ANNUAL REPORT 1992-93

MINISTRY OF POWER
GOVERNMENT OF INDIA, NEW DELHI

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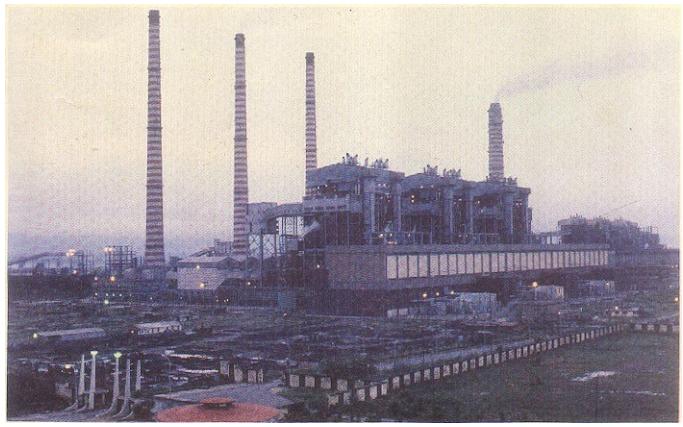
GRAPHS AND CHARTS

Outer view of Korba Super Thermal Power Station



MINISTRY OF POWER

ORGANISATION

The Ministry of Power and Non-Conventional Energy Sources was formed comprising the Departments of power and Non-conventional Energy Sources with effect from 24th June, 1991. It was further bifurcated into two separate Ministries, namely Ministry of Power and Ministry of Non-conventional Energy sources with effect from 2nd July, 1992. Shri Kalp Nath Rai was the Minister of State for Power (independent charge) upto 18th January, 1993. Shri N.K.P. Salve and Shri P.V. Rangayya Naidu, took over as Minister and Minister of State for Power on 19th January, 1993 respectively.

Shri S. Rajgopal was the Secretary in the Ministry of Power upto 13.7.1992(FN). Shri R. Vasudevan took over as the Secretary of the Ministry of power with effect from 14.7.1992(FN). He is assisted by six Joint Secretaries, including the Financial Adviser.

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

i) Administration & Hydel;

ii) Thermal

iii) Investment Promotion Cell;

iv) Planning, Coordination & Energy Management;

v) Systems & Operation and

vi) Finance.

The Central Electricity Authority (CEA), constituted under the electricity (Supply) Act, 1948, advises the Ministry of Power on technical and economic matters. The construction and operation of generation and transmission projects in the Central Sector are entrusted to Central Sector Power Corporations, namely, the National Thermal Power Corporation (NTPC), the National Hydroelectric Power Corporation (NHPC), the North Eastern Electric Power Corporation (NEEPCO) and the Power Grid Corporation of India Limited (PGCIL). The PGCIL, which was incorporated on the 23rd October, 1989, is responsible for all the existing and future transmission projects in the Central Sector and also for the formation of the National Power Grid. There are two joint venture Power Corporations under the administrative control of the Ministry of Power, namely, Nathpa Jhakri Power Corporation and Tehri hydro Development Corporation, which are responsible for the execution of the Nathpa Jhakri Power Project and projects of the Tehri Hydro Power Complex, respectively. The Damodar Valley Corporation (DVC), constituted under the DVC Act, 1948, and the Bhakra Beas Management Board (BBMB), constituted under the Punjab Reorganisation Act, 1966, are also under the administrative control of the Ministry of Power.

The Ministry of Power also administered the Beas Construction Board, which has since been wound up from 30.4.1992. Further, the Central Power Research Institute (CPRI) the Power Engineers Training Society (PETS) and the Energy Management Centre (EMC) are under the administrative control of the Ministry of Power. Programmes of rural electrification are within the purview of the Rural Electrification Corporation (REC). The Power Finance Corporation (PFC) provides term finance to projects in the power sector.

FUNCTIONS

The primary responsibility of the Ministry of Power pertains to the development of electrical energy in the country. The Ministry is concerned with perspective planning, policy formulation, processing of projects for investment decision, monitoring of the projects, training and manpower development and the administration and enactment of legislation in regard to power generation, transmission and distribution.

