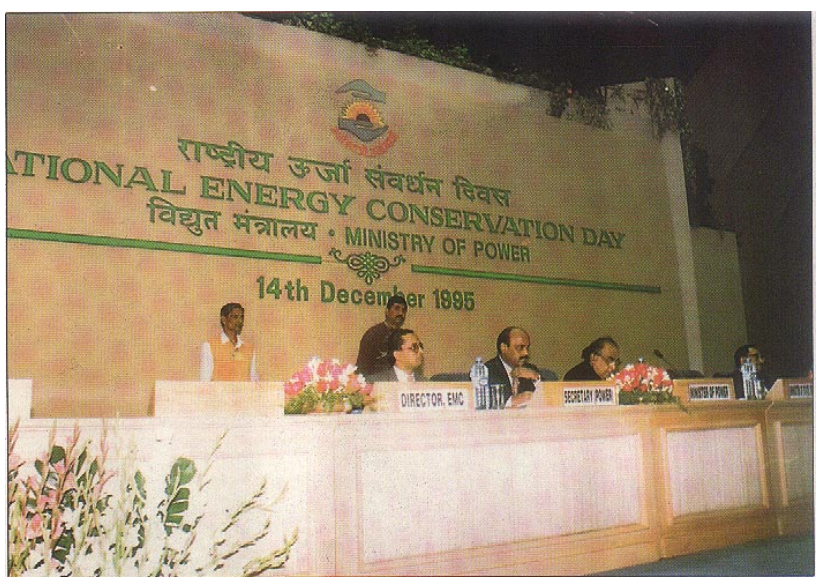
5.5.6 PRIVATE SECTOR PARTICIPATION

The progress of work in respect of Phase-II Programme is slow mainly due to funds constraint with the State Electricity Boards. In order to push up the R & M Programme, this field has been opened for private sector participation. The following three alternative options have been suggested to the various State Electricity Boards/ State authorities for implementation of R & M programme through private sector participation:

i) Lease, Rehabilitate, Operate and Transfer.

ii) Sale/Purchase of Plant, and

iii) Joint Ventures of SEB and IPP as possible options.



National Energy Conservation Day, 1995

6. COOPERATION WITH NEPAL AND BHUTAN IN HYDRO POWER

The development of water resources of the common rivers of India and neighbouring countries of Nepal and Bhutan for mutual benefits has been under discussion with these countries. There is regular exchange of surplus electric power between India and the above neighbouring countries for meeting the power requirements in the border areas.

Four major water resources projects in Nepal have been under discussion. The feasibility study report of one project viz. Karnali Multi-purpose project (10800 Mw) was prepared in 1989. The key parameters of the project are to be finalised after mutual discussions. India had offered financial and technical assistance for investigation of three other major projects viz. Pancheshwar (2000 MW), Sapta Kosi (3300 MW) and Burhi Gandaki (600 MW). Joint technical expert groups have been constituted for each of the above projects for joint guidance for investigation and preparation of detailed project reports (DPRs). The exchange of power between India and Nepal is presently taking place at 17 points along Indo_ Nepal border. The voltage level for new inter-connections has been agreed to be 132 KV to increase the quantities of power being exchanged. Two joint Indo-Nepal Committees viz., Power Exchange Committee and Power Exchange Coordination Unit should look into the matter concerning the exchange of power between the two countries. India has also agreed to provide 70 MU of energy to Nepal annually free of cost from Tanakpur HE project in India. A treaty on Mahakali River Basin has been signed between His Majesty's Government of Nepal and Government of India in February, 1996.

In Bhutan, Chukka H. E. Project (336 MW) implemented with Indian financial and technical assistance and operating in an excellent manner is a shining example of cooperation between the two countries for mutual benefits. The surplus power from the project is being imported by India. Kurichu H.E. Project (45 MW) in Eastern Bhutan is presently under implementation on turnkey basis with Indian financial and technical assistance. For the implementation of another H.E. Project viz., Tala H. E. Project (1020 MW) an agreement has recently been signed between Government of India & Royal Government of Bhutan. The investigation of Shankosh multipurpose Project (4060 MW) have been completed by CWC and DPR was finalised in December, 1995 and is presently under examination in CEA.

Two other hydro electric projects namely Wangchu and Bunakha with a total installation of 1080 MW have been investigated and their DPRs are presently under various states of consideration.

7. PRIVATE SECTOR PARTICIPATION IN POWER GENERATION AND DISTRIBUTION

7.1 The policy of Private Sector participation in Power Sector was launched in 1991. The response to the policy has been encouraging. As on 31.3.96, 194 offers for setting up power plants for a total capacity of 75296 MW involving an investment of approx. 282228.00 crores have been received and are under different stages of clearance. 52 of these offers are from foreign private firms including NRIs and Joint Venture proposals. 16 of these proposals have been approved by the Government from the foreign investment angle.

7.2 As on 31.3.1996, 972.3 MW has been added by the existing licensees and new generating companies. These are Shivpur HEP (1 8 MW) of M/s Bhoruka Power Corporation Ltd. Trombay (1 80 MW) and Bhira PSS (1 50 MW) of M/s TEC. Dahanu TPS (500 MW) of M/s BSES, Maniyar HEP (12 MW) of M/s Universal Carborandum and lst Unit of (67.5 MW) of Jojobera TPS. In addition, Budge Budge (500 MW) of M/s CESC is scheduled for commissioning during 1996-97. It is expected that among the new proposals some units of gas based power projects such as Jegurupadu (216 MW) and Godavari (208 MW) in Andhra Pradesh, Paguthan (655 MW) in Gujarat, Phase I of Dabhol (695 MW) in Maharashtra, Hazira (515 MW) CCGT and GIPCL Baroda (160 MW) in Gujarat, Adamtilla (9 MW) and Bansakandi (15.5 MW) gas based power projects in Assam, Tawa HEP in Madhya Pradesh and Jojobera TPS in Bihar might get completed around 1997 which have a shorter gestation period.

7.3 Based on the experience gained with the initial batch of Power Purchase Agreements (PPAS) for private power projects, Government have circulated detailed principles for negotiating PPAs for Indian Private Power Projects by the State Governments/SEBs with a view to strengthening their capabilities in negotiating the PPAS. To add more clarity to the policy, the tariff notification has been amended from time to time, wherein, interalia, liberalised tariff norms for hydroelectric projects have been notified and use of naphtha has been permitted as primary fuel. To add transparency to the system of finalising private power projects, competitive bidding has been made mandatory. Detailed guidelines have been issued to the State Governments for adopting competitive bidding.

7.4 Detailed guidelines for encouraging private sector participation in renovation and modernisation of power projects have been issued. To meet rapidly increasing demand for power by industries, State Authorities have been advised to encourage captive/ cogeneration plants by the industries with either provision for purchase or provision for wheeling arrangements of the surplus power by the concerned SEBS. Initiatives have been taken to encourage setting up of mega power projects which will be of a capacity of 1 000 MW or more and would be catering to more than one State. Liquid fuel based power plants, specially, captive power plants, power plants located in proximity to refineries and in coastal and remote areas and those being set up to look after exigencies of the grid are being encourged. The Government of India's tariff notification has also been amended for allowing norms for naphtha based power stations.

7.5 The limit of capital expenditure of the schemes, requiring concurrence of the Central Electricity Authority has been enhanced from Rs.100 Crores to Rs.400 Crores in case of generating schemes put up by Generating Company which was selected through a process of competitive bidding by the competent Government. Procedures for CEA clearance have been simplified such as introduction of two stage clearance viz., in-principle clearance followed by TEC, reduction in the number of clearances required to be obtained for the purpose of appraisal of the private power projects by CEA. Greater thrust is being given to private sector participation in renovation and modernisation, setting up of captive power plants and mega power projects. The broad outline of these initiatives are as follows:

I) Captive and Cogeneration Power Plants:

State Governments have been advised to encourage captive, including co-generation power plants by forming an institutional mechanism for early clearance of such proposals and also to ensure effective measures such as purchasing or wheeling surplus power from such plants. Government have extended concessional customs duty for import of project equipment and spare parts for captive power plants. It is expected that these measures would go a long way in meeting the immediate and long term energy needs of the industrial sector and also in adding generation capacities in the country. This would also obviate the need for counter guarantee which the Government is finding difficult to sustain.

ii) Renovation & Modernisation:

In order to mitigate power shortages, the Government have been emphasizing both on supply side and demand side management. However, the thrust had mainly been on new capacity addition and the upkeep of these plants did not receive desired attention. As a result, efficiency of these plants gradually deteriorated. Government successfully implemented a Renovation and Modernization (R & M) programme in the Seventh plan but, due to the paucity of funds in the State Sector, this could not be sustained. Since R & M is recognized as offering a much cheaper and quicker way to add to capacity, it deserves the highest priority. Since the private power policy has opened up new avenues of financing of R & M, a policy has now been finalized in consultation with the State Governments to enhance the possibilities of large scale private sector involvement in R & M of existing plants. Detailed guidelines have been issued to the State Governments for entrusting Renovation and Modernization of power projects to the private sector. The guidelines have been identified as follows:

a) Lease, Rehabilitate, Operate and Transfer

b) Sale of plant and

c) Joint Ventures of SEB and IPP as possible options.

However, these options are only illustrative and choice and initiative have been left to the State Governments for working out other innovative solutions as well. It is hoped that R & M would get the much needed impetus through private participation, thereby, providing immediate power with economic investment.

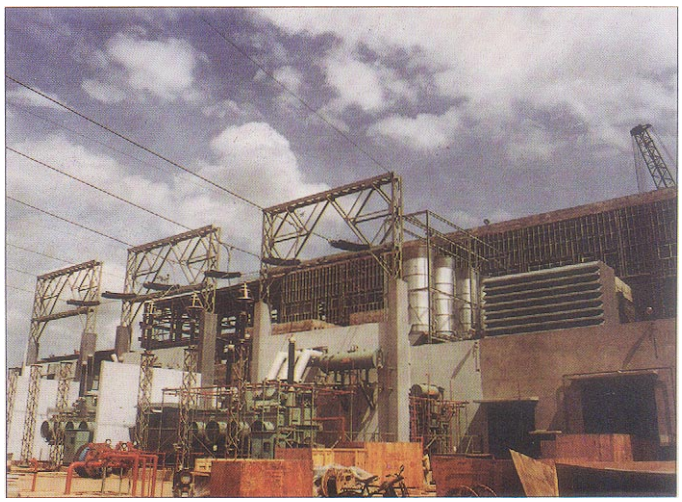
iii) Liquid Fuel Policy:

Even though the response of the private sector to set up coal/Lignite, gas and hydel projects has been encouraging, it has been recognized that, in view of the long gestation period, these projects would take three to five years to come on stream. Hence, a quick capacity addition is essential in order to avert a severe power crisis. Many states have also approached Ministry of Power in this regard. After detailed examination of the matter in consultation with Ministry of Petroleum and Natural Gas and Planning Commission, and a detailed study through computer modelling, it is felt that there is economic wisdom in setting up liquid based power plants in certain areas of the country. It was also indicated by the Ministry of Petroleum & Natural Gas that there is some surplus of such heavy fuels in the country and some of them being on OGL could be also imported. It was, therefore, decided to also permit setting up of power projects based on heavy fuel oils such as, Naphtha, Heavy Petroleum Stock (HPS), Low Sulphur Heavy Stock (LSHS), Heavy Furnace Oil (HFO), Furnace Oil (FO) and Natural Gas, wherever available, as primary fuel. However, since these are expensive fuels “deemed generation” beyond the PLF levels at which the fixed cost is recovered, is not allowed. Captive Power Plants, power plants located in proximity to refineries, coastal and remote locations, and those being set up to look after exigencies of the grid would be given preference. A Resolution has been issued in this regard. The GOI tariff notification has also been amended for allowing norms for Naptha based power stations.

iv) Mega Power Projects:

Projects of capacity of 1000 MW or more and catering to more than one state is proposed to be set up in the private sector through Government of India intervention. The project set up in a State which is meant for only that State will continue to be promoted by the State. This has been found necessary as coal and hydro reserves are primarily in one part of the country viz. East, Northeast and North, and power shortages occur primarily in the West and the South. It is, therefore, obvious that unless mega power projects are set up in the region having coal and hydel potential, it would not be possible to tackle the increasing demand for power on the most viable route. Establishing mega projects in the coastal regions based on imported coal also poses as a feasible option. Since funds with the public sector are limited, the Ministry of Power had been exploring the possibility of setting up mega power projects through the private sector route and the initial response has been positive. Some of these private sector projects would also have the added advantage of the associated coal mine being developed by the private sector itself. Since it would be difficult for one state to handle such projects it has been decided that Power Grid would provide escort services to the IPPs and also

arrange for wheeling of power to the different purchaser States who would enter into PPAs with the IPPs. The competitive bidding route will be adopted for selecting the promoter. CEA would identify potential sites for setting up such mega projects, NTPC would prepare feasibility reports the cost of which could be recovered from the private promoter and the Power Grid would take measures for selection of promoters.



GVK's Jegurupadu Project Transformer Yard with GT Hall in the background

8. CENTRAL ELECTRICITY AUTHORITY

Central Electricity Authority (CEA) is a statutory Organisation constituted under Section 3 (1) of the Electricity (Supply) Act, 1948. It was established as a part-time body in 1951 and made a full-time body in 1973. It is an attached off ice of Ministry of Power, Govt. of India.

In all technical, financial and economic matters, the Ministry of Power is assisted by the CEA. CEA is responsible for technical co-ordination 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 & Commercial), Member (Power Systems), Member (Planning), and Member (Grid & Operation).

8.1 FUNCTIONS OF THE CEA

The Authority is generally to exercise such functions and perform such duties under the Act and in such manner as the Central Government may prescribe under the Rules framed under Section 48 (1) of the Electricity Supply Act, 1948 or by issue of written directions in matters of policy involving public interest under Section 48(l) of the said Act. Under Section 3(l) of the Act, the C EA is particularly charged with the following functions:

1 To develop a sound, adequate and uniform national power policy, formulate short-term and perspective plans for power development and coordinate the activities of planning agencies in relation to the control and utilisation of national power resources;

2) To act as arbitrators in matters arising between the State Govt. or the Board and a licensee or other person as provided in the Act;

3) To collect and record the data concerning generation, distribution and utilisation of power and carry out studies relating to cost, efficiency, losses, benefits and such like matters;

4) To make public from time to time information secured under the Act and to provide for the publication of reports and investigation;

5) To advise any State Govt., Board, Generating Company or another agency engaged in generation and/or supply of electricity on such matters as will enable such Govt., Board. Generating Company or agency to operate and maintain the power system under its ownership or control in an improved manner and where necessary in coordination with any other agency owing or having the control of another power system;

6) To promote and assist in the timely completion of schemes sanctioned under Chapter V of the Act;

7) To make arrangement for advancing the skill of persons engaged in the generation and supply of electricity;

8) To carry out or make arrangement for any investigation for the purpose of generating or transmitting electricity;

9) To promote research in matters affecting the generation, transmission and supply of electricity;

10) To advise the Central Govt. on any matter on which its advice is sought or make recommendations to that Govt. on any matter if, in the opinion of the Authority the recommendation would help in improving the generation, distribution and utilisation of electricity; and

11) To discharge such other functions as may be entrusted to it or under any other law.

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

a) Co-ordination of research and development in the power generation field;

b) 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.

13) Apart from the above functions provided under the Electricity (Supply) Act, 1948, the CEA also undertake design and engineering of power projects with a view to developing in-house technical know-how and also to assist State Electricity Boards, Generating Companies & State Authorities requiring such assistance under Section 5(l) (v) of the Electricity (Supply) Act, 1948.

8.2 CLEARANCE OF SCHEMES

As per a notification issued on 28.12.95 energy schemes selected through competitive bidding by the Competent Government or Governments and estimated to involve a capital expenditure exceeding Rs.400 Crores shall be submitted to the Central Electricity Authority for its concurrence.

8.3 TECHNO ECONOMIC APPRAISAL OF SCHEMES BY CEA

Techno economic appraisal formation is responsible for examination of the schemes for proposed thermal/hydro 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 PP/HEP, tying up of necessary inputs like coal, water environmental clearances, civil aviation clearance, etc. and techno economic appraisal of thermal/hydro power projects before according approval. CEA is also responsible for establishing the need for captive power projects in public/private sector and to recommend the same whenever required. Techno economic clearance of revised cost estimates in respect of earlier cleared/ ongoing schemes of public sector undertakings/SEBs is also the responsibility of the formation. In addition, the formation is also responsible for techno-economic appraisal of Transmission & Distribution schemes associated with various generating schemes.

Keeping in view the difficulties experienced by private sector project developers in finalising financial packages and other linkages such as cost etc. CEA have decided to issue “In Principle” clearance to them for their proposals. This facilitates the IPIs to tie up funds and other approval with the concerned authorities.

9. BADARPUR MANAGEMENT CONTROL CELL

Badarpur Management Control Cell (BMCC) is a subordinate office under Ministry of Power. BMCC administers the management with the National Thermal Power Corporation to make payment to the Badarpur Thermal Power Station (BTPS)/Badarpur Thermal Power Project and its allied work at Delhi.

Badarpur Thermal Power Station at Delhi consists of 3x100 MW and 2x210 MW coal fired units with an installed capacity of 720 MW. However, the 3 units of 100 MW each have been derated to 95 MW w.e.f. 11.1.1990. The station is owned by Government of India and is being managed by NTPC since April 1, 1978. During the year 1995-96, the station generated a total of 4038.09 MUs at a PLF of 65.21 % against the target of 4400 MUs (PLF 71.25%). Other parameters like specific furnace oil consumption Auxiliary power consumption, D.M. Water consumption during the year 1995-96 were 4.40 MI/kwh, 9.42 % and 3.18 % respectively. BTPS has achieved PLF of more than 70% continuous during last 3 years.

9.1. ASH UTILISATION

BTPS has been making sincere efforts for productive utilisation of ash generated for constructive purposes. M/s Ballarpur Industries has set up a fly ash evacuation system for its use for manufacture of auto claved concrete blocks and beams utilising fly ash to the tune of 250 T/day. BTPS has started on experimental basis manufacture of ash based bricks using FAL-G technology. During 1995-96 BTPS has utilised 6606 MT Ash.

BTPS has also invited entrepreneurs for setting up industries to manufacture ash based products and also for free lifting of pond ash for development of low lying area.

10. PUBLIC SECTOR UNDERTAKINGS AND OTHER ORGANISATIONS

10.1 NATIONAL THERMAL POWER CORPORATION LTD. (NTPC)

National Thermal Power Corporation (NTPC) was set up in 1975, as a central sector generating company for the development of thermal power. The Corporation is at present engaged in operating/ setting up of several thermal power projects and Gas based power projects. The total approved investment of the corporation as on end March, 1996 stands at Rs.27873.28 crores (excluding the investment on Transmission Systems which have since been transferred to Power Grid). The NTPC is at present placed in Schedule "A".

The approved capacity of NTPC Projects is 19115 MW.

The capacity commissioned upto March 1996 is 16795 MW. This includes acquisition of Unchahar (420 MW) and Talcher (460 MW) to the country's generating capacity. Presently, NTPC has to its credit 11 coal based thermal power projects and 6 gas based combined cycle projects with an aggregate approved capacity of 19115 MW. 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.

10.1.1 GENERATION

As on 31.3.1996 a total capacity of 16335 MW (Excluding Talcher TPS - 460 MW) was under operation at various NTPC stations.

This comprises of 30 units of 200/210 MW each at Singrauli, Korba, Ramagundam,

Kahalgaon STPP, Bihar

Farakka, Vindhyachal, NCTPP, Unchahar, Kahalgaon, 14 units of 500 MW at Singrauli, Korba, Ramagundam, Rihand, Farakka and Talcher and 26 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 high level. Against the target of 81 000 MUs (MOU target) for the year 1995-96, the gross generation from NTPC stations was 93468 MU which is 30.91 % of total thermal power generation in the country.

Till end of March,'96, the coal based units under commercial operation generated 48464 MUs at a plant load factor of 75.03%.

10.1.2 HIGHLIGHTS FOR THE YEAR 1995-96

1. NTPC coal stations PLF of 78.80% during the year 1995-96 which is 2.91% higher than the PLF of 76.57% during the year 1994-95.
2. Ramagundam unit no. 6 of 500 MW capacity has set a National record of continuous run of 406 days during this year.

10.1.3 ADB LOAN FOR FEROZE GANDHI UNCHAHAR TPS STAGE-II (2 x 210 MW)

The Asian Development Bank have approved NTPC as the implementing agency for stage-II of Feroze Gandhi Unchahar Thermal Power Project under loan for US $ 160 million consequent upon take over the project by NTPC.

Kawas Gas Based Project, Gujarat

The transfer of the loan has been made effective from 14.11.1995 and an amount of US$ 14.67 million has been utilised during financial year 1995-96.

10.1.4 BADARPUR THERMAL POWER STATION (BTPS), DELHI

Badarpur Thermal Power Station (BTPS), Delhi consists of 3 x 1 00 MW and 2 X 21 0 MW coal fired units with an installed capacity of 720 MW. However, the 3 units of 1 00 MW each have been derated to 95 MW w.e.f. 11.1.90. The station is owned by Government of India and is being managed by NTPC since lst April, 1978. During the year 1995-96, the station generated a total of 4038.09 MUs at a PLF of 65.21 % against the target of 4400 MUs (PLF 71.25%).

10.1.5 JOINT VENTURE PROJECTS

The 208 MW Combined Cycle Power Project at Kakinada being executed by Spectrum Power Generation Ltd. is co-promoted by NTPC along with Spectrum Technology, USA and Jaya Foods Industries.

NTPC and Oman Oil Company has signed an MOU to promote a joint stock public limited company for setting up of power projects based on gas from proposed Oman India pipeline project. Pre-feasibility studies have been conducted.

Utility Powertech Ltd., a joint venture company of NTPC, and BSEB has been incorporated to undertake construction, erection and project management activities in power and other industrial sectors in India and abroad.

NTPC has also signed an MOU with Indian Oil Corporation for setting up petro fuel based power station.

10.1.6 MEMORANDUM OF UNDERSTANDING

The Memorandum of Understanding (MOU) for the year 1995-96 was signed between NTPC and the Ministry of Power on 21.8.1995. MOU targets for the year 1995-96 in respect of major performance parameters are given below:

Sl.NO.	(Target) V.Good	Excellent	Achievement
1. Capacity Addition (MW)	500 by March '96	500 by Feb.'96	710
2. Generation (MUs)	81000	83000	93468
3. Availability Factor %	81	83	85.31
4. PLF %	73.5	75.5	78.80
5. Heat Rate (Kcal/Kwh)	2510	2490	2490
6. Gross Margins (Rs.Cr.)	3224.37	3235.22	3267.62
7. Net Profit to Capital employed	4.05	4.10	5.55

10.1.7 CENTRE FOR POWER EFFICIENCY & ENVIRONMENTAL PROTECTION (CENPEEP)

In line with protocol of intent signed in July'94 between USDOE, USAID and Ministry of Power (GOI), NTPC for long-term technical cooperation programme a project namely Greenhouse Gas Pollution Prevention Project (GEP) has been formulated under USAID and accepted by Government of India for implementation.

A Centre for Power Efficiency & Environmental Protection (CENPEEP) has been established by NTPC at NOIDA Office.

10.1.8 NTPC'S PROJECT

Details of NTPC's Projects/Units are given in the statements.

STATEMENT

DETAILS OF NTPC PROJECTS SHOWING AGGREGATE APPROVED CAPACITY 19115 (MW)

A - UNITS COMMISSIONED UPTO MARCH, 1995

S. No.	Name of Region/Project/State	Capacity in MW Approved	Actual 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-I (500) Mar. 88 Unit-2 (500) July 89
3.	National Capital Thermal Power Project (Dadri) Uttar Pradesh	840 Stage-I (4x2l0)	Unit-1 (21 0) Oct. 91 Unit-2 (21 0) Dec. 92 Unit-3 (21 0) Mar. 93 Unit-4 (21 0) Mar. 94
4.	Dadri GBPP Uttar Pradesh	817 Stage-I (4xl3l+2xl46.5)	Gas Turbine Unit-1 (1 31) 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
5.	UnchaharTPP Uttar Pradesh	420 Stage- I (2x2l0)	Unit-1 (210) Nov. 88 Unit-2 (210) Mar. 89
6.	Auraiya GBPP Uttar Pradesh	652 Stage-I (4x1 12+2x102)	Gas Turbine Unit-l (1 12) 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+lxl49)	Gas Turbine Unit-1 (88) Jan. 89 Unit-2 (88) Mar. 89 Unit-3 (88) May 89 Steam Turbine Unit-4 (149) Mar. 90

STATEMENT

2/3

S. No.	Name of Region/Project/State	Capacity in MW Approved	Actual date of commissioning
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)	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
10.	Kahalgaon STPP Bihar	840 Stage-I (4x210)	Unit-1 (210) Mar. 92 Unit-2 (210) Mar. 94 Unit-3 (210) Mar. 95
11.	Talcher STPP Orissa	1000 Stage-I (2x500)	Unit-1 (500) Feb. 95
WESTERN REGION			
12.	Korba STPP Madhya Pradesh	2100 Stage-I (3x200+1x500) STAGE-II (2x500)	Unit-1 (200) Mar. 83 Unit-2 (200) Oct. 83 Unit-3 (200) Mar. 84 Unit-4 (500) May 87 Unit-5 (500) Mar. 88 Unit-6 (500) Mar. 89
13.	Vindhyachal STPP Madhya Pradesh	1260 Stage-I (6x2l0)	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 (4xl06+2xl 10.5)	Gas Turbine Unit-1 (106) Mar. 92 Unit-2 (106) May 92 Unit-3 (106) Jun 92 Unit-4 (106) Aug. 92 Steam Turbine Unit-5 (110.5) Feb. 93 Unit-6 (110.5) Mar. 93

STATEMENT
3/3

S. No.	Name of Region/Project/State	Capacity in MW Approved	Actual date of commissioning
15.	Gandhar GPP Gujarat	648 (4x1 31 +1 x255)	Gas Turbine Unit-1 (1 31) March 94 Unit-2 (131) March 94 Unit-3 (131) May 94 Steam Turbine Unit-IV (255) Mar. 95
	SUB-TOTAL	**15625 MW**	
B - UNITS COMMISSIONED/TAKEN-OVER DURING 1995-96			
EASTERN REGION			
1.	Talcher STPP Orissa	1 000 Stage- I (2x500 MW)	Unit-2 (500) Feb. 96 (Ant.)
2.	Kahalgaon STPP Bihar	840 Stage-I (4x2l0 MW)	Unit-4 (21 0) March 96
3.	Talcher TPP (take-over)	460 (4x60+2x110)	460*
	SUB-TOTAL	**1170 MW**	
C - SCHEDULED TO BE COMMISSIONED BEYOND 1996-97			
NORTHERN REGION			
1.	UnchaharTPP Uttar Pradesh	420 Stage- II (2x2l 0 MW)	Unit-3 (21 0) Jan. 2000 (Ant.) Unit-4 (21 0) Jul. 2000 (Ant.)
2.	Kayamkulam CCPP Kerala	\400	Gas/Steam Turbine Unit-1 February'98 (Ant.) Unit-2 April '98 (Ant.) Unit-3 February'99 (Ant.)
WESTERN REGION			
1.	Vindhyachal STPP Madhya Pradesh	1 000 Stage- II 2x500 MW	Unit-7 (500) Feb. 2000 (Ant.) Unit-8 (500) Feb. 2001 (Ant.)
	SUB-TOTAL	**1820 MW**	
D — UNITS YET TO BE DECIDED			
EASTERN REGION			
1.	Farakka STPP	500 Stage- III (1 x500 MW)	Unit-6 (500 MW) Yet to be decided. The project not taken up due to low demand of electricity in Eastern Region
	TOTAL	**500**	

GRAND TOTAL (A+B+C+D) = 19115 MW (APPROVED CAPACITY)

N.B.: 1. Capacity commissioned upto March, 1996 is 16796 MW.

*2. During 1995-96, 460 MW capacity was added to NTPC, by way of acquisition of 460 MW (4x60 MW+2x110 MW) Talcher Thermal Power Station of OSEB of 3rd June, 1995. The new capacity added during 1995-96 Was 71 0 MW (Talcher Unit-II 500 MW and Kahalgaon Unit-IV 21 0 MW).

10.2 NATIONAL HYDRO ELECTRIC POWER CORPORATION (NHPC)

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 organize an integrated development of hydroelectric power in the country. The Authorised Share Capital of the Corporation stands at Rs.2500 crores which stands almost fully subscribed by the Government. NHPC is now placed in Schedule "A" category.

10.2.1 ACHIEVEMENTS IN 1995-96

NHPC Power stations generated 6140.67 MUs against a target of 5590 MUS, during 1995-96.

In Uri Project (480 MW), all project works are going on as per schedule and 94% work has been completed. The project is scheduled to be commissioned with the first unit by Dec. 1996 and last unit by May, 1997. Efforts are on to commission all the units by Eighth Plan.

In Salal Stage II Project, all three units have been commissioned through Tail Race Tunnel of Salal Stage 1. Tail Race Tunnel of Stage II is almost complete and the benefit of additional generation will accrue from June 1996 when extra water will be available in the river.

In respect of Dulhasti Project, tenders for balance civil works have been invited and bids are under evaluation. Meanwhile, pending award of contract, execution of some of the works have been taken up departmentally and 153 m excavation of HRT from D/Ssidebyconventional drilling and blasting method has been achieved. Excavation by TBM in HRT U/S side has also been taken up departmentally and a progress of 70 m has been achieved.

In Rangit Project, consequent to resolving of contractual problems, progress of various works has picked up. The excavation of HRT U/S started departmentally and concreting of dam foundation has also been started.

The Lt. Governor of A & N Islands laid the foundation stone of Kalpong Mini Hydel Project (2.25 MW) in Andaman & Nicobar Island on 1.10.1995, which is envisaged for execution as a deposit work by NHPC.

The agreement between KPA & NHPC was signed on 27.09.1995 for execution of the 45 MW Kurichu H.E. Project in Eastern Bhutan.

Active construction of infrastructure works was taken up in Dhauliganga H. E. Project (280 MW) in Uttar Pradesh, OECF Japan has pledged a loan assistance of 5665 million yen for part financing of major civil works of this project.

10.2.2 STATUS OF ON-GOING PROJECTS

10.2.2.1. SALAL H.E. PROJECT (STAGE-II) (3 X 115 MW), JAMMU & KASHMIR

All the three units of the project have already been commissioned through tail race tunnel of Stage-I. Work on the construction of Tail Race Tunnel-II is nearing completion. The major works of TRT-II have been completed and benefit of additional generation will accrue in the coming season when sufficient water will be available.

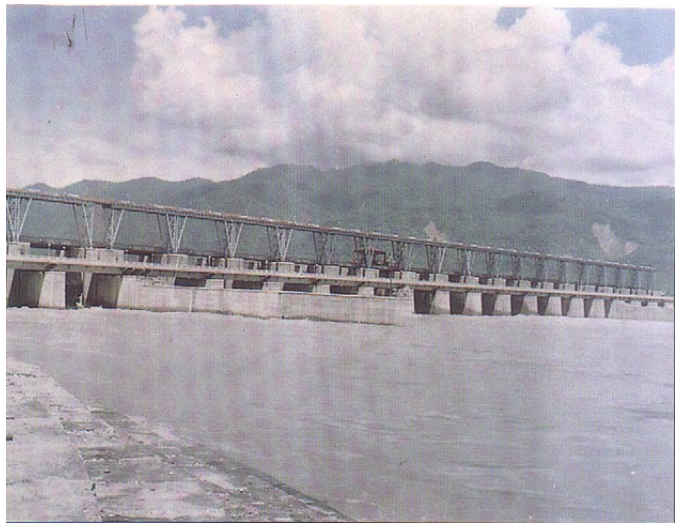
10.2.2.2 URI H.E. PROJECT (4X120MW), JAMMU & KASHMIR

The project is being executed through a Swedish-UK Consortium on turnkey basis. The construction activities at the project are going round the clock and overall 94% of the total work including supply of the equipment has been completed. In surface works excavation has almost been completed and 99.5% concrete placement has also been done. Excavation works of all the underground structures including HRT (10664 MW) has been completed and concrete lining work is progressing. Tail race tunnel (2059 M) excavation has also been completed, and concrete lining work is under progress. In underground power house caverns, all excavation and 99.5% of concreting has been completed. In Unit No.4, turbine erection has been completed. In transformer hall, all the transformers (13 nos.) have been installed and 400 KV oil field cables have been laid. Surge shaft excavation and concrete lining has been completed. Excavation of penstocks has been completed. Civil works in switchyard have been completed. AC and DC stations service systems have been installed.

The Project is scheduled for commissioning by May 1997. (Ist Unit-Dec. 96, 2nd Unit-Feb.97, 3rd Unit-April 97 & 4th Unit-May 97).

10.2.2.3 DULHASTI H.E. PROJECT (3 X 130 MW), JAMMU & KASHMIR

The project was entrusted to a French Consortium for execution on turnkey basis. However, the civil contractor of the French Consortium suspended the work at site w.e.f. 24th August, 1992 on the plea of increased militant activities in the project area. To restart the work, a rescission agreement with M/s DSB, the Civil contract partner of the French Consortium, terminating the civil contract and an overall amended contract with the remaining partners of the French Consortium have been signed in June 1995. According to the arrangement, NHPC is required to appoint a new contractor for execution of the balance civil works for which the Corporation has already invited global tenders. The bids received against the global tenders are under evaluation. Meanwhile some works at the project have been taken up by the Corporation departmentally and 153 m excavation of HRT from D/S side by conventional drilling and blasting method has been achieved. Excavation by TBM in HRT U/S side has also been taken up departmentally and a progress of 70 m has been achieved. So far, about 28% of overall work at the project has been completed.



Tanakpur Barrage, U.P.

10.2.2.4 RANGIT H.E. PROJECT (3 X 20 MW), SIKKIM

All the infrastructure works have been completed. After completion of diversion tunnel, the river has been diverted. The excavation of dam abutments has been completed and abutment treatment is in progress. Adit to HRT U/S and Adit to HRT D/S have been completed. Excavation of HRT is under progress and a progress of 1259 M has been achieved against a total legth of 2851 M. The work of HRT U/S side is being done departmentally since Dec. 94 and overall 44% tunnel excavation has been done. Excavation of 3 nos. penstock has been completed. Excavation for pressure shaft is under progress. Excavation for power house pit has been completed. Raft concreting for control room, service bay and Unit-III has been completed. Raising of columns for EOT crane is in progress. EOT crane has already been received at site. The erection work for draft tube elbow liners is in progress. Most of the turbines and generator equipment have reached the site. The project is scheduled to be commissioned in March, 1998.

10.2.2.5. DHAULIGANGA H.E.PROJECT (280 MW), UTTAR PRADESH

Major work on the project could not be started due to paucity of funds. OECF have since granted a 5665 million yen loan for taking up the execution of the project.

The work of infrastructure development and pre-construction activities have been taken up. Steps for acquisition of land are in progress.

10.2.2.6. KOEL KARO H.E. PROJECT (710 MW), BIHAR

The work on the project could not be started due to local resistance and constraint of funds. Possibilities for financial assistance for the project from OECF, Japan are being explored.