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

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

ENERGY POLICY

The Energy Policy of the Government of India aims at ensuring adequate energy supplies at a minimum cost, achieving self-sufficiency in energy supplies and protecting the environment from the adverse impact of utilising energy resources in an injudicious manner. The main elements of Energy Policy are:

- Accelerated exploitation of conventional energy sources, viz coal, hydel, oil and nuclear power.
- Management of demand for oil and other forms of energy.
- Energy Conservation and Management, with a view to increase energy productivity.
- Optimising the utilisation of existing capacity in the country.
- Development and exploitation of renewable sources of energy to meet the energy requirement of rural communities.
- Intensification of research and development activities in the field of new and renewable energy sources.
- Organisation of training for the personnel engaged at various levels in the energy sector.

THE YEAR UNDER REVIEW

During the year 1992-93(upto Nov. 92), the National Thermal Power Corporation (NTPC) commissioned a total generating capacity of 1080 MW, raising its total installed capacity to 12413 MW. The generation from the NTPC power stations during 1992-93 upto November, 1992 has been 40965 million units as against the target of generation of 57940 million units for the entire year, and the pro rata target of 38,267 MUs for the period April to Nov. 92. A Memorandum of Understanding (MOU) for the year 1992-93 was signed between the NTPC and the Ministry of Power on 23.10.92. The MOU targets of NTPC for the year 1992-93 in respect of major performance parameters are given below:

CATEGORY OF PERFORMANCE

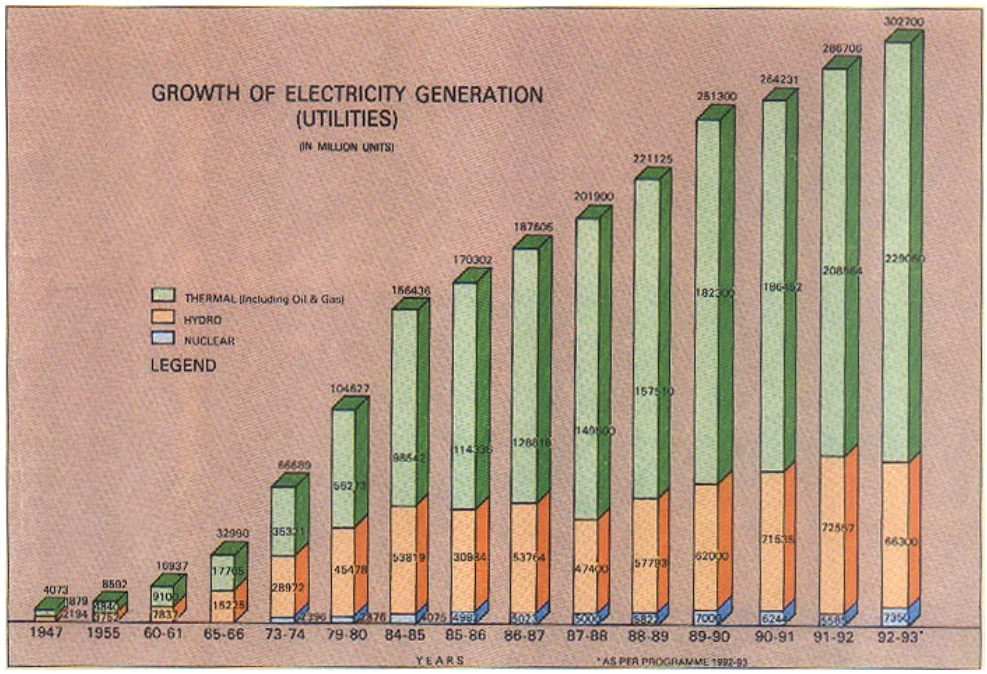
	Very Good (Target)	Excellent
1. Capacity Addition (MW)	1500	1710
2. Generation (MUs)	57940	60837
3. Turnover (Rs. crores)	3936	-(*)
4. Profits (Rs. crores)	656	721

(*) Based on tariff norms recommended by K.P. Rao Committee

The NTPC qualified for the meritorious Productivity Award for achieving high standards of performance. The workers from Vindhyachal Project and Singrauli station of NTPC were given Prestigious Prime Ministers' Shram Award and Rajiv Gandhi Memorial Award respectively. NTPC was also awarded All India Organisation of Employers (AIOE), Vishveswariya and Company standardisation Awards.