FOREIGN PROJECTS

10.2.3 KURICHU H.E. PROJECT (3 X 15 MW) BHUTAN

NHPC has been entrusted with the execution of Kurichu H. E. Project in Bhutan as a deposit work and an agreement was signed between KPA and NHPC on 27.9.95 in this regard. The infrastructure and other construction activities have started at the project. The land acquisition is under progress. The land required for temporary buildings and main road from Kurizampa to Project site has been taken over.

NEW SCHEMES

10.2.4 KALPONG H.E. PROJECT (2 X 1.125 MW), ANDAMAN & NICOBAR

The execution of the project has been entrusted to NHPC as a deposit work with the funds to be provided by A & N Island authorities. A nucleus staff has now been located at site and steps for taking up the infrastructure works and collection of field data etc., have begun. Prequalfication tender notice has been issued for Dam works and water conductor system including civil works of power house.

10.2.4.1 CHAMERA H.E. PROJECT STAGE-II (3 X 100 MW), HIMACHAL PRADESH

The project has already been cleared by CEA. However, due to paucity of funds, global tenders were invited for turnkey execution of the project with 100% financing. Processing of the Bids received is in progress.

10.2.5 CONSULTANCY SERVICES

The total value of orders received by the Company for the Consultancy Services during the year was Rs.3.43 crores. Notable among the services rendered include the Jawahar Tunnel lining in J & K and the geophysical, design work for organisations like THDC, NJPC etc.

10.3 Projects of NHPC are indicated in the statement.

STATEMENT

PROJECTS OF N.H.P.C.

	Location		**Capacity**
Operating Projects			
Baira Siul	H.P.		198 MW
Chamera - I	H.P.		540 MW
Loktak	Manipur		105 MW
Salal-I	J&K		345 MW
Salal-II	J&K		345 MW
Tanakpur	U.P.		120 MW
		Total	**1653 MW**
Projects Sanctioned/On-going			
Uri	J&K		480 MW
Rangit	Sikkim		60 MW
Dulhasti	J&K		390 MW
Dhauliganga Stage-I	U.P.		280 MW
Koel Karo	Bihar		710 MW
		Total	**1920 MW**
Projects on Deposit Turn-Key Basis			
Kurichu	Bhutan		45 MW
Kalpong	Andaman & Nicobar		2.25 MW
		Total	**47.25 MW**
Project under consideration			
Chamera - II	H.P.		300 MW
Projects under survey and investigation			
Dhauliganga Intermediate	U.P.		200 MW
Goriganga Stage-I	U.P.		60 MW
Goriganga Stage- II	U.P.		120 MW
Goriganga Stage-IIIA	U.P.		120 MW
Goriganga Stage- III B	U.P.		20 MW
		Total	**520 MW**

10.3 RURAL ELECTRIFICATION CORPORATION

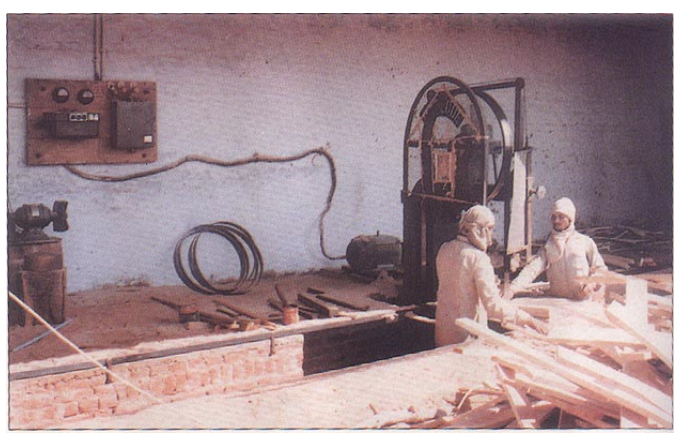
Rural Electrification Corporation (REC) was set up in 1969 with the primary objective of providing financial assistance for rural electrification programme in the country. Rural Electrification programmes under taken by the REC cover electrification of villages, including tribal villages and dalit bastis, energisation of pumpsets, provision of power for small and agro based rural industries, lighting of rural households and street lighting. The Corporation also provides assistance to the State Electricity Boards for taking up System Improvement Projects for strengthening improving of sub-transmission and distribution system and small generation projects like wind energy and hydel projects. The REC is schedule "A" Organisation.

The authorised share capital of the Corporation is Rs.600 Crores. The paid up capital of the Corporation as on 31.3.1995 stands at Rs.486.60 Crores. During the year 1995-96, the Central Government have contributed Rs.48 crore towards the share capital of the Corporation increasing its equity to Rs.534.60 crores.

During the year 1994-95, REC approved 2286 new projects involving a loan assistance of Rs.1264 crores for electrification of 4853 new villages, dalit bastis & hamlets and energisation of 4.38 lakh pumpsets besides provision of electricity to other categories of services and electrification of Dalit-Bastis and hamlets etc. During the year 1995-96 REC has approved 1273 new projects involving financial assistance of Rs.1108 crores. Cumulatively upto March, 96, REC sanctioned 30,685 R E projects involving a financial assistance of Rs. 12,452 crores for electrification of 3.20 lakh new villages and energisation of over 64.5 lakh pumpsets besides provision of electricity to other categories of services and electrification of Dalit-Bastis and hamlets etc.

10.3.1 DISBURSEMENT OF LOAN

Loan advanced by REC to the SEBs, State Governments and RE Cooperative Societies during the year 1994-95 amounted to Rs.1028 crores. The cumulative loan amount advanced at the end of 1994-95 was Rs.8191 crores. During the current year 1995-96 (April, 95-March, 96), the Corporation has disbursed Rs.827 crores (Provisional) as loans, taking the cumulative disbursement (upto March, 1996) to Rs. 9018 crores.



A Village Saw-Mill run on Electricity

10.3.2 PHYSICAL ACHIEVEMENT

During the year 1994-95, against the target of electrification of 2554 villages and energisation of 2.12 lakh irrigation pumpsets, 3541 villages were reported electrified and 3.99 lakh pumpsets energised. The target of pumpsets was exceeded by 88%. During the year (1995-96), 3675 villages have been electrified and 3.27 lakh pumpsets (Prov.) energised against the target of 3562 villages and 3.04 lakh pumpsets.

Cumulatively, upto March, 96, over 2.93 lakh villages have been electrified and 65 lakh pumpsets energised under REC schemes. The level of rural electrification in the country which stood at 12.8% at the time of establishment of the Corporation has risen to 87% at the end of March, 1996. Similarly, the number of pumpsets energised which stood at 10.9 lakh at the time of setting of the Corporation in 1969 has risen to over 110 lakhs representing a ten fold increase.

10.3.3 KUTIR JYOTI PROGRAMME

Kutir Jyoti Programme which provides for release of single point light connections to the households of the rural poor below the poverty line, including Dalit and Adivasis families continued to be given special thrust. During the year 1994-95, Government approved a grant of Rs.5 crores for release of 1.25 lakh single point light connections to the house-hold of the rural poor including in RE 1995-96. The Corporation released a grant of Rs.8.29 crores to SEBs/State Govts. including the spill over amount from the previous year and covered 1.34 lakh light connections in all. The year (1995-96) initially envisaged a programme for release of 1.25 lakh single point light connection with a grant amount of Rs.5.0 crores. On the request of several States and proposal submitted by REC, the Government enhanced the target from 1.25 lakh connection to 6.25 lakh connections with corresponding increase in grant amount from Rs. 5 crores to Rs.25 crores for the year 1995-96. Against the revised target of 6.25 lakh connections, upto the end of March, 96, only 5.1 lakhs (Provisional) connections have been released. This represents a four fold increase. Over 21 lakh connections have been released since the inception of the scheme. REC released a grant of Rs.20.78 crores (prov.) during the year 1995-96.

10.3.4 SYSTEM IMPROVEMENT PROJECTS

The Corporation is laying emphasis on implementation of System Improvement Projects to increase the efficiency of rural electrification net-work, reduce line losses, improve voltage condition and reliability of power system in the rural areas. Under this programme, the Corporation during the year 1994-95 sanctioned 269 new System Improvement Projects involving a financial outlay of Rs.305.96 crores. An amount of Rs.197.48 crore was disbursed and 145 additional substations were completed during the year 1994-95. During the year 1995-96, the Corporation sanctioned 214 new System Improvement Projects involving a financial outlay of Rs.260.78 crores. An amount of Rs. 193.60 Crores was disbursed and 202 additional substations were completed during 1995-96. Cumulatively upto the end of March, 1996, the Corporation has sanctioned 1526 System Improvement Projects with a financial outlay of Rs. 1439 crores. The total amount disbursed was of the order of Rs.969.60 crores and as many as 857 new sub-stations have been commissioned by the end of March, 1996.

10.3.5 RURAL ELECTRIC COOPERATIVES

Efforts were continued to put the rural electric cooperatives on a sound footing. Out of the 11 approved RE Cooperative Societies, 37 were operational by the end of March, 1995. During the year 1995-96, 3 societies have been taken over and 2 have been placed under liquidation. As a result, only 34 RE Cooperatives (including 2 under liquidation) were in operation as on March 31, 1996. During the year 1995-96, the operating societies have released a total of 67231 service connections which includes 9720 pumpsets and 57511 domestic/ industrial/commercial connections. During the year, these societies have also electrified 6 new villages. These figures are provisional and include the progress of the societies which have been taken over or put under liquidation upto the date of their operation. As at the end of March 1996, the RE Cooperative Societies have electrified 4159 villages and 1812 hamlets and have released 9.76 lakhs services which includes 2.08 lakhs pumpsets and 7.68 lakhs industrial/domestic/commercial connections.

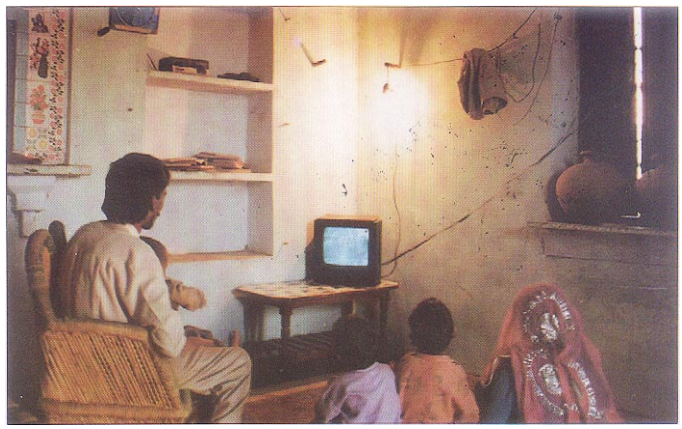
10.3.6 OECF ASSISTANCE

The Overseas Economic Cooperation Fund of Japan (OECF) had sanctioned assistance of Rs.24.4 billion yen (equivalent to Rs.870 crores). Under this assistance, 21 Power System Improvement Sub-projects for strengthening of transmission and distribution net work have been taken up for implementation on turn-key basis in the States of Andhra Pradesh, Haryana, Karnataka and West Bengal. In addition, one Small hydro Electric Sub-Project of 2 x 6 MW capacity will also be executed in Karnataka State-under OECF assistance. The work under the various projects involving an outlay of Rs.132

crores is in progress and a disbursement of Rs.33 crores, has already been made till 31st March, 1996. Another batch of 20 System Improvement and 1 small HEP involving an outlay of Rs.375 crores have been sanctioned by OECF in November, 1995 under current loan for implementation in the State of Andhra Pradesh, Kerala, Orissa and Tamil Nadu. These are also being taken up by the executing agencies for implementation.

10.3.7 The Corporation has signed MOU for 1995-96 with the Ministry of Power. During the year 1994-95, the performance of Corporation was adjudged as "Excellent" by the Department of Public Enterprises.

During the financial year 1995-96 the corporation is likely to generate gross earnings (on receipt basis) of Rs.567.91 Crores.



A rural family watching television made available by electricity in villages.

10.4 NORTH EASTERN ELECTRIC POWER CORPORATION (NEEPCO)

The North Eastern Electric Power Corporation Ltd. (NEEPCO) was constituted in 1976 under the Company's Act, 1956 with the objective of harnessing and developing the power potential of the North Eastern Region of the country. It is Schedule "B" Organisation.

Out of a total effective installed capacity of 1318.34 MW in the Region, NEEPCO is contributing 317.34 MW through its Kopili Hydro Electric Projects and Assam Gas Based Power Project, Kathalguri under O & M. Inspite of having only 24.07% of the total installed capacity in the region the Corporation has been able to meet more than 38.15% of the peak demand/energy needs of the region. The Corporation proposes a capacity addition of 500 MW within the 8th Five Year Plan in a phased manner through its Projects under execution and another 455 MW in the beginning of the 9th Five Year Plan as indicated below:-

YEAR	NAME OF PROJECT	CAPACITY ADDITION
8TH PLAN		
1994-95	Assam Gas Based Power Project, Kathalguri (2 Nos, of G.T. Units)...	67.32 MW
1995-96	Assam Gas Based Power Project, Kathalguri (3 Nos, G.T. Units)...	100.02 MW
1996-97	i) Kopili H.E. Project-Ist Stage extension, Assam (2 units of 50 MW each)....	1 00.00 MW
	ii) Agartala Gas Turbine Power Project, Tripura (4 Nos. of 21 MW units)....	84.00 MW
	iii) Doyang H.E. Project, Nagaland (1 Units of 25 MW)....	25.00 MW
	iv) Assam Gas Based Power Project, Kathalguri (3 ST Units+ 1 GT Unit)	123.66 MW
	Total	500.00 MW
1997-98	i) Doyang H.E. Project, Nagaland	
9TH PLAN	(2 x 25 MW).....	50.00 MW
	ii) Ranganadi H.E. Project, Arunachal Pradesh (3 x 135 MW) ...	405.00 MW
	Total	455.00 MW

10.4.1 PROJECT UNDER OPERATION AND MAINTENANCE (COMPLETED)

10.4.1.1 KOPILI HYDRO ELECTRIC PROJECT (150 MW) - ASSAM

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

The target of generation for Assam Gas Turbine Power Project during the year 1995-96 was 700 MU. Against this target generation 336.02 MU was generated during this year.

The cumulative generation in respect of Kopili H. E. Project since inception till March, 96 was 6448.87 MU & that of Assam Gas Based Power Project, Kathalguri was 336.17 MU.

The total earnings in terms of sale of power from Kopili H.E. Project was Rs.35.00 Crores and that of Assam Gas Based Power Project, Kathalguri was 56.00 Crores (prov.) during 1995-96.

10.4.2 PROJECT ON-GOING (GENERATION)

10.4.2.1 DOYANG HYDRO ELECTRIC PROJECT (75 MW) - NAGALAND

This project is located in the Wokha District of Nagaland. The Project was administratively approved in February, 83 for installing 3 units of 35 MW. The Project proposal was revised for 3 x 25 MW with zero date as Sept., 87 which was technically accepted. The latest cost of the project at Feb., 93 price level stands at Rs. 384.75 Crores (including IDC), which was techno-economically cleared by CEA on 10.8.93 and CEA clearance obtained in August, 95. The annual generation target is 227 MU at the rated capacity. Based on the latest Cost Estimate, Cost of generation at Power House Bus Bar works out to be 196.26 paise per Unit at 90% dependable year and Cost of Sale comes to 323.84 paise per unit ensuring 10% return on equity and 12% free Power to Home state for 90% dependable year. The lst (25 MW) unit of the Project is scheduled to be commissioned with in the VIII th Plan period, i.e., March, 1997 and the Project is expected to be fully commissioned in July, 1997.

10.4.2.2 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.774.12 crs. (including IDC) and the same has been duly approved. The project envisages to generate 1874 MU annually at rated capacity The cost of generation comes to 47.20 paise per unit at 90% dependable year. The sale price worked out to 77.20 paise per unit. The lst (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, 1997-98.

10.4.2.3 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 Nov., 87 at a cost of Rs.203.17 Crores for installing 6 (six) units of Gas turbine and 3 (three) units of Steam Turbine to utilise the waste heat with a total installed capacity of 291 MW. The project cost subsequently was revised at Rs.895.77 Crores on the basis of bids received for turn-key contract. The price increase was mainly due to the effect of evaluation, sharp increase in international cost of gas turbines after the Gulf War, increase in cost of Civil works and addition of certain items in the estimate which were not included earlier. On receipt of Govt. approval of this Revised Cost Estimate of Rs.895.77 Crores in May, 1992, orders for turn-key contract were placed. The latest cost as per first quarter 1996 price level works out to be Rs. 1347.57 crores.

The required gas 1 MMSCD 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 tied up with the Overseas Economic Co-operation Fund (OECF) Japan,

AGBPP, Kathalguri (NEEPCO)

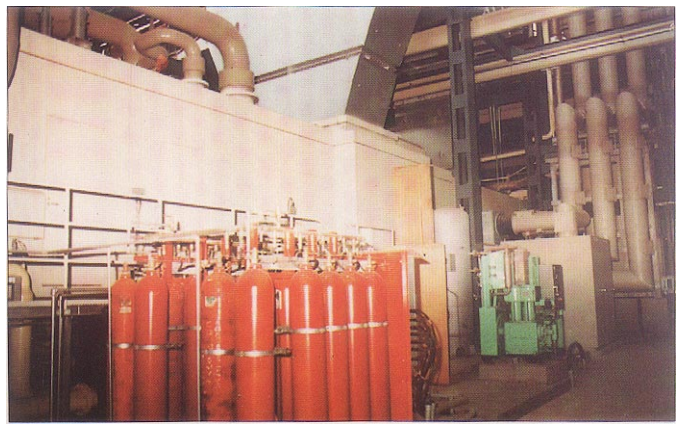
for loan assistance for implementation of the Project. M/S Mitsubishi Corporation and M/s BHEL have been entrusted with supply and execution of the Machineries on Turn-key contract. The project will be fully commissioned in March 1997. Five nos. of Gas Turbine unit each having a capacity of 33.66 MW have been commissioned.