During the financial year 1992-93 the NTPC earned a net profit of Rs. 504.16 crores (upto January 1993).

The performance of the National Hydro-electric Power Corporation was also commendable during 1991-92. The Corporation which is responsible for the operation and maintenance of Baira Suil, Loktak and Salal Stage-I projects, generated 2495.70 million units in 1992-93 (upto October, 92) as against the target generation of 2424.00 million units. The transmission lines of the NHPC are to be transferred to NTPC (now known as the Power Grid Corporation of India). A Memorandum of Understanding (MOU) was signed between the NHPC and the Power Grid Corporation of India and de jure transfer has already taken place.



POWER GENERATION

HIGHLIGHTS

As a result of favourable monsoon, the generation targets fixed for 1992-93 (upto December, 1992) for Hydro, have been exceeded during the period April, 1992 to December, 1992. The thermal generation was 2.7% less than the programme. However, it was 7.7% more than that of the corresponding period of last year. The Hydro generation during this period was 3.2% more than the programme.

The total energy generation in the country during 1991-92 was 286.70 billion units showing an increase of 8.5% over the generation in 1990-91. The increase in thermal generation during 1991-92 over the previous year was 11.9%. The hydro generation registered an increase of 1.4% during 1991-92 over the last year.

For the year 1992-93, the generation target of 302.700 BUs has been fixed, comprising 229.05 BUs thermal, 7.350 BUs nuclear and 66.300 BUs hydro power. This envisaged an increase of about 5.6% over the generation achieved during 1991-92.

During the period April, 1992 to December, 1992 the hydro generation was about 4.5% less than that of last year. The thermal generation was however 7.7% more than that of last year. The total generation during this period was 221.282 BUs which is 4.6% more than the generation during the corresponding period of the previous year. The actual generation during the period, April, 1992 to December, 1992 as compared with the target is given below:

APRIL TO DECEMBER, 1992

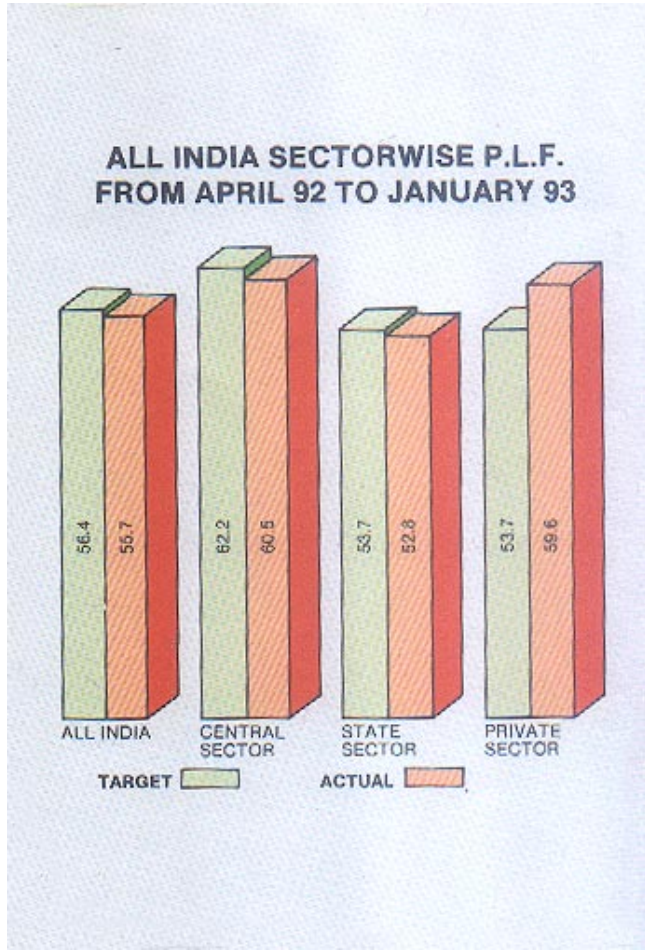
(Figs. in MU)

	Prog.	Actual	%of Prog.	%age of the corresponding period/last year
Thermal	166750	162261	97.3	107.7
Nuclear	5411	4776	88.3	120.2
Hydro	52585	54245	103.2	95.5
Total	224746	221282	98.5	104.6

PLANT LOAD FACTOR OF THERMAL STATIONS

Thermal capacity, at present constitutes about 69% of the total installed capacity, in the country, and contributes about 72% of the total power generation. At the beginning of the 6th Five Year Plan, the performance of the thermal power stations was unsatisfactory with the plant load factor of 44.3% only. To improve their performance, a number of measures were taken to achieve the optimum utilisation of the existing thermal units. At the beginning of 7th Five Year Plan i.e. 1985-86, the PLF improved to 52.4% and further increased to 56.5% in 1987-88 which was the highest achieved in any year. During 1991-92 the PLF was 55.3%. During the period April, 1992 to December, 1992 the PLF has been 54.8%.

During the period April, 1992 to December, 1992 the following State Electricity Boards/Corporations achieved PLF higher than the All-India average of 54.8%.



Sl. No.	State Electricity Boards/ Corporations	PLF%
1.	Rajasthan	72.8
2.	Punjab	58.2
3.	Gujarat	59.6
4.	Maharashtra	58.3
5.	Andhra Pradesh	60.3
6.	Tamil Nadu	62.2
7.	West Bengal Power Development Corpn.	58.7
8.	NTPC	65.2
9.	A.E.Co.	61.1
10.	Trombay	56.2
11.	C.E.S.C.	68.9

In the State Sector, Kota Thermal Power Station of RSEB achieved the highest Plant Load Factor of 72.8% during April, 1992 to December, 1992. In the Private Sector, Ahmedabad Electric Co. achieved the highest Plant Load Factor of 68.9% during the period. In the Central Sector Singrauli Super Thermal Power Station of NTPC achieved the highest PLF of 72.9% during this period.

MERITORIOUS PRODUCTIVITY AWARD SCHEME

The Meritorious Productivity Award Scheme for better performance of Thermal Power Stations is being implemented by the Department of Power since 1983-84. The objective of this Scheme is to maximise Thermal Generation by motivating employees working in various Thermal Power Stations by providing cash awards to them for significant increase in Thermal Generation in their respective stations. For the year 1991-92 the following power stations received awards under this scheme:

S. No.	Name of the Station	S. No.	Name of the Station
1.	Raichur	12.	Vindhyachal
2.	Vijayawada	13.	Korba STPS
3.	Neyveli-I	14.	Kota
4.	Tuticorin	15.	Sikka
5.	Bhusawal	16.	Farakka
6.	Singrauli	17.	I.P.Station
7.	Rihand	18.	Koradi
8.	Ramagundam	19.	Nasik
9.	Gandhinagar	20.	Khaper Kheda
10.	Anpara	21.	Bandel
11.	Chandrapur (Mah.)	22.	Panipat

During the VIIIth Five Year Plan, a total of Rs.10 crores is likely to be spent on this scheme assuming an average expenditure of Rs. 2 crores during the each year of the Plan.

Another scheme for incentive award for efficient and economic operation of thermal power stations in the country has also been approved. Under this scheme also, during the VIIIth Five Year Plan, a total amount of Rs. 10 crores is estimated to be incurred assuming an expenditure of Rs. 2.00 crores during each year of the Plan. But actual provision of Rs. 14.98 crores has been made in 8th Five Year Plan for both the schemes.

RENOVATION AND MODERNISATION OF THERMAL POWER STATIONS

R & M PROGRAMME - PHASE-I

With a view to improve the performance of the existing thermal power stations, a massive renovation and modernisation programme has been launched all over the country.