10.4.2.4 KOPILI H.E. PROJECT 2 X 50 MW 1 ST STAGE EXTENSION - ASSAM

This Project is located in N.E. 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 TG. units of 50 MW each. Investment approval to the project was accorded in May, 1993 at an estimated cost of Rs.110.99 crores (including IDC). The project, on completion, will generate 502 MU of energy annually at 90% dependable year. The Cost of Sale of Power for the commissioned Kopili H.E. Project is Rs.0.6135 per unit at present. The estimated cost of sale of power for Kopili STAGE-I extension Project is Rs.0.42 per unit. Hence on commissioning of the Extension Project, the Cost of Sale of Power shall be significantly reduced for Kopili H.E. Project. The Project is scheduled to be fully commissioned in December, 1996.

10.4.2.5 AGARTALA GAS TURBINE POWER PROJECT (4 X 21 MW) -TRIPURA

This project is located at Ramchandranagar in West Tripura District in the state of Tripura, 15 K.M., away from Agartala. The Project envisages installation of 4 Gas Turbine Units of 21 MW each at a cost of Rs.294.05 Crores (including IDC). CCEA clearance for the project has been accorded in Nov., 94. The Cost of Generation is 150 paise/KWh at Bus Bar and that of Sale is 163 paisa/unit. The Project is scheduled to be completed in September, 1996.



Inside view of AGBPP Kathalguri (NEEPCO)

10.5 POWER FINANCE CORPORATION (PFC)

The Power Finance Corporation (PFC) Ltd., was incorporated on July 10, 1986 with the objective of providing term-finance for Power Generation Projects, Transmission-Distribution, System Improvement, R & M, Survey & Investigation and Training of Personnel engaged in Power Development programmes. As on 31.3.1996, the authorised capital and the paid-up (equity) capital of the Corporation stood at Rs.2000 Crores and Rs. 1030.45 Crores respectively. The PFC is placed under "B" schedule.

The funds provided by the Corporation are in nature of additionality to plan allocation and based on the merits of the individual projects.

The Power Finance Corporation during the year 1995-96 sanctioned new loans to the order of Rs.1658 crores for a wide variety of power projects.

Consistent with the role of PFC as a Development Bank, its operations are comprehensive and cover financial assistance to Power projects, guarantee for credits availed by project executing agencies, imparting training and arranging consultancy services relating to PFC's functions and objectives.

10.5.1 PERFORMANCE HIGHLIGHTS

The operations of the Corporation, as on 31st March, 1996, included new loan sanctions during the year 1995-96 of the order of Rs. 1658 Crores, for a wide variety of power projects in the various parts of the country, and progressive disbursements of loan instalments. As on 31.3.1996, the authorised capital and the paid up (equity) capital of the Corporation stood at Rs.2000 crores and Rs. 1030.45 Crores respectively.

10.5.2 LENDING RATES

The lending rates of PFC are currently the most competitive. PFC undertook a downward revision of the lending rates with differential rates favouring the critical areas of investment requirements with a view to ensuring that the ongoing projects do not get exposed to cost escalation for want of prompt and timely infusion of funds.

10.5.3 EMCAT PROJECT

A project for Energy Management Consultation and Training (EMCAT) is under implementation by the Corporation with the assistance from USAID. An allocation of US $ 16 million has been made to the Corporation. Under the project, the Corporation organised a number of short term and long-term training programmes for personnel of State Power Utilities and PFC within the country as well as in the USA, besides holding seminars and workshops on critical issues pertaining to Power Sector at regular intervals. USAID has allocated an additional US $ 2 million grant under EMCAT Project to build in-country capabilities for development of private power projects as well as transactional assistance for the formulation of the necessary project contract documentation and also to broaden PFC's loan portfolio spectrum.

10.5.4 IMPLEMENTATION OF OFAPs

PFC continues to attach high priority and importance to qualitative improvement in the functioning of SEBs/SGCs in managerial, technical and financial areas through formulation and implementation of Operational and Financial Action Plan (OFAP). PFC also monitors regularly progress made by utilities towards effective implementation of OFAPs by way of periodical visits to utilities for detailed review and through quarterly progress reports obtained from utilities.

10.5.5 LENDING TO PRIVATE POWER PROJECT

PFC has decided to extend financial assistance to private power projects in line with the Government of India's new economic policy. PFC may fund such programmes on its own or enter into consortium arrangements with other financial institutions to co-finance new ventures in generation, transmission and distribution. The lending will be decided by the PFC from time to time and would inter-alia be linked to credit worthiness of the borrowers and the conditions prevailing in financial market.

10.5.6 CAPTIVE AND CO-GENERATION POWER PROJECT

Recognising the urgent need for accelerated capacity addition in the power sector for bridging the demand-supply gap, PFC has decided to extend financial support to captive and cogeneration power projects in a big way. These projects are generally found to have shorter gestation periods and are more economical, to construct and operate. PFC has decided to tailor the terms and conditions for such projects on a case to case basis depending upon the technical and commercial merits of the projects, cash flow of the schemes, Debt Service coverage, IRR etc.

10.5.7 LEASE FINANCING

PFC has introduced financial leasing of power equipment to the entities in power sector. Under this scheme, all entities in State, Central, Municipal, Private and Joint Sectors engaged in power generation, transmission and distribution, energy conservation, renovation and modernisation etc. are entitled to seek financial assistance. Any equipment/machinery essential for power projects and associated works can be covered under the schemes. PFC may also arrange participative/ syndicated lease.

10.5.8 BILL DISCOUNTING

PFC has decided to offer credit under Direct Discounting of Bill of all power equipment manufacturers to enable them to supply equipments to utilities on deferred payment terms. The scheme covers sale of all power machineries and capital goods to all types of existing and new power utilities including captive and cogeneration plants for their expansion, modernisation, replacement and renovation programmes.

10.5.9 PRE-INVESTMENT FUND

The initial allocation of US $ 14 million under Pre-investment Fund (PIF) has subsequently been enhanced to US $ 20 million due to extensive marketing done by PFC and good response forthcoming from SEBS. Under the PIF, financial assistance is being provided to finance project preparation and other studies aimed at enhancing the performance of power Utilities. In all, upto the end of 31.3.1996 an amount of Rs.106.41 crores has been sanctioned and an amount of Rs.9.40 crores disbursed, under PIF.

10.5.10 TECHNICAL ASSISTANCE PROJECT

The Technical Assistance Project for Private Power Development (TAP-PPD) loan is for an amount of US $ 20 million. Under this, financial assistance is being provided to SEBs/SGCs for hiring the services of qualified and experienced consultants to assist and advise them in negotiating power purchase and other related agreements with the Independent Power Producers and also to help them to privatise any existing facilities. In all, upto the end of March, 1996 an amount of US $ 15.26 Million has been sanctioned under TAP-PPD. In 1995-96 US $ 13.59 Million was sanctioned under TAP-PPD.

10.5.11 PFC'S ROLE IN RENOVATION AND MODERNISATION

In the beginning, R&M Phase I programme was being financed by the Government of India through CEA (for

Effluent Treatment Plant at Koradi Thermal Power Station of Maharashtra State Electricity Board - A PFC Funded Project

central loan assistance portion) and respective State Governments (for State Plan portion) in the ratio of approximately 40:60. After the formation of PFC, Government of India portion of financing was entrusted to PFC w.e.f. 1.4.1988. As Central Loan assistance, PFC extended support to 25 nos. of stations and against an sanctioned amount of Rs. 113.39 Crores an amount of Rs.104.75 Crores has already been disbursed under Central Loan assistance.

PFC took up financing of State Government portion also for some critical and complementary activities from the year 1990-91 onwards. With a view to giving thrust to the total R&M programme, PFC extended financial support to activities covered under State Plan portion also. An amount of 50.37 Crores has already been disbursed against the sanctioned amount of Rs. 58.63 Crores for 10 nos. of Stations under the State Plan.

PFC is extending loan assistance to ongoing R&M Phase II programme upto 70% of the total cost of the scheme.

It has sanctioned loan assistance to 9 eligible borrowers for their 23 schemes as well as selected environmental activities of 2 ineligible borrowers-HSEB and WBSEB under relaxed conditions.

On ongoing R&M schemes, PFC is likely to disburse about Rs.135 crores during the year 1996-97. Further, PFC has projected to lend/sanction about Rs.300 Crores for R&M programme during the year 1996-97.

PFC has taken certain initiatives to give thrust to the R&M/Life Extension and Refurbishment programmes. Some of the loan conditionalities have been relaxed to enable financially weaker SEBs to avail PFC loan assistance for environment/R&M schemes and a proposal has been initiated to provide loan assistance to such schemes at lower interest rates, through a separate window of financing. Further, PFC is extending loan assistance to cover full costs of life extension/ environmental studies and eligibility conditions for State utilities are relaxed for such loans.

10.6 POWERGRID CORPORATION OF INDIA LIMITED (POWERGRID)

Power Grid Corporation of India Ltd. (POWERGRID), formerly known as National Power Transmission Corporation was incorporated as a Government of India enterprises in 1989 under the Companies Act., 1956, as a Public Sector Limited Company with an authorised share capital of Rs.5000 crores.

The Mandate for the corporation, as expressed in the Corporate Mission, is "Establishment and operation of Regional and National Power Grids to facilitate transfer of power within and across the Regions with reliability, security and economy, on sound commercial principles". In line with the Corporate mission, POWERGRID has the following objectives:

* Efficient operation and maintenance of transmission systems.
* Strengthening Regional Power Grids and establishing Inter-Regional links leading to formation of National Power Grid.
* Establish/augment regional load despatch centres and communication facilities.
* Introduce rational tariff structure for exchange of power.
* Bring about economies of scale in all facets of Power Systems.
* To achieve constructive cooperation and build professional relations with stock holders, peers and other related organisations.

The transmission system assets along with manpower from major Central Power generating Organisation in the Central Power Sector has already been transferred to Power Grid with retrospective effect from April 1, 1992. All the five Regional Load Despatch & Communication Centres (RLDCs), have already been transferred to Power Grid. With this the process of RLDC transfer is completed, and all the five RLDCs are being operated by Power Grid. Power Grid has already completed four years of its full-fledged business operation on 31st March, 1996 with distinguished achievements in terms of construction, operation, financial and commercial performance. The PGCIL is a schedule "A" Organisation.

10.6.1 SIGNIFICANT ACHIEVEMENTS

10.6.1.1 OPERATIONAL

As on March 31, 1996, Power Grid operates a total of 27,244 CKMs transmission lines consisting of 19902 CKMs of 400 KV, 4946 CKMs of 220 KV, 766 CKMs of 132 KV and 1630 CKMs of HVDC system distributed over 51 sub-stations with 22748 MVA of transformation capacity. The operational performance of Power Grid transmission system has been very impressive in all the five power regions. Overall availability of transmission lines for the year 1995-96 was maintained at 98.29% excluding HVDC System, which is comparable with the international standards. As per study conducted by NGC, UK in 1993, Power Grid stands one among the top six power utilities in the world who have maintained their transmission system above 98% line availability. Power Grid has commissioned 1669 CKMs of transmission lines and 1 sub-station in 1995-96. Details of the various projects commissioned during the year 1995-96 are given as under:

TRANSMISSION LINES COMMISIONED DURING 1995-96

		CKM
1.	400 KV Transmission Line	
	a) Mariani-Misa	446
	b) Trichi-Madurai	260
	c) Gandhar-Dehgaon	314
	d) Talcher-Rourkela	342
	e) Hissar-Bhiwani	35
	Total: (400 KV Lines)	1397
2.	220 KV Transmission Line Dimapur-Misa	250
3.	132 KV Transmission Line Itanagar-Ranganadi	22
	Total length of Transmission Lines commissioned during the year.	1669

Power Grid also possesses expertise for state-of-the art Hotline Maintenance of transmission lines, which has resulted in increased availability of the transmission system.

10.6.1.2 CONSTRUCTION

Construction performance so far has been commendable. It has surpassed the MOU Stringing target for the past three Years. Construction Performance for the year 1995-96 is given as under:

CONSTRUCTION PROGRAMME

Sl. No.	Activity	Target 1995-96	Achievement (1995-96)
1.	Stringing (CKM)	1700	1753
2.	No. of Transformers	5	5
3.	Transformation Capacity (MVA)	1575	1575

10.6.2 POWERGRID PROJECTS

The Project undertaken by Power Grid are broadly classified in four categories:

1) Generation linked Projects
2) Inter-regional links schemes
3) Systems coordination and control schemes
4) Grid Strengthening schemes

10.6.2.1 GENERATION LINKED PROJECT

ONGOING PROJECTS

Presently, 14200 CKMs of transmission lines are under construction by PowerGrid, consisting of 800 KV, 400 KV, 220 KV & 132 KV and 13 Sub-stations. Some of the important generation linked transmission projects, under implementation by Power Grid include, Nathpa Jhakri (400 KV) and Kathalguri (400 KV) Transmission Systems, Gandhar-Padge (400 KV) etc.

FUTURE PROJECTS

Some of the crucial general linked transmission projects proposed to be undertaken by Power Grid, and presently at various stages of approval, include the transmission system associated with Kayamkulam (220 KV), Faridabad Gas- I , (400 KV & 220 KV), Unchahar (400 KV & 220 KV), Rajasthan Atomic Power Project (RAPP) - 3 & 4 (220 KV), Vindhyachal - II (400 KV), Ganga Valley (Tehri) (800 KV), etc.

10.6.2.2 INTER REGIONAL LINKS

ONGOING PROJECTS

The inter-regional HVDC links will facilitate integration of the regional grid systems into the national grid, establish inter-regional flow of surplus power, avoid frequent grid collapses and lead to the achievement of a nation-wide optimal hydro-thermal mix. Keeping in view the importance of these HVDC inter-regional links in the development of the National Power Grid, Power Grid has drawn up a programme for inter-connecting the various power regions of the country through these links. Presently Power Grid has an existing HVDC back-to-back link at Vindhyachal (2 x 250 MW), which connects the Northen and the Western grid systems in asynchronous mode. The other HVDC inter-regional link projects, under execution, is the Chandrapur HVDC back-to-back project (2 x 500 MW), connecting Western and Southern Regions. It may be mentioned that the Vizag HVDC back-to-back project (1 x 500 MW), connecting Eastern and Southern Regions has been approved in 1995 - 96.

FUTURE PROJECTS

The inter-regional HVDC back-to-back projects, likely to be undertaken by Power Grid in the near future, include the East-North HVDC back-to-back (1 x 500 MW) inter-regional link and an inter-regional link between Eastern and Western Regions.

10.6.2.3 SYSTEM COORDINATION AND CONTROL

Load Despatch and Communication facilities are the basic prerequisites for economic despatch of power between Regions/States, and effective and efficient on-line grid management of Regional and National Power Grids. Accordingly Power Grid has undertaken implementation of state-of-the-art Unified Load Despatch and Communication (LD & C) facilities in all the Power Regions of the country. The Regional Load Despatch & Communication (RLDC) Projects under implementation, are the Southern Region (S-RLDC) and the Northern Region (N-RLDC).

FUTURE PROJECTS

The North-Eastern Regional Load Despatch and Communication (NE-RLDC) project under the Power Grid's Unified Load Despatch & Communication Scheme is in an advanced stage of approval. Power Grid is also in the process of undertaking the implementation of the Western (W - RLDC), Eastern (E-RLDC) and National Load Despatch & Communication (National-LDC) Schemes, with state-of-the-art technology.

10.6.2.4 GRID STRENGTHENING SCHEMES

Power Grid has also embarked upon a number of Grid Strengthening Schemes like installation of Transformer, reactor, filters& capacitor and establishment of tie lines in the regional grid to enhanced reliability of Transmission System.

10.6.3 STRATEGIC STUDIES

POWERGRID is also actively involved in its various long term strategic studies, so as to ensure that the management-structure-system are in place to cater to the changing needs while implementing the various crucial projects of POWERGRID.

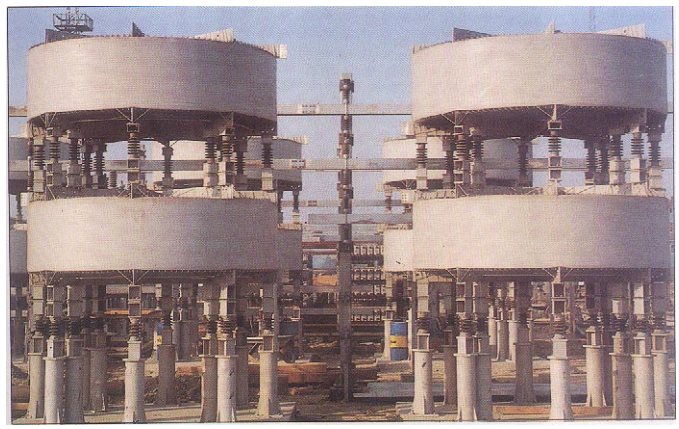
POWERGRID has undertaken strategic studies, funded and supported by the World Bank, ADB, etc. in the areas of "Rationalisation of Tariff and Regulatory Framework", "Institutional Development Study of POWERGRID" keeping the Indian Power Sector in the background, and "System Study for Long Term Transmission System Planning". Some of the recommendations of the already completed studies, are at various stages of implementation.

10.6.4 SOURCES OF FUNDS

10.6.4.1 INTERNATIONAL SOURCE

WORLD BANK

The World Bank has already extended a loan of US $ 350 million directly to Power Grid for its Power Grid System Development Project (PSDP) which consists of projects such as



A Sub-station of Power Grid at Kanpur (U.P.)

Coordination and Control System for Southern Region, additional Transmission system for Vindhyachal STAGE-I, AC link between Ramagundam and Hyderabad for Chandrapur HVDC back-to-back project, completion of Central Transmission projects and Rihand Transmission projects and organisational studies, which includes Institutional Development Studies (IDS) of Power Grid etc.

Further, the World Bank has agreed "in principle" to extend the 2nd loan to PowerGrid, on a time slice concept, amounting to around US $ 1.20 billion, in three tranches of US $ 400-500 million each, against a basket of projects whose combined project cost works out to US $ 4-5 billion, spread in a time slice of 5 - 7 years as investment plan. Together with this funding, there are indications of co-financing of part of these projects by the J-EXIM, ODA and possibly by the Korean EXIM Bank. The various projects proposed to be covered under the funding of the 2nd loan of the World Bank include, RLDC Schemes of Eastern & Western Regions; Inter-Regional Links, namely, East-West & East - North Inter-connectors; System Improvement Programmes in the Western and the Southern Regions and associated transmission systems of the Ramgundam - III, Rihand - II and other associated transmission systems of the Private Generation Projects, namely, the CEPA (8 x 660 MW) project in the Eastern Region.

ASIAN DEVELOPMENT BANK (ADB)

Asian Development Bank (ADB) has also recently extended financing of US $ 275 million for funding some of the key projects in the North Eastern Region and other regions, which includes Transmission Re-enforcement/Power evacuation schemes in North-Eastern Region, transmission system for Vindhyachal Stage-II, Unchahar Stage-II and Jeypore-Gajuwaka AC portion and North-Eastern Regional Load Despatch and Communication Schemes.

OVERSEAS ECONOMIC CO-OPERATION FUND(OECF)

The Overseas Economic Co-operation Fund (OECF) has provided a loan of Y 7.115 billion and Y 22.101 billion for Gandhar and Khathalguri Transmission Systems respectively (in North Eastern Region). OECF has also sanctioned a first tranche loan of Y 3.538 billion for Faridabad Transmission System in the Northern Region. The total loan commitments by OECF, Japan to Power Grid stands at Yen 32.754 billion.

EUROPEAN INVESTMENT BANK (EIB) ASSISTANCE

For European Investment Bank (EIB), Power Grid is the first Organisation in their very first ever extension of lending activity in Asia. It is co-financing the Southern Region Load Despatch & Communication (SRLDC) Project to the extent of 55 million European Currency Unit (ECU) amounting to Rs. 198 crores.

Other Financial Institutions and Banks, such as the Overseas Development Administration, UK, the West Merchant Bank (WMB), UK, the Banque Indo Suez, Paris and Credit Nationale, Paris, have extended loans and grant commitments of the order of 2164.0 million and FFr 396 million.

Industrial Bank of Japan (IBJ) & Export-Import Bank of Japan (J - Exim) both have already financed Power Grid projects and have shown keen interest in financing new projects worth US $ 400 million and US $ 600 million respectively

10.6.4.2 DOMESTIC SOURCES

In addition to sourcing of funds from the International funding agencies, Power Grid has also tapped the Domestic Debt market. Till date Power Grid has successfully raised Rs.566 crores by issuing Power Bonds, Besides these, Power Grid has been able to arrange Term Loans from LIC (Rs.20 crores), Buyer's Credit from IFCI (Rs.1 00 crores), Term Loan from UTI (Rs.150 crores), fully subscribed Bonds with ICRA rating of LAA + (Rs.67 crores), in two tranches. During the year Power Grid could raise a Bond for a total of Rs.250 crores, which includes Rs.236 crores of taxable Bonds and Rs. 1 4 cores non-taxable Bonds.

10.6.5 RESEARCH AND DEVELOPMENT

In the area of Research and Development, a MOU has been signed with I IT Kharagpur for the development of Real Time Digital Simulator for Power System.

10.6.6 FUTURE PERSPECTIVE

Alongside the development of the Regional and the National grids, which mainly includes establishment of inter-regional links, HVDC systems, Unified Load Despatch and communication facilities, a continuous economic exchange of power, based on certain sound commercial principles, has to be established in order to fully utilize the benefits out of the integrated operation of National Power Grid. In view of achieving this goal, Power Grid will promote creation of regional power pools in all regions, on a voluntary cooperation basis of public and private utilities including alternative non-conventional energy systems for benefits of the members. Power Grid will coordinate closely the generation, despatch and transmission to optimize operation of total power system. As an operator of power pools Power Grid will provide information on available capacity and energy to members for their needs and a price range; a forum for coordinating generation maintenance schedules; monitor tie-line flows for ensuring system reliability; deviations from agreed transactions; information for raising bills and settlement etc. This system will ensure most economic generation of power based on commercial principles. States will be able to contract for specific type and quantum of power and will be free to contract cheapest power. This will also help the generating organizations in optimum utilization of their capacities. The methodology of power pool operation is under discussion with various concerned agencies.

10.6.7 ENTRY OF INDEPENDENT POWER PRODUCERS (IPPS)

In view of the recent opening of the Indian Power Sector to Private parties, there has been a considerable development in respect of investment in the generation capacity addition as well as Joint Venture participation in the bulk power transmission in the country. POWERGRID being the National Grid operator, having ownership and access to the vast national grid network spread almost all over the country, has a definite role to play, in helping Private power development in the country

10.6.8 EXTENDING THE NATIONAL POWER GRID TO NEIGHBOURING COUNTRIES

Power Grid is already exchanging power with Bhutan from its Chukha hydroelectric project and has also started a dialogue for interconnection and power sharing arrangements with other neighbouring countries, to take advantages of diversity of resources & loan pattern for mutual benefit.

10.6.9 STATE-OF-ART TECHNOLOGIES

In keeping pace with the mission of developing the national grid, Power Grid is contemplating to induct sophisticated technologies for ensuring reliability of system which includes Unified Load Despatch and Communication facilities at the regional and national level, HVDC back-to-back system for regulated flow of power and avoiding transmission of disturbances from one grid to another, large capacity long distance HVDC bipole, 800 KV EHV transmission system for transferring large blocks of power and to conserve right-of-way, series compensation and static var compensation on existing lines to increase the power transfer capabilities, phase shifting transformers to adjust flow of power in parallel circuits to improve the transient & dynamic performance of the system, flexible A.C. transmission systems, upgrading and uprating the existing transmission system, Hotline maintenance, etc.

Details of Power Grid's Projects are given in the statements.

STATEMENT
1/3

DETAILS OF POWERGRID PROJECTS

A. DETAILS OF ONGOING POWERGRID PROJECTS

Sl. No.	Name of the Project	Voltage Rating (KV)	Length (CKM)	Cost (Rs. Crs.)	Region(s)	State(s)	Schemes Type
1.	Kathalguri	400 & 220	2429	786.84	NER	Assam	Generation Linked
2.	Dulhasti TL	400	450	166.57	NR	J&K	Generation Linked
3.	Dulhasti Contingency	400 & 220	180	220.37	NR	J&K	Generation Linked
4.	Vindhyachal Additional TL	400	2068	707.45	WR	MP, Maharashtra	Generation Linked
5.	Gandhar Gas TL	400	656	203.81	WR	Gujarat, MP	Generation Linked
6.	Uri TL	400 & 220	220	210.37	NR	J&K	Grid Strengthening
7.	Rangit TL	132	302	40.43	ER	WB, Bihar	Generation Linked
8.	Nathpa-Jhakri TL	400	1826	1084.76	NR	HP, Rajasthan, Haryana, UP	Generation Linked
9.	Kopili Stage-I Extn. TL	220	85	22.37	NER	Assam	Generation Linked
10.	Chamera I-Kishenpur TL	400	180	73.74	NR	HP	Generation Linked
11.	Kishenpur-Moga TL	800	580	520.60	NR	Punjab, J&K	Generation Linked
12.	Ranganadi TL	400 & 132	300	113.52	NER	Assam	Generation Linked
13.	Doyang TL	220 & 132	608	108.66	NER	Assam, Manipur	Grid Strengthening
14.	Chandrapur HVDC	400	189	985.98	WR&SR		Inter-regional Link
15.	CTP-I Augmentation	-	-	50.03	SR, NR & WR		Grid Strengthening
16.	Agartala Gas TL	132	110	19.32	NER	Tripura	Generation Linked
17.	Balipara-Tenga TL	132	90	23.96	NER	Assam	Generation Linked
18.	Kaiga TL	400	130	41.64	SR	Assam	Generation Linked
19.	Tehri TL	800 & 400	540	421.00	NR	UP	Generation Linked
20.	SRLDC		-	621.57	SR	All constituent States	System Coordination Control
21.	NRLDC	-	-	479.51	NR	All constituent States	System Coordination & Control
22.	Tanakpur-Mahandra Nagar TL	132	6	1.17	NR	UP	Power Supply to Nepal
23.	Jeypore-Gazuwaka HVDC B/B	400	450	496.82	ER&SR		Inter-regional Link
24.	RAPP-B TL	220	730	97.80	NR	Rajasthan	Generation Linked
25.	Neyveli-Bahoor TL	230	55	11	SR	TN, Pondy	Generation Linked
26.	LILO of Rihand-Kanpur at Vindhyachal	400	-	12.81	NR	UP	Grid Strengthening
27.	Installation of Filter at Dadri	-	-	36.40	NR	UP	Grid Strengthening
28.	Installation of Capacitor at Dadri	-	-	21.44	NR	UP	Grid Strengthening
29.	Augmention of NER	132	570	83.57	NER		Grid Strengthening
30.	Vindhyachal-II TL	400	1,445	657.71	NR	MP	Generation Linked
	TOTAL (A)		**14199**	**8021.22**			

STATEMENT

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B. DETAILS OF NEW POWERGRID PROJECTS

Sl. No.	Name of the Project	Length (CKM)	Estimated Cost (Rs. Crs.)	Region(s)	State(s)	Schemes Type
1.	LD&C NER		156	NER	All constituent States	System Coordination & Control
2.	Mau HVDC B/B	600	650	ER & NR	All constituent States	Inter-regional Link
3.	LD&C ER		419	ER	All constituent States	System Coordination & Control
4.	LD & C WR		448	WR	All constituent States	System Coordination & Control
5.	E-W Inter-regional Link	800	240	ER&WR	All constituent States	Inter-regional Link
6.	Grid Strengthening Schemes	260	12	ER & NER		Grid Strengthening
7.	Rihand TL-II	850	897	NR	UP	Generation Linked
8.	Unchahar TL-II	604	143	ER	Orissa	Generation Linked
9.	Faridabad Gas TL-I	214	180	NR	Haryana	Generation Linked
10.	Kayamkulum-I TL	240	121	SR	Kerala	Generation Linked
11.	Ranganadi-Along TL	300	75	NER	Arunachal Pradesh	Generation Linked
12.	Talcher TL-II	2100	2200	ER	Orissa	Generation Linked
13.	Ramagundam-III	1070	381	SR	AP	Generation Linked
14.	Dauliganga TL	660	200	NR	UP	Generation Linked
15.	North Karanpura TL	1700	500	ER		Generation Linked
16.	Kahalgaon -II TL	400	250	ER	Bihar	Generation Linked
17.	Koelkaro TL	900	300	ER	Bihar	Generation Linked
18.	Teesta Stage-III TL	1350	1500	ER	Sikkim & WB	Generation Linked
19.	Anta Gas-II TL	620	99	NR	Rajasthan	Generation Linked
20.	Yamuna Nagar-I TL		196	NR	Haryana	Generation Linked
21.	Rihand-III TL	1000	800	NR	UP	Generation Linked
22.	Strengthening of NR System	110	150	All constituent States		
23.	Baglihar-Kishenpur TL	140	76	NR	J&K	Generation Linked
24.	Baspa TL	175	70	NR		Generation Linked
25.	Sawalkot-Kishenpur TL	140	76	NR	J&K	Generation Linked
26.	Tehri-II TL (THDC)	200	250	NR	UP	Generation Linked
27.	Koteshwar TL (THDC)	40	250	NR	UP	Generation Linked
28.	Rajasthan A.P.P. (5&6) TL	760	400	NR	Rajasthan	Generation Linked
29.	Kaiga Extn. TL	120	80	SR	Karnataka	Generation Linked

STATEMENT
3/3

Sl. No.	Name of the Project	Length (CKM)	Estimated Cost (Rs. Crs.)	Region(s)	State(s)	Schemes Type
30.	Kawas-II TL	900	100	WR	Gujarat	Generation Linked
31.	Tarapur A.P.P. TL	440	100	WR	Maharashtra	Generation Linked
32.	Agartala G.P.P. TL	130	23	NER	Tripura	Generation Linked
33.	Kameng T.P.	220	65	NER	Arunachal Pradesh	Generation Linked
34.	Assam Gas-I TL	380	200	NER	Assam	Inter Regional Links
35.	High Cap. NE-S Link	4000	3000	NER & SR	All constituent States	Inter Regional Links
36.	Capacitor Instalment	-	350	Various Stations		Grid Strengthening
37.	SVCs	-	540	Various Stations		Grid Strengthening
38.	Additional Transformers/Reactors	-	300	Various Stations		Grid Strengthening
39.	TOD Metering	-	10	Various Places		Grid Strengthening
40.	Sub Distribution Improvement	-	50	Various Places		Grid Strengthening
41.	Infrastructure Development/Office Comm.	-	11	Various Places		Grid Strengthening
	SUBTOTAL (B)	**21423**	**11039**			
C.	**DETAILS OF NEW POWERGRID PROJECTS ASSOCIATED WITH IPPS**					
1.	CEPA Transmission Stage-I & II	10070	6130	SR, ER, WR, NR	Orissa, MP, Gujarat, Rajasthan, Punjab, Haryana, Maharashtra	Generation Linked Inter-Regional Link
2.	Nippon Denor TL	900	380	SR	Karnataka, AP	Generation Linked
3.	Cogentrix Transmission System	870	400	SR	Karnataka	Generation Linked
	SUBTOTAL (C)	**11840**	**6910**			
	GRAND TOTAL NEW PROJECT (A+B+C)	**33263**	**24068**			

D. LIST OF THE MAJOR PROJECTS APPROVED DURING 1995-96

1. Transmission system for RAPP-B
2. Transmission System for Vindhyachal-II
3. System coordination SR-Load Despatch & Communication
4. Inter-regional link Jeypore-Gazuwaka HVDC
5. System coordination NR-Load Despatch & Communication
6. Grid strengthening Project - Augmentation of NER
7. Transmission system for Neyvali-Bahoor
8. Transmission system for Jalandhar-Hamirpur
9. Transmission system for Tanakpur-Mahendranagar
10. Transmission system for Rangit
11. LILO of Rihand Kanpur at Vindhyachal
12. Transmission system for Farakka-II
13. Transmission system for Talcher-I

10.7 TEHRI HYDRO DEVELOPMENT CORPORATION (THDC)

The Tehri Hydro Development Corporation (THDC) was incorporated on 12th July, 1988, as a joint venture of the Govt. of India and Govt. of Uttar Pradesh 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 hydro-electric sites/projects in Bhagirathi, Bhilangana Valleys as may be entrusted to the Corporation by the Government. The Corporation has an authorised share capital of Rs. 1200 crores. THDC is a Schedule "B" Organisation.

The Corporation is engaged in the implementation of Tehri Project since June, 1989 after the works were transferred to it by the Government of Uttar Pradesh. The Tehri complex is located on river Bhagirathi, envisaging construction of two dams one downstream of Tehri Town and the other at Koteshwar, 22 Kms downstream of main dam.

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 on 15.03.1994 approved implementation of Stage-I of the project i.e., Tehri Dam & HPP (1000 MW), alongwith minimum essential works of PSP and ongoing commitments of Koteshwar Dam & HPP and the Associated Transmission System for evacuation of power at the following costs:

Components	Cost (Rs. in Cores)
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 the Power Grid Corporation through its own resources.

10.7.2 TEHRI DAM & HPP STAGE-I

Tehri Dam & HPP Stage-I comprises the following major components.

* 260.5 M 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 diametre each head race tunnels, 4 Nos. pressure shafts and 2 Nos. tail race tunnels etc.
* A concrete chute spillway with 3 bays of 10 M span each, 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.

1 0.7.3 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 would be:

- Addition to the installed capacity in Northern Region by 1000 MW.
- Annual energy availability (Peaking): 3568 Million Units.
- Additional irrigation in 2.7 lakh hectares area besides stabilisation in existing 6.04 lakh hectares area.
- 162 Million gallons of water per day (300 cusecs) for drinking water supply to Delhi.
- 108 Million gallons of water per day (200 cusecs) for drinking water supply to 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.

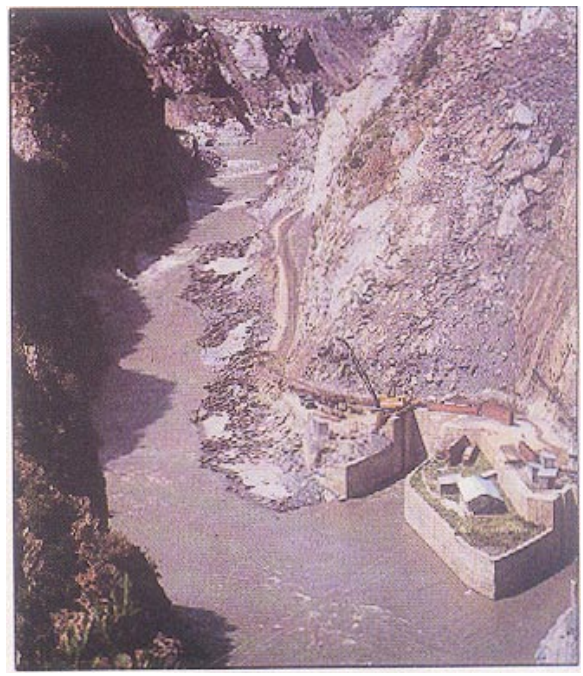
1 0.7.4 STATUS OF PROJECT WORKS

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 upto 615 M. Further, Coffer Dam raising works is in progress and it has been raised up to EL 650 M.
- 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 m diameter each, with a total length of 5190 m have been completed and lining work is completed in Stage-I tunnels while it is partly done in tunnels for PSP.
- Approach adits to underground power station cavern have also been completed.
- First phase rehabilitation of the rural area coming under submergence due to construction of coffer dam has been completed. Works for establishment of New Tehri Town (NTT) which is already partly inhabited, are in advance stage of construction. Shifting of population to NTT is to be completed by June 96 i.e. by the time the coffer dam is completed.
- A revised package of rehabilitation measures, evolved in association with the State Admn. and after consulting a cross-section of the local population, has been announced for implementation. This would go a long way in addressing the genuine problems of the oustees, and ensuring shifting of the oustees from Old Tehri Town.
- 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.
- The Catchment Area Treatment in about 27000 Ha. and Compensatory Afforestation in about 4335 Ha. have been completed against the planned total of 36000 Ha. and 4550 Ha. respectively.
- Tenders for the major civil works are in various stages of finalisation. The LOIs for Power House civil works have been issued. Tenders for Main Dam & Spillways are under finalisation. Meanwhile, major excavation works in spillway area and core stripping works of Dam are being taken up to utilise the working season till the major contractors mobilise at site.
- For Electro-Mechanical equipment, detailed terms & conditions of contract are under finalisation with a consortium of manufacturers from Russia/Ukraine, and the ABB-Germany. The preparations for issue of ICB for the Generator Transformers, Busducts and Switchgear are also in progress.