The scheme covers 34 selected stations comprising 164 thermal units including 2 units of 55 MW capacity damaged in fire at Durgapur TPS, aggregating to a capacity of 13,585.5 MW. The total sanctioned cost of various renovation schemes is Rs. 1083 crores. Of this, Rs. 455 crores is being provided under Central Loan Assistance (CLA) and Rs. 628 crores will have to be financed by the States under State Plan (SP)/Own Resources (OR). In so far as the Central Assistance is concerned, the Government of India had approved an amount of Rs. 500 crores in 1984, for providing Central Loan Assistance to various State Electricity Boards/ Organisations to supplement their efforts.

The Power Finance Corporation have started financing the schemes from the year 1988-89.A total amount of Rs. 347.24 crores has been released to various State Electricity Boards/Organisations under Central Loan Assistance upto 31st October, 1992 against a total budget provision of Rs. 445.57 crores. In addition, State Electricity Boards/ Organisations incurred a total expenditure of Rs. 521.80 crores upto 31st October, 1992 against a total budget provision of Rs. 1065.91 crores.

CEA has been doing overall coordination and extensive monitoring of the implementation of physical and financial progress of the R&M programme.

Some of the thermal units where substantial portion of R&M works have been carried out, have shown marked improvement in their performances, as shown in Table-1.

R & M PROGRAMME PHASE-II

Keeping in view the benefits being accrued out of the Phase-I R&M programme during the VIIth plan period, its second phase has been launched for implementation during VIIIth Plan period with the main objective of achieving optimum performance results from the old thermal units. The total tentative cost of the R&M programme (Phase-II) covering 46 old thermal power stations comprising 202 generating units aggregating to a total capacity of 20606.025 MW is Rs. 1605.95 crores (including Rs. 147.40 crores under World Bank Loan Assistance). Of the total 46 schemes of TPS, 45 schemes covering 198 units aggregating to a capacity of 20,286 MW at a total estimated cost of Rs. 1569.23 crores (including Rs. 147.40 crores of World Bank Loan Assistance) have been cleared from CEA and the balance 1 scheme covering 4 units aggregating to a capacity of 320 MW at a total tentative cost of Rs. 36.72 crores is under examination.

The implementation of the schemes has already commenced. A major portion of the schemes is proposed to be financed from the loan by PFC to various SEBs/ Organisations. A total initial expenditure of Rs. 94.85 crores has been incurred mostly under SP/ORs of SEBs/ Organisations upto October, 1992

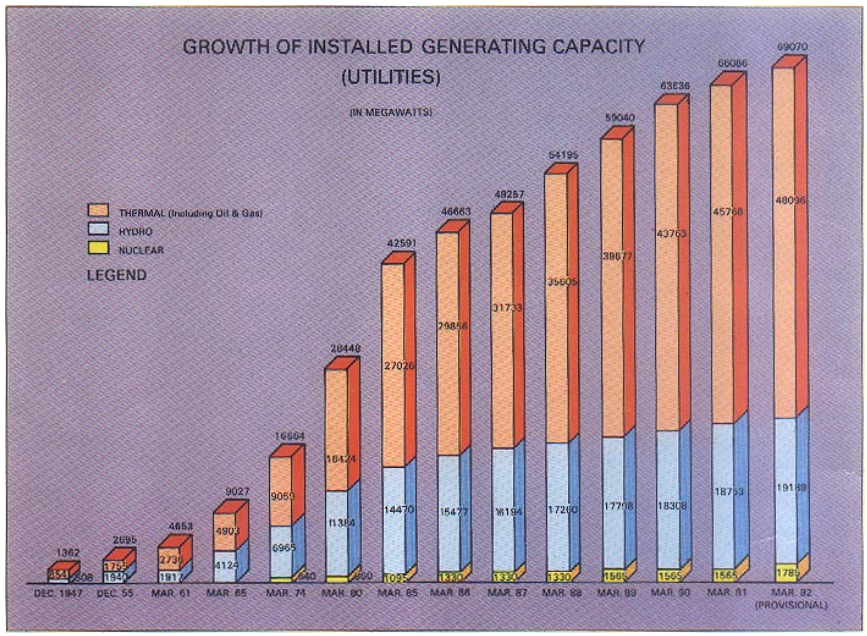
TABLE-I

STATEMENT SHOWING IMPROVEMENT IN PLF OF THERMAL UNITS WHERE SUBSTANTIAL R&M WORKS HAVE BEEN CARRIED OUT.