COMMISSIONING SCHEDULE

- The first unit of the project is envisaged to be commissioned by September, 2000.



Construction work at Tehri Dam Site

10.8 NATHPA JHAKRI POWER CORPORATION (NJPC)

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. The NJPC is Schedule "B" Organisation.

NJPC is presently executing its first mega project namely Nathpa Jhakri Hydro-electric Project (NJHEP) with an installed capacity of 1500 MW in District Kinnaur and Shimla (H.P) for which the World Bank has sanctioned a loan of US $ 437 Million. Besides this project, NJPC also plans to take up investigations of new hydroelectric projects in the Satluj basin in Himachal Pradesh.

NJPC in its implementation of its first project is supported by CWC and CEA as Principal Consultants along with a Consortia of Nippon Koei (Japan), Electrowatt (Switzerland) and WAPCOS (India) as Retainer Consultant. Besides these, NJPC is also backed by the services of a Panel of Experts comprising of Nationally/ Internationally renowned Engineers and Geologists.

10.8.1 NATHPA JHAKRI HYDRO-ELECTRIC PROJECT, HIMACHAL PRADESH.

The Nathpa Jhakri Power Project envisages the construction of:

- 60.50 m high concrete dam on Satluj river at Nathpa to divert 405 Qusecs of water through four intakes.
- an underground desilting complex comprising of four chambers each 525 m long, 16.31 m wide and 27.5 m deep, is one of the largest underground complex in the world.
- a 10.15 m. diameter and 27.30 km long head race tunnel (HRT), one of the largest hydro power tunnels in the world, terminating in 21 m. dia and 301 m. deep Surge Shaft.
- three circular steel-linked Pressure Shafts, each 4.9 m. dia and 633 m. long bifurcating near the Power House to feed six generating units.
- 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 to utilize a design discharge of 405 cusecs and design head of 425 m.
- 10.15 m diameter and 982 m long tail race tunnel to discharge 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 on commissioning 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.

Being a diversion dam there is neither impoundment and resultant displacement of population, nor deforestation.

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 31 st January, 1990,

10.8.4. PROGRAMME EXECUTION (NJPC)

The Civil construction activities of this mega project had commenced in late 1993 with the award of civil works worth Rs.2,040 crores to three International Joint Venture Consortia Contractors, namely, Continental (India) and Foundation (Canada); Hindustan Construction Company (India) and Impregilo (Italy); and Jaiprakash (India) and Hyundai

The progress of works at the Project till March, 96 is summarised hereunder:

1 0.8.5 PROJECT PROGRESS

I) INFRASTRUCTURE WORKS

The excavation of all the HRT adits have been completed. Mainly the Protection works on 7.459 Km. Rampur Bye-pass road are in progress. Construction of Residential Building, Field Hostel and Commercial Complex is also in progress.

II) MAIN CIVIL WORKS

The implementation of the civil works for the four major civil contracts are in progress with the three joint ventures of the Indian and foreign Construction Companies.

10.8.6 DAM COMPLEX

The diversion of river Satluj through the diversion tunnel which is one of major milestones has been achieved on February 29, 1996.

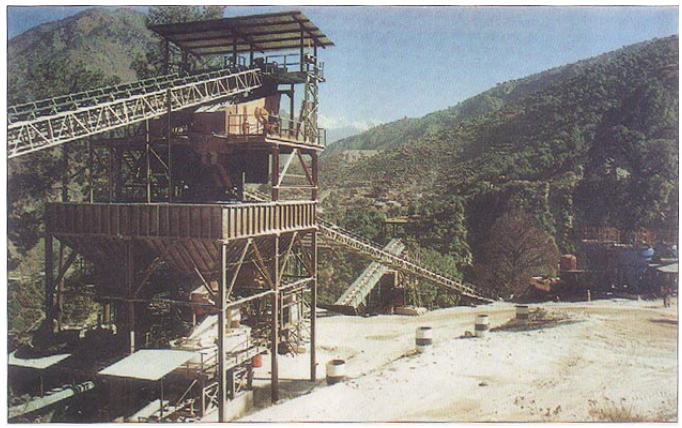
Works of right bank slope stabilisation and dam excavation are in progress. Excavation of all four intake tunnels has started and 294 m out of 695 m has been completed. Excavation of all four desilting chambers (Central portion crown) is also in progress. Excavation of Flushing Tunnel has started and 271 m out of 1675 m has been completed.

10.8.6.1. HEAD RACE TUNNEL

On the 27.30 Km head race tunnel (HRT), excavation of length of 13.40 Kms. has been completed. On the 301 m. surge shaft, excavation upto the depth of about 134 m. has been completed. Excavation of Bye-Pass Adit to HRT (6th Face) has started and 249 m. out of 277 m. has been completed.

10.8.6.2. POWERHOUSE COMPLEX

The excavation of the Machine Hall upto the level 983 m. has been completed and excavation of Transformer Hall is in progress. Excavation of the inclined portion of the pressure shafts No.3 (pilot shaft)



Treatment of the Grove for Construction Activities of NJPC Project

has been completed. In pressure shaft No.1, out of a total length of 360 m, 296 m. has been completed. In the tail race tunnel, excavation (heading) work 836 m. out of a total of 982 m. has been completed. Excavation of Bus-Ducts No.2 to 6 are progressing from both the power house side as well as the Transformer Hall side. Fabrication of Ferrule has started for the pressure shafts.

10.8.7 ELECTRO-MECHANICAL PACKAGES

PACKAGE 1: ELECTRO-MECHANICAL

The Electro-mechanical contract of Generating Units and Associated Equipments has become effective on November 1, 1994 and the Model testing in respect of Turbine has been completed.

PACKAGE II: BUTTERFLY VALVES

The LOI has been issued to M/s. Kvaerner Bovine Ltd., UK on February 29, 1996.

PACKAGE III: GENERATOR

TRANSFORMER

Evaluation of bid of one of the bidders is expected and the LOI shall be finalised by end of June, 1996.

PACKAGE IV: 400 KV SF6 GIS AND BUSDUCTS

The detailed letter of acceptance has been issued to M/s GEC ALSTHOM, France in February, 1996.

.10.8.8 FUTURE PORTENTS

NJPC is also exploring the possibilities of taking up other projects in Himachal Pradesh. Some of these projects are briefly described below:

a) **RAMPUR HYDRO ELECTRIC PROJECT (540** MW): COST Rs. 1646 crores.

b) **KOL DAM HYDRO ELECTRIC PROJECT (80 MW):** Estimated Cost of Rs.942.51 Crores at June, 1988 price level. The project has been accorded techno-economic approval by CEA in August, 1988.

c) **PARBATI HYDRO ELECTRIC PROJECT:** The Parbati River is one of the major tributaries of Beas river and is estimated to have a potential of nearly 2050 MW. The proposed Parbati Hydro Electric Project (PHEP) is planned to consist of three stages with a capacity of 750 MW, 800 MW and 501 MW, respectively.

It has been estimated that the stage-I will cost Rs.1200 crores and will generate 2800 Gwh of energy per year.

The cost of the stage-II (1991 prices) would be Rs. 1115.08 crores and it will generate 2921 Gwh in a 90% dependable year. The capital cost of generation of Stage-III (1991 prices) worked out to be Rs.812 crores and it will generate 2154 Gwh of energy in a 90% dependable year.

10.9 DAMODAR VALLEY CORPORATION (DVC)

10.9.1 ORGANISATION & OBJECTIVES

The Damodar Valley Corporation (DVC) was established on July 7, 1948 under the Damodar Valley Corporation Act for promotion and operation of the schemes for irrigation, water supply and drainage, generation, transmission and distribution of energy. 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 the 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 Hoogly 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.

The Corporation has 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 Barrage and irrigation system excluding the navigation canal was transferred to the Government of West Bengal in 1964.

10.9.2 EXISTING POWER PLANTS OF DVC

THERMAL

Bokaro 'A'	190 MW (3 X 50 MW)& (1 X40 MW)
Bokaro 'B'	630 MW (3 X 210 MW)
Chandrapura	750MW (3 X 180MW &1 X 210 MW)
Durgapur	350 MW(1X140 MW & 1 X 210 MW)
Mejia TPS (Unit-I)	210 MW (1 x 210 MW)

Gas Turbine

GTP, Maithon	82.5 MW (3 X 27.5 MW)

HYDEL

Tilaiya	4 MW (2 X 2 MW)
Maithon	60 MW (3 *X 20* MW)
Panchet	80 MW (2 X 40 MW)

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

DVC's soil conservation activities have already covered an area of three lac hectares of affected areas. More than 8000 check-dams have already been constructed for controlling run off soil and providing small irrigational facilities.

10-9.3 OVERALL PERFORMANCE AND ACHIEVEMENTS

During the period under review (April, 95 - March, 96) DVC's system generation was 6830 MU of which thermal contribution was 6402.032MU, hydel 384.582 and GT 42.089 MU. During the period DVC's turn-over was Rs. 1051.90 crores which enabled DVC to earn a profit of Rs.37.27 crores.

PERFORMANCE HIGHLIGHTS

	(April 95 - March, 96)
System Generation (MU)	6830
PLF on Installed Capacity%	38.00
Sp. Oil Consumption (ml/Kwh)	13.39
Sale of Power (MU)	7393
Turnover (Rs. Crores)	1051.90
Profit (Rs. Crores)	37.27
Target generation for 1995-96 (MU)	7005

On 27/28 September 95, DVC dams combated one of the major floods when 6.13 lakh cusec of inflow was moderated to 2.49 lakh cusec outflow thereby

(Korea).

saving the lower valley from a major disaster.

10.9.4 BERMO MINES:

DVC's Bermo Mines produced 225923 MT of coal during 1995-96.

10.9.5 PROJECTS UNDER CONSTRUCTION:

10.9.5.1 MEJIA TPS (3 X 210 MW)

The first unit of 210 MW has already been commissioned in December, 95; the other 2 units, viz. unit 2 & unit 3, are planned to be commissioned in Sept. 96 and March, 97, respectively.

About 2539 acres of land has been acquired out of 2574 acres. 378 families of homestead land evictees out of 399 families have been shifted to rehabilitation site.

10.9.5.2 BOKARO 'B' TPS STAGE -II (2 X 210 MW)

The revised cost of the project is Rs.351.34 crores for which CEA's approval is awaited. Unit-2 and Unit-3 were put under commercial operation w.e.f. 15.12.91 and 01.04.94 respectively.

R.C.T.S.: Phase I of Rapid Coal Transportation System (RCTS) is in progress and is expected to be completed shortly.

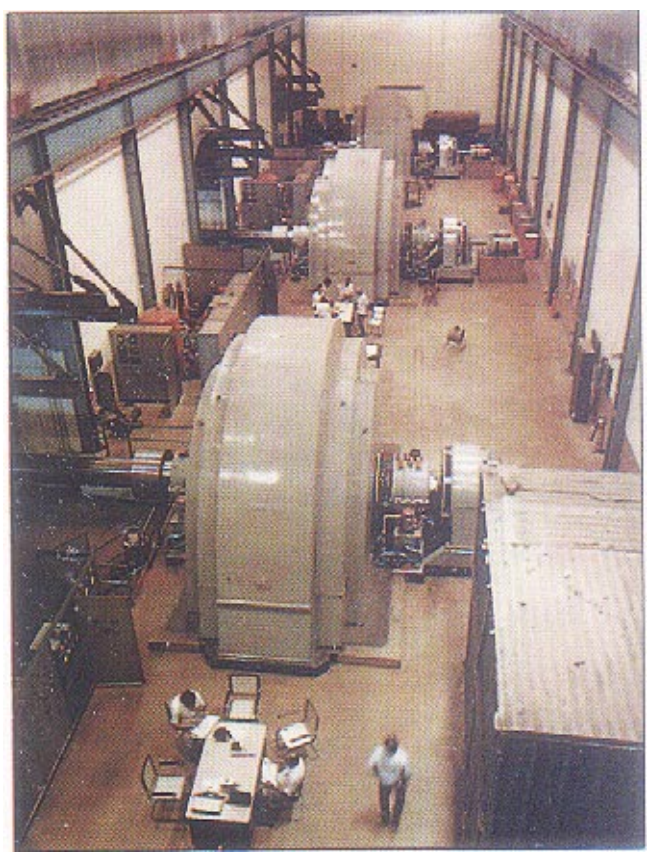
10.9.5.3 PANCHET HYDEL UNIT-2 (1 X 40 MW)

The Panchet Hydel Unit-II was commissioned in Turbine mode on 11.4.91.

Tail Pool Dam: About 58% of cut-off wall and 7.23% of concrete work in Spillway & Under-cluices have been completed. The Tail Pool Dam is expected to be completed in March, 98. At present, work is stopped totally since 8.10.96 due to prevailing disturbed situation at site.

10.9.6 PERFORMANCE FOR THE PERIOD APRIL, 1995 - MARCH, 1996

Station	Energy Gen.(MU)	PLF%
BTPS-A	345.361	20.69
BTPS-B	2452.335	44.31
CTPS	1786.385	27.12
DTPS	1817.95	59.13
THERMAL	(Total) 6402.032	37.96
HYDEL	(Total) 384.541	
GT	42.089	
SYSTEM	(Total) 6828.662	(6830 MW)



Maithon Hydel Station, DVC

10.10 BHAKRA BEAS MANAGEMENT BOARD (BBMB)

Bhakra Management Board (BMB) was constituted under Section 79 of the Punjab Re-organisation Act, 1966 for the administration, maintenance and operation of Bhakra Nangal project w.e.f. 1st October, 1967. The Beas Project Works, on completion, were transferred by Government of India from Beas Construction Board (BCB) to BMB as per Section 80 of the Punjab Re-Organisation Act, 1966 and the Bhakra Management Board was renamed as Bhakra Beas Management Boards (BBMB) w.e.f. 15.5.1976.

The Board manages the facilities created for harnessing the waters impounded at Bhakra & Pong in addition to those diverted at Pandoh through the BSL Water conductor system. It has also been assigned the responsibility of delivering water and power to the beneficiary States in accordance with their due/entitled shares. The works being managed by the BBMB are broadly grouped as three large multi purpose projects viz; Bhakra Nangal Project, Beas Project Unit-I (BSL Project), & Beas Project Unit-II (Pong Dam).

The Bhakra Nangal Project comprises the Bhakra Dam, Bhakra Left Bank & Bhakra Right Bank Power Houses, Nangal Dam, Nangal Hydel Channel and Ganguwal & Kotla Power Houses. Bhakra Dam is a majestic movement across the river Satluj. It is a large straight gravity concrete dam rising 255.55 m (740 ft.) above the lowest foundation and spanning the gorge with 51 8.16 m (1 700 ft.) length at the top. The Gobind Sagar Lake created by the Dam has 168.35 Sq. Km. area and a gross storage capacity of 9621 million cubic metre (7.80 MAF). The two power houses – one on the Left Bank (5 x 108 = 540 MW) and the other on the Right Bank (5 x 132 + 1 x 157 = 685 MW) have a combined installed capcity of 1225 MW. The Ganguwal & Kotla Power Houses fed from Nangal Hydel Channel have an installed capacity of 155.3 MW.

The Beas Project Unit-I (BSL Project) envisages the diversion of Beas Water into the Satluj Basin, falling from a height of 320 metre (1 050 ft.) and generating power at Dehar Power House having an installed capcity of 6 x 165 = 990 MW. This project comprises a diversion dam at Pandoh,13.1 km Pandoh Baggi Tunnel having a discharge capcity of 9000cusecs, 11.8 km long Sunder Nagar Hydel Channel, Balancing Reservoir at Sunder Nagar, 12.35 km long Sunder nagar Satluj Tunnel, Surge Shaft and Dehar power Plant.

The Beas Dam at Pong is the highest earth fill (earth core, gravel shell) dam in India, having 132.6 metre (435 ft.) height with a live storage capacity of 7290 million cubic metre (5.91 MAF). The Pong Power Plant (6 x 60 = 360 MW) is located on the right side of the stilling basin of the dam.

The total installed generating capcity of the BBMB Power Houses is 2730.30 MW which is more than 1/8th (about 13%) of the total installed Hydro-electric generating capacity in the country as per following details:-

Power Houses		Installed Capacity (MW)
1.	Bhakra (Right Bank)	4 x 132 + lxl57 = 685
2.	Bhakra (Left Bank)	5 x 108 = 540
3.	Ganguwal	2x24.2 +1 x29.25 = 77.65
4.	Kotla	2x24.5 +lx29.25 = 77.65
5.	Dehar	6 x 165 = 990
6.	Pong	6 x 60 =360
		=2730.30

10.10.1 GENERATION & TRANSMISSION SYSTEM

These Power Houses generate about 12000 million units of energy per annum, thus contributing about 17.5% to the All India Hydro Generation. These Power Plants have the highest plant availability factor (90 to 95%). The Power generated at BBMB Power Houses is evacuated over a vast transmission net work at 400 KV, 220 KV, 132 KV & 66 KV level and the transmission system comprises 24 nos. EHV Sub Stations and Transmission Lines having 3735 circuit km length. The transmission line serviceability is as high as 99.5 - 1 00%.

The actual generation from BBMB Power Houses during the period lst April, 1995 to March , 1996 was 12016 MUs, (19.92% more) against the generation target of 10020 MUs, fixed by C.E.A. i.e. additional 1996 MUs, valuing Rs. 1 99.60 Crores.

Through economy on various cost charges the BBMB has achieved 50% reduction in 0 & M charges (generation & transmission) by bringing down the same from 4 P/unit to 2 P/unit.

10.10.2 RENOVATION AND MODERNISATION
Renovation, Modernisation and Uprating of one machine (Unit No.9) at Bhakra Right Bank was completed during 1995-96 and the work of Renovation, Modernisation and Uprating of other four machines, one at a time, is in hand. Renovation, Modernisation and Uprating of machines at Ganguwal & Kotla Power Houses are also being undertaken in phased manner.

Pandoh Dam, BBMB

10.11 CENTRAL POWER RESEARCH INSTITUTE (CPRI)

The Central Power Research Institute, Bangalore was established in the year 1960. It was re-organised into an autonomous society under the Ministry of Energy in 1978.

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.

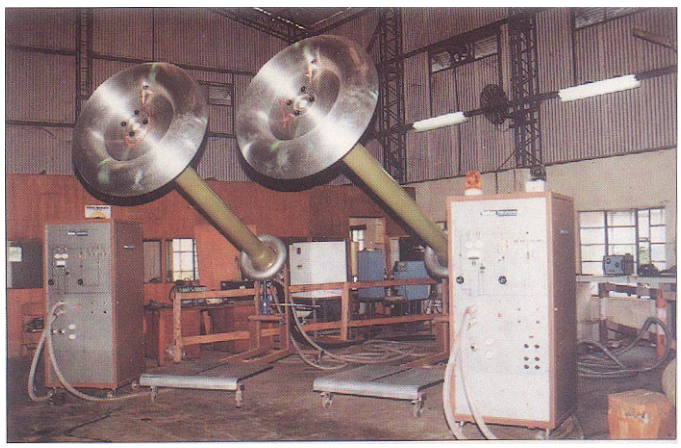
10.11.1 OBJECTIVE

* 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.

The Institute is headed by a Director General and 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 Off ice of the Institute is at Bangalore and its other units are located at Bhopal, Hyderabad, Nagpur, Ghaziabad, Thiruvananthapuram and Raichur.

10.11.2 PERFORMANCE AND ACHIEVEMENTS – YEAR AT A GLANCE

a) The laboratories of the Institute both at Bangalore and Bhopal have been



A view of 600 KV Water Termination for Testing of EHV Underground Power Cable (C.P.R.I.)

accredited by the National Accredition Board for Laboratories (NABL) for Testing and Certification as per EN 45000 Standards. This has opened up the global markets for the Institute.

b) Apart from regular tests, many special & unique tests were completed during the year like testing of NHVDC thyristor valve assembly, Impulse testing of 1 MVA transformers for M/s. Volt Amp transformers Ltd. Oman, flammability test on cables for Nuclear Power Corporation etc.

c) The Institute has been awarded a patent for the invention related to "Means for field oriented control of synchronous motor for various speed."

d) The Institute organised a total of 13 workshops/training programmes during the year. They were well attended by engineers from Power Utilities, Government Bodies and Industry. The Institute organised a Seminar on electrical engineering equipment for utility engineers of SAARC countries. Bangladesh, Bhutan and Pakistan participated in four days seminar. This Institute plans to organise more such programmes in the near future.

e) The Institute organised a special training programme for the engineers of Indian Oil Corporation Ltd. This programme covered the areas of solid, liquid and gaseous insulating materials and a few case studies of diagnostic testing of insulating materials. The Institute plans to organise more such programmes in the near future.

f) Some Research & Development projects of CPRI were sponsored by other Ministries and industries. The technical reports brought out after the completion of R & D projects were well published among Power Utilities and Industries across the country. The technologies emerging as a fall out of the R & D efforts are being commercialised through M/sN.R.D.C., New Delhi. During the year, the following technologies were commercialised:

i) Solar photovoltaic Lantern

ii) Electronic Ballast

g) The Second Short Circuit Alternator project envisages supply, erection & installation of a Short circuit Alternator as a spare unit to the existing machine at Switchgear Testing & Development Station, Bhopal to meet the increasing demand on testing of switchgear. The project sanctioned at a cost of Rs.5067 lakhs, is under final stages of completion.

h) The Institute also is in the process of augmenting five of its laboratories to meet the growing demands of the clients and to keep in pace with the stringent quality requirements. These are:

- High Voltage Division
- Insulation Division
- Materials Technology Division
- Short Circuit Laboratory
- Switchgear Testing & Development Station, Bhopal

i) The Institute has commercialised many technologies through National Research Development Corporation, New Delhi.

j) The Institute has been meeting its nonplan expenditure through revenue generated by testing and consultancy for the last 8 years successfully. During the year 1995-96, the revenue earned by the Institute is Rs.13.74 crores which is 33.79% more than the previous year.

10.12 NATIONAL POWER TRAINING INSTITUTE (NPTI)

National Power Training Institute (NPTI), set up as a Government of India Society with effect from 1.4.1993 by upgradation of formerly Power Engineers Training Society (P.E.T.S.) which was established on 1.1.1980, has been involved in the service of Human Resource Development in the country's power sector. Besides its Headquarters located at NPTI Complex, Sector-33, Faridabad (Haryana), it operates on all India basis through its four Regional Power Training Institutes at Neyveli (Tamil Nadu); Durgapur (West Bengal); Badarpur (New Delhi) and Nagpur (Maharashtra). The NPTI including its four Regional Power Training Institutes is fully equipped with latest state-of-the-art training infrastructure and also expert faculty with long years of professional teaching background as well as adequate R & D exposure. The training Institute at Badarpur was equipped with a computerised full scope simulator of 210 MW fossil fuel Thermal Power Plant to provide off-job/ hands-off operation training. Two more simulators of 500 MW and 210 MW are in the process of getting commissioned at NPTI Head Quarter and the training institute at Nagpur respectively. These will be based on latest technology i.e. DDC based instrumentation.

A training Resources Unit is also functioning at NPTI Head Quarter to develop training materials to meet the training need of power sector.

In addition, an Institute for Advanced learning & Management Studies for higher echelons of power sector is being established at NPTI Complex, Faridabad. The envisaged role of this Institute would be - Training of higher echelons of power sector; training in advanced & frontier technology; training in management areas; training of faculties for Plant Level Training Cells, State Power Training Institutes, Regional Power Training Institutes; Preparation of standardised training material and training packages for training Institutes of power sector; and providing consultancy to the Utilities on training and technical problems including setting up of Plant level/State Level Training Institutes.

The four training Institutes of NPTI are presently offering 42 long-term courses on 12 topics and 319 short-term courses on 69 different topics for Engineers, Operator and Technicians in the areas of Thermal Generation, Hydro Generation and Power System. More than 41,000 personnel have been trained upto March, 1996. The number of persons trained in the various courses conducted by the Institutes under NPTI during the year 1995-96 is as follows:-

S.No.	Courses	No. of persons trained
1.	Regular courses for Engineers	141
2.	Condensed courses for Engineers	114
3.	Operator/Technicians Courses	510
4.	Short-term courses for Engineers	652
5.	Short-term courses for Technicians/Sup.	452
6.	On-Plant/On-site courses	411
7.	Simulator courses	211
	Total	2491

The achievement in terms of trainee weeks has been 15756 during the year 1995-96. 3696 Engineers have been imparted training on the 210 MW Simulator at Badarpur Institute since its installation in 1982 under UNDP assistance.

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, Assessment of Training Needs etc. In this regard the following proposals have been taken up:-

i) Setting up of Training Institute in Bhutan for which NPTI has been appointed as Consultant by the Ministry of External Affairs.

ii) Consultancy for DVC on formulating training needs and other associated aspects of career development for various categories of employees.

iii) Training Need Assessment of PSEB Transmission and Distribution personnel.

iv) Training Need Assessment of BSEB Patratu Thermal Power Plant personnel.

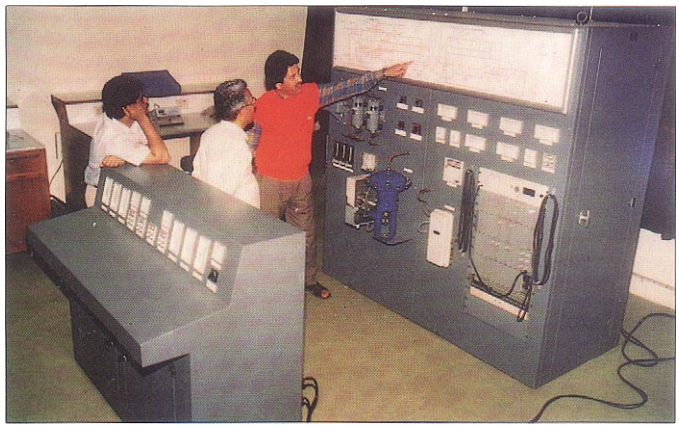
In addition to the above, All India Council for Technical Education (AICTE), New Delhi accorded approval for Recognition of 52 weeks Graduate Engineer Course (Thermal) as Post Graduate Diploma in Thermal Power Plant Engineering to be conducted at the four Regional Power Training Institute of NPTI.

Under the ODA aided CBT plan schemes, NPTI is developing Computer aided self-learning packages on the various topics of Thermal Power Station Operation & Maintenance. A team of six officers of NPTI has been trained in UK for the purpose. The self -learning packages will be available for power utilities by March, 1996 and the scheme estimated to cost Rs.3.74 crores including ODA aided component of Rs.1.79 crores, is expected to be completed by October, 1996.

10.12.1 FUNDS

During the year 1995-96 Rs.260 lakhs (under Non-Plan) and Rs. 1000 lakhs (under Plan) have been released by the Ministry of Power.

In regard to the training fee and other miscellaneous receipts NPTI realised a sum of Rs.162.38 lakhs during the year 1995-96 as compared to Rs. 107.75 lakhs during the year 1994-95.



Auto Control Simulator Training NPTI

10.13 ENERGY MANAGEMENT CENTRE (EMC)

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

The Institutional structure for determining and directing energy policies is a two-tiered one. The Energy Conservation Cell in the Ministry of Power formulates policy, designs the energy management programme and ensures effective coordination between interested Ministries and other entities. The Energy Management Centre with Head Quarters at New Delhi has been designed to implement and monitor the Energy Conservation Programme as also to provide advice on matters relating to energy efficiency and conservation.

10.13.1 ROLE AS COORDINATOR

Over the years, a large number of organisations have been carrying out highly competent work independently in the field of energy management and conservation. However, their efforts are fragmented by lack of coordination and absence of central perspective. Hence central coordination of energy conservation activities was considered of top most priority. The need for an executive agency for implementing and monitoring of energy conservation programmes in the country and provide policy guidance and advise on energy efficiency was felt.

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 ACTIVITIES OF THE CENTRE

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

* promote energy audits in enterprises and provide recommendations to improve energy efficiency and fuel substitution;
* organise sector specific promotional campaigns and provide technical assistance in the field of energy efficiency;
* identify barriers to improve energy efficiency and propose appropriate incentives and other measures to overcome them;
* suggest introduction of standards and labels and setting of consumption targets;
* organise training for energy managers and equipment operators;
* implement multilateral and bilateral aided energy efficiency projects;
* monitor progress made in energy conservation and fuel substitution and initiate follow-up actions where needed;
* develop a National Energy Database by collecting and analysing data on energy supply, demand and information on prices;
* review laws and regulations that have an impact on energy consumption and propose modifications and formulate suitable policies and actions; and
* provide planning assistance to government agencies.

10.13.3 THE CENTRE HAS CARRIED OUT THE FOLLOWING ACTIVITIES DURING 1995-96

* The following projects and studies were on-going, which were undertaken by EMC directly and also through co-operation with Ministry of Power.
  - Macro-level policy study on Energy Efficiency in Indian Economy vis-a-vis other developing economies in Asia-Pacific region.
  - Preparation of Energy Efficiency booklets on:
  - Industrial energy efficient technologies
  - Paper industry
  - Secondary steel
  - Preparation of Status Report on Action Plan on
    Time of Use
    Tariff in India
  - Preparation of material for inclusion in the text books prescribed in the school curriculum
  - Preparation of practical energy saving guide for small business/industries
  - Study on prospects for energy efficiency in buildings

- Demonstration project on energy efficient street lighting
- Demonstration project on energy efficient lighting in Shram Shakti Bhawan
- Preparation of guidelines for Private Investment in T & D loss reduction projects
- Status reports for selected domestic appliances
- Development of informative booklet on strategic management of energy efficiency at the corporate level
- Showcase demonstration project on energy savings through fan efficiency improvement in Cement industry
- DSM plan for Gujarat Electricity Board
- Energy consumption norms in foundry and mini steel industry
- Development of computer aided monitoring and targetting system for a process industry
- Energy saving in Aluminium Electrolysis by bringing down the operating temperature of Electrolyte
- Replacement of foot valves in 20,000 agricultural pumpsets in Andhra Pradesh
- Energy efficient pumpsets to the farmers through various fora

* Organised four training programmes and two workshops under India-EC Energy Audit Support Programme.
* Organised sixteen training programmes, and four one day workshops and six half day top management awareness workshops imparting training of personnel on energy conservation in the various sectors of industry. Around 700 officials from various industries/organisations/ instructions of the ranks of Mangers, Sr. Managers participated in these programmes.
* 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.

10.13.4 INTERNATIONAL COOPERATION PROJECTS

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).

EMC is currently implementing the following international projects:

i) India-European Union Energy Management Cooperation Programme (Phase-II)
   - Information Exchange Programme
   - Energy Audit Support Programme
   - Sectoral studies on agro food and marine sub-sectors
   - Policy studies including DSM and database.

ii) Indo-German Technical Cooperation Programme on Energy Conservation in Indian Industries.

iii) Swedish Agency for Research Cooperation for developing countries (SAREC) Programme.
   - Development of environmentally sound technologies for energy efficiency improvement and pollution abatement.
   - Studies on GHG emission for assessment of energy efficiency options for mitigation of the emissions.

iv) Energy Efficiency Support Project of the Asian Development Bank (ADB).

10.13.5 BUDGET ESTIMATES FOR THE YEAR 1995-96

The budget estimates for the year 1995-96 for EMC was Rs.55.00 lakhs and Agency Projections was of Rs.415.43 lakhs.

11. OTHER IMPORTANT ACTIVITIES

11.1 CONSULTATIVE COMMITTEE OF MEMBERS OF PARLIAMENT

During the year 1995-96 the Ministry of Power co-ordinated and organised seven meetings of the Consultative Committee of Members of Parliament for the Ministry of Power. The agenda items of discussion at these meetings related to, "Private Sector Participation in Power Development", "Power Grid Corporation of India Ltd.," "Rural Electrification Corporation", "Policy Framework in Private Sector Power Development" and "National Thermal Power Corporation", "National Hydro Electric Power Corporation", and "Power Finance Corporation."

These meetings were very useful in presenting opportunity to the Ministry to update the Hon'ble Members of Parliament on the new policy initiatives.

11.2 IMPLEMENTATION OF OFFICIAL LANGUAGE POLICY - HINDI

i) The Ministry of Power, its attached Subordinate Offices and other organisations 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 its organisations. Similarly all communications received in Hindi are replied to in Hindi compulsorily. The Sub Committee of the Parliament on Official Language visited the office of the Power Finance Corporation, T.H.D.C. (HQ) and C.P.R.I. under the administrative control of this Ministry and appreciated the efforts being made in the progressive use of Official Language.

iii) Two meetings of Hindi Salahakar Samiti of Ministry of Power were convened in which progress made by the Ministry of Power as well as other offices under its control was discussed. Meetings of Official Language Implementation Committee of the Ministry of Power were also regularly convened during 1995-96.

iv) Cash award schemes such as Incentive Scheme for Original Noting/Drafting in Hindi as well as Hindi Dictation Scheme formulated and circulated by the Department of Official Language, Ministry of Home Affairs for promoting the use of Hindi in official work continued to be followed in the Ministry, its attached offices/organisations. These schemes are yielding results as they have been widely accepted by the officers/ employees. In order to motivate and encourage the employees to acquire proficiency in Hindi, employees were also deputed to take part in Probodh, Praveen and Pragya classes conducted under Hindi teaching scheme.

v) To assess the progressive use of Hindi in various offices under the administrative control of Ministry, periodic inspections were made and guidelines issued on the basis of Inspection Reports.

vi) A Hindi Pakhwara was celebrated in the Ministry from 5.9.1995 to 20.9.1995 to step up the use of Hindi in Official work. Competitions in Hindi essay writing, Hindi debate, Hindi shorthand and typing were organised and winner participants were awarded with the prizes by the Hon'ble Minister of Power.

vii) The Official Language branch of Ministry of Power, has been strengthened and the post of Dy. Director (OL) and supporting staff have been provided.

viii) A scheme for awarding Vidyut Rajbhasha Running Shield, Rajbhasha

Trophy and Rajbhasha Cup is being introduced to encourage the progressive use of Hindi through positive competitiveness among the attached and subordinate offices and Public Sector Undertakings/ Autonomous Bodies/Boards/Societies/ Institutions under the administrative control of the Ministry.

11.3 WELFARE OF 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.

	GROUP 'A'			GROUP'B'			GROUP 'C'			GROUP'D'		
Name of Office	Total	SC	ST	Total	SC	ST	Total	SC	ST	Total	SC	ST
Ministry of Power	36	4	-	99	13	-	110	20	-	66	32	4

11.4 ESTABLISHMENT OF REGIONAL TARIFF BOARDS

The recommendation of the Working Group for setting up of National Power Tariff Board (or National Electricity Regulatory Commission) has been concurred in by all the State Govt./UTs. However, the State Govts. (notably Orissa, U.P., Karnataka and Haryana) have favoured setting up of State level Regulatory Commission instead of Regional Tariff Boards. The planning commission has since, agreed for setting up of National and State level Electricity Regulatory Commission. The Orissa Power Sector Reform Bill which, inter alia, recommended setting up of an independent commission known as "Orissa Electricity Regulatory Commission" has since been passed. The reform bill of a few more State Govts. are under active consideration.

11.5 ESTABLISHMENT OF AN AUTONOMOUS REGULATORY BODY

It is now proposed to establish an autonomous quasi-judiciary statutory body called National Electricity Regulatory Commission at the apex level which would have jurisdiction throughout the country in respect of Central Power Supply utilities, Generating Companies supplying powers to two or more States and Captive Power Plants and Co-generation plants. The State level regulatory commission will have the jurisdiction over the State Power Utilities, including private distribution companies and generating companies supplying power to that State.

The National/State Electricity Regulatory Commission shall fix the tariff and standards of power supply by the producers to the consumers and act as arbitrator in setting tariff related disputes and also into the grievances of bulk consumers.

11.6 VIGILANCE ACTIVITIES/ DISCIPLINARY CASES

At the beginning of the year, 1995, there were thirteen vigilance/disciplinary cases, of which three cases have been decided during the year. Stress is being laid on the need for greater role of preventive vigilance.

11.7 RECREATION ACTIVITIES

The Ministry is promoting sports and cultural activities. Prizes for various sports activities were given away on 7.2.1996 by its Recreation Club to winners in numerous activities in sports.

2. Power Sports Control Board (PSCB),

Constituted as a nodal agency with the participation of Central Power Organisation i.e., Central Electricity Authority and all the public sector undertakings/ autonomous bodies under the administrative control of the Ministry of Power is arranging various tournaments in various disciplines every year, all over the country with the help of member organisations. The Board got formally registered as a society under the Societies Regulation Act, 1860 on May 13, 1994. The Ministry is encouraging the participation of its officers and staff in several other sports and cultural meets organised by the Central Civil Services Cultural and Sports Board. The Ministry of Power presented dance and chorus songs in the first Cultural programme of PSCB held on 31.3.1996 in Siri Fort Auditorium, New Delhi.

11.8 GRIEVANCES CELL

The Grievances Cell of Ministry of Power dealt 52 case relating to various grievances which includes 24 pending cases of last year i.e., 1994-95. All these cases relate to pension, pensionary benefits, transfer, pay fixation, seniority, employment on compensation grounds etc. Out of these 52 grievances, 38 have been finally disposed off.

11.9 CONTROLLER OF ACCOUNTS

The office of the Controller of Accounts has four Pay and Accounts Offices, working under his control viz. P.A.O. (Sectt), P.A.O., C.E.A., New Delhi, P.A.O. (CEA), Bangalore, and P.A.O. (BMCC). The monthly accounts of these offices are submitted regularly to Principal Accounts Offices, thereafter these are consolidated and sent to the office of the Comptroller General of Accounts, Ministry of Finance. The monthly accounts are prepared after incorporating the financial transactions of the Ministry of Power in a detailed classified form. The payment on account of DCRG, Pension, Commuted Value of Pension, G.P.F. to the officials of the Ministry/ Central Electricity Authority on retirement during the year by all the P.A.O.s were made in time. The Principal Accounts Office is also responsible for the preparation of Appropriation Accounts, Statement of Central Transaction (SCT) and Finance Account on annual basis for submission to the Comptroller General of Accounts (CGA). The Principal Accounts Office also brought out the document 'Accounts at a Glance' for 1993-94.

11.9.1 COMPUTERISATION OF ACCOUNTS

The office of Comptroller of Accounts utilises the software packages INTEGRATED MODULE FOR PROCESSING VOUCHER (IMPROVE) AND CONTROLLER'S ACCOUNTING (CONTACT) provided by CGA. The voucher level computerisation has been carried out in all the four P.A.Os. The consolidation of monthly accounts of all the P.A.Os. in Ministry of Power is done by using the CONTACT Software packages. Various other packages like SCT, MIS are also used for Report Generations. 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 Comptroller General of Accounts.

11.10 INTERNAL AUDIT WING

The Internal Audit Wing ensures adoption of sound procedure regularities and financial propriety of transactions and accounts. This wing advises the D.D.Os. 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 1994-95 is as under:

Year (Accounts due for Audit)	No. of units due/ inspected	No. of paras raised	No. of paras settled	No. of paras outstanding upto 31.3.96
1994-95	25/25	409	98	311

11.11 AUDIT OBSERVATIONS

The organisation-wise break-up of Audit Observations and Inspection Report as on 31.3.1996 are as under:

Sl.No.	Organisation	No. of Inspection Reports	Number of Paras
1.	C.E.A.	4	19
2.	BTPP/BTPS	17	193
3.	B.M.C.C.	3	5
4.	Ministry of Power	6	57
5.	N.P.T.I. (Including its Institutes)	4	60
6.	C. P. R. I.	3	9
7 .	E.M.C.	3	14
	PAY AND ACCOUNTS OFFICE/CONTROLLER OF ACCOUNTS		
8.	PAO(CEA), New Delhi	5	18
9.	PAO(BMCC), New Delhi	3	4
10.	PAO(Sectt.), New Delhi	5	16
11.	PAO(CEA), Bangalore	2	8
		55	403

POWER SUPPLY INDUSTRY IN INDIA - HIGHLIGHTS

I. STATEWISE GENERATING CAPACITY, ELECTRICITY GENERATION, SALES AND PER CAPITA CONSUMPTION

State/U.T.	** Capacity (MW)		** Generation (GWH)		f Sales (GWH)		@ @ Percapita Consumption (KWH)	
	1992-93	1993-94	1992-93	1993-94	1992-93	1993-94	1992-93	1993-94
Haryana	1780	1780	7973	6716	8091	7888	507	487
Himachal Pradesh	272	272	1088	976	1107	1179	208	217
J & K	262	337	801	785	1505	1607	188	197
Punjab	3499	3509	15718	16322	13937	14540	684	703
Rajasthan	1733	1942	8592	8517	10635	11194	246	254
Uttar Pradesh	5075	5575	18167	19847	21890	23358	179	186
Chandigarh	2	2	—	—	459	465	715	665
Delhi	552	552	2432	2276	7765	7875	823	779
Central Sector	8064	9172	39614	41899	—	—	—	—
Total (N. Region)	**21239**	**23141**	**94385**	**97338**	**65389**	**68106**	**282**	**288**
Gujarat	4892	4939	23045	24121	20000	22506	538	590
Madhya Pradesh	3533	3783	13259	14383	16065	18389	281	310
Maharashtra	9129	9339	38607	41417	34428	36764	439	459
Goa	—	—	—	—	599	670	541	593
Daman & Diu	—	—	—	—	102	130	1015	1182
D & N Haveli	—	—	—	—	164	209	1175	1392
Central Sector	4674	4906	22842	27543	—	—	—	—
Total (W. Region)	**22228**	**22967**	**97753**	**107464**	**71358**	**78668**	**406**	**437**
Andhra Pradesh	4226	4726	18371	19959	19336	21831	312	344
Karnataka	3051	3168	12758	14344	12948	14041	303	323
Kerala	1477	1484	6193	5822	5698	6234	200	217
Tamil Nadu	4315	4317	16958	17657	19645	20822	369	387
Pondicherry	—	—	—	—	696	702	856	843
Lakshadweep	5	5	12	13	9	10	183	207
Central Sector	4430	4640	22691	25378	—	—	—	—
Total (S. Region)	**17504**	**18340**	**76983**	**83173**	**58332**	**63640**	**312**	**335**

APPENDIX - 1

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State/U.T.	** Capacity (MW)		** Generation (GWH)		f Sales (GWH)		@ @ Percapita Consumption (KWH)	
	1992-93	1993-94	1992-93	1993-94	1992-93	1993-94	1992-93	1993-94
Bihar	1548	1550	2967	2987	$ 7858	$ 8674	117	125
Orissa	1742	1742	5423	5375	5321	5967	297	319
West Bengal	3315	3525	11700	13663	$ 10031	$ 10596	158	164
DVC	2242	2242	5195	6913	—	—	—	—
A & N Islands	28	29	62	69	46	51	162	168
Sikkim	30	34	43	35	49	51	114	116
Central Sector	1340	2020	3693	3865	—	—	—	—
Total (E. Region)	**10245**	**11142**	**29083**	**32907**	**23305**	**25339**	**162**	**172**
Assam	537	577	1068	940	1482	1488	97	96
Manipur	12	12	4	3	199	216	104	111
Meghalaya	194	194	430	584	238	254	129	135
Nagaland	7	7	4	2	90	87	73	68
Tripura	53	53	176	154	167	174	59	60
Arunachal pradesh	33	39	54	60	49	61	54	67
Mizoram	23	23	19	**16**	65	76	91	101
Central Sector	255	255	1403	1522	—	—	—	—
Total (N.E. Region)	**1114**	**1160**	**3158**	**3281**	**2290**	**2356**	**93**	**94**
Total (All India)	**72330**	**76750**	**301362**	**324163**	**220674**	**238109**	**283**	**299**

** Utilities only

@ @ Utilities and Non Utilities

To ultimate Consumers by Utilities.

$ Includes D.V.C.'s sale to ultimate Consumers in Bihar & West Bengal Area.

* Provisional.

APPENDIX - 1
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	Dec. 1950	1970-71	1980-81	1990-91	1991-92	1992-93	1993-94*
II. SYSTEM PEAK DEMAND (AGGREGATE)							
Utilities (MW)	--	9743	19121	40672	43672	46632	--
III.FUEL CONSUMPTION							
Utilities Steam Stations							
Coal (MTx 10)[6]	2.22	14.59	35.82	112.90	133.68	141.09	--
Lignite (MT x 10)[6]	--	2.54	3.98	9.62	10.50	10.63	--
Furnace Oil							
(Kilo Lts x 1 0)[6]	--	1.28	1.87	0.78	0.81	0.78	--
Diesel Oil							
(Kilo Lts x 10)[6]	--	0.04	0.22	0.27	0.30	0.24	--
IV. AVERAGE GENERATION PER KW OF INSTALLED CAPACITY (KWH/KW) @ @							
(Utilities)							
Hydro	4505	3956	4075	3820	3791	3569	3465
Steam	2377	3702	3672	4147	4402	4531	4746
Diesel & Gas	1342	917	1219	2976	3517	3286	2887
Nuclear	0	5757	3512	3924	3095	3355	2693
Overall	2982	3795	3772	4000	4156	4167	4224
V. ELECTRICITY SALE (GWH)							
Utilities							
Domestic	525	3840	9247	31982	35854	39717	43136
Commercial	309	2573	4682	11181	12032	12653	13857
Industrial	2604	29579	48069	84209	87289	90169	94493
Agriculture	162	4470	11489	50321	58557	63328	70695
Public Lighting	60	500	748	1648	1766	1901	1994
Railway Traction	308	1364	2266	4112	4519	5068	5538
Public Water Works							
& Sewage Pumping	189	1016	1534	3643	4449	4377	4834
Miscellaneous	--	382	1332	3261	3179	3461	3562
Total	**4157**	**43724**	**82367**	**190357**	**207645**	**220674**	**238109**

	Dec. 1950	1970-71	1980-81	1990-91	1991-92	1992-93	1993-94*
Average Annual Growth Rate (%) during the decade	6.34	12.19	6.55	8.74	8.69	8.73	8.80
VI. PATTERN OF ELECTRICITY SALE (%)							
Domestic	12.6	8.8	11.2	16.8	17.3	18.0	18.1
Commerical	7.5	5.9	5.7	5.9	5.8	5.7	5.8
Industrial	62.6	67.6	58.4	44.2	42.0	40.9	39.7
Agriculture	3.9	10.2	17.6	26.4	28.2	28.7	29.7
Others	13.4	7.5	7.1	6.7	6.7	6.7	6.7
VII. ELECTRICITY CONSUMPTION							
Utilities/Non Utilities							
Per 1 000 of Population (KWH)	15550	89760	132340	252770	269980	283100	299004
Per 1 000 Sq. Kms. of area in (GWH)	1.69	15.35	25.05	64.35	70.34	75.04	80.76
Per MW of connected Load (GWH)	1.86	1.85	1.34	1.57	1.53	1.47	--
Per 1 000 consumers (GWH)	3.52	3.31	2.53	2.73	2.80	2.83	--
VIII. PERCAPITA(KWH) **(Utilities/Non-Utilities)**							
Generation	18.17	113.29	175.95	345.87	368.54	381.84	401.23
Consumption	15.55	89.76	132.34	252.77	269.98	283.10	299.00
NO. OF CONSUMERS (Thousand)							
Domestic	1157	10165	22338	50389	53771	56664	--
Commercial	259	2306	4582	8002	8429	8772	--
Industrial	*63	553	1150	2077	2180	2248	--
Agriculture	19	1571	4233	8631	9128	9558	--
Others	3	70	268	534	679	696	--
Total	**1501**	**14665**	**32571**	**69633**	**74187**	**77938**	**--**

@ @ The Figures given under this table indicate the generation in Kwh during the year per KW of installed capacity at the end of year.

* Provisional

-- Data not available

APPENDIX - 1
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	Dec.1950	1970-71	1980-81	1990-91	1991-92	1992-93	1993-94*
X. CONNECTED LOAD (MW)							
Domestic	734	5986	13079	32051	38979	46183	--
Commercial	401	1911	4494	8341	8731	10702	--
Industrial	**1562	11631	24844	42947	46966	49920	--
Agriculture	118	6225	16489	32511	34562	36400	--
Others	20	477	2492	5051	6427	6591	--
Total	**2835**	**26230**	**61398**	**120901**	**135665**	**149796**	**--**
XI. LENGTH OF T & D LINES							
(Circuit Kms)							
H V D C	--	--	--	--	1630	1667	--
400 KV	--	--	2340	21634	23085	23886	--
230/220 KV	--	11211	31834	62345	65967	68688	--
132/1 1 0 KV	2708	46160	59738	87965	89509	88186	--
78/66/44 KV	7431	25769	26752	34947	35712	36020	--
33/22 KV	5022	95073	163882	212267	218070	224685	--
15/11/66/33/22 KV	14110	362628	784513	1329774	1385113	1434367	--
Distribution Lines	--	576323	1453402	2784482	2755114	2848195	--
Total	**--**	**1117164**	**2522461**	**5433414**	**4574200**	**4725694**	--
XII. TRANSFORMATION CAPACITY (MVA)							
Step up	972.81	16256.24	37094	75823	81246	88866	--
Step down	1366.76	34726.70	97882	207595	220993	236483	--
Distribution	834.37	17048.84	43829	87501	97013	105060	--
XIII. SYSTEM LOSSES(%)							
All India	**15.83**	**17.50**	**20.56**	**22.89**	**22.83**	**21.80**	**21.46**

@ Estimated
($) Figures ending March 1951
** Including water works & traction
-- Data not available
* Provisional

XIV.ELECTRICITY SOLD DURING 1992-93 & 1993-94*- (GWH)*(UTILITIES)

Region	Domestic		Commercial		Industrial		Agricultural		Others		Total	
	92-93	93-94	92-93	93-94	92-93	93-94	92-93	93-94	92-93	93-94	92-93	93-94
Northern	13473	14790	4403	4721	21138	20809	22048	23297	4327	4489	65389	68106
Western	11390	11963	3534	3992	31959	34056	19633	23266	4842	5391	71358	78668
Southern	10114	11068	2792	3111	23621	24641	19015	21453	2790	3367	58332	63640
Eastern	4231	4704	1707	1792	12475	14022	2568	2606	2324	2215	23305	25339
North Eastern	509	610	217	240	977	965	64	73	523	468	2290	2356
Total	**39717**	**43135**	**12653**	**13856**	**90170**	**94493**	**63328**	**70695**	**14806**	**15930**	**220674**	**238109**

* Provisional

APPENDIX - 2

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	87476
Utilities	MW	66086	69065	72330	76754
Hydro	MW	18753	19194	19576	20379
Nuclear	MW	1565	1785	2005	2005
Thermal (Coal)	MW	43004	44792	46597	49147
Oil & Gas	MW	2764	3294	4152	5223
Non-Utilities	MW	8613	9302	10045	10722
2. Generation					
Utilities + Non-Utilities	BU	289.44	315.63	332.71	356.33
Utilities	BU	264.33	287.03	301.36	324.05
Hydro	BU	71.64	72.76	69.87	70.46
Nuclear	BU	6.14	5.53	6.73	5.40
Thermal (Coal)	BU	178.32	197.16	211.12	233.15
Oil & Gas	BU	8.23	11.58	13.64	15.04
Non-Utilities	BU	25.11	28.60	31.35	32.28
3. Consumption					
Utilities + Non-Utilities	BU	210.15	229.52	245.47	265.45
Industrial	BU	105.35	110.60	116.15	121.36
Transport	BU	4.14	4.54	5.09	5.64
Agriculture	BU	50.32	58.56	63.33	70.70
Domestic Commercial and Services ($)	BU	50.34	55.82	60.90	67.75
3A. Auxiliary Consumption					
Utilities + Non-Utilities	BU	22.77	24.67	25.68	26.32
T&D Losses	BU	56.52	61.44	61.56	65.01

($) Includes net energy exported to neighbouring countries

A night view of a NJPC Township at Kotla (Jeori)