Sl. No.	Name of TPS	Unit Particulars No.	Rated capacity	Derated capacity	PLF before Renovation Based on rated capacity	Based on derated capacity if any	PLF after substantial renovation based on rated capacity (or) derated capacity wherever applicable (%) 4/92 to 10/92
			(MW)	(MW)	(%)	(%)	
1.	2.	3.	4.	5.	6.	7.	8.
1.	Badarpur	1	100	95	45.7	48.1	82.0
		2	100	95	52.8	55.7	76.9
		3	100	95	57.2	60.2	51.4
		4	210	-	44.2	-	75.7
		5	210	-	37.0	-	77.0
2.	I.P.	2	62.5	-	47.9	-	67.9
		3	62.5	-	53.5	-	66.0
		4	62.5	-	49.7	-	60.4
		5	60	-	50.3	-	55.2
3.	Faridabad	1	60	55	28.8	31.4	70.4
		2	60	55	36.5	39.8	59.1
		3	60	55	21.1	23.0	50.3
4.	Bhatinda	1	110	-	48.0	-	48.1
		3	110	-	45.7	-	65.3
		4	110	-	52.6	-	66.9
5.	Obra	2	50	40	45.7	57.1	66.7
		9	200	-	33.3	-	68.3
		10	200	-	31.4	-	57.8
		11	200	-	28.4	-	59.6
		12	200	-	40.2	-	59.0
		13	200	-	35.1	-	57.6

1.	2.	3.	4.	5.	6.	7.	8.
6.	Amarkantak	3	120	-	39.2	-	45.3
7.	Gandhinagar	2	120	-	48.2	-	61.2
8.	Ukai	2	120	-	38.7	-	52.7
9.	Koradi	2	120	115	68.0	66.7	68.9
		3	120	115	59.4	61.7	62.3
		4	120	115	38.9	40.6	62.1
10.	Nasik	2	140	-	51.9	-	60.5
11.	Bhusawal	1	62.5	58	71.2	76.2	76.9
12.	Kothagudem	1	60	-	40.0	-	65.2
		3	60	-	53.8	-	56.1
		5	110	105	27.6	28.9	42.6
		6	110	105	23.2	24.3	34.3
		7	110	-	17.3	-	49.4
		8	110	-	34.2	-	38.6
13.	Ennore	1	60	-	51.0	-	75.9
		2	60	-	48.7	-	71.4
		3	110	-	33.85	-	49.2
		4	110	-	25.2	-	43.9
		5	110	-	26.4	-	63.2
14.	Tuticorin	1	210	-	46.0	-	60.0
		2	210	-	47.0	-	81.4
		3	210	-	40.4	-	80.0
15.	Neyveli	4	50	-	77.8	-	81.4
16.	Talcher	1	62.5	60	33.7	35.1	51.9
		4	62.5	60	37.3	38.9	51.9
17.	Patratu	2	50	40	25.2	31.5	45.8
		8	110	105	30.1	31.5	51.2
18.	Santaldih	3	120	-	26.7	-	63.1
19.	Bandel	2	80	-	33.8	-	53.8
20.	DPL	3	70	-	00.0	-	27.0
21.	Namrup	5	30	-	38.0	-	48.0

GENERATING CAPACITY ADDITION



PROGRAMME, ANTICIPATED ACHIEVEMENT AND SLIPPAGE DURING/FROM 1992-93:

ACHIEVEMENT DURING 1991-92:

The aggregate capacity of 3810.8 MW comprising 754.3 MW hydro, 2586.5 MW thermal and 470 MW nuclear was targetted for commissioning during 1991-92, out of which an aggregate capacity of 3026.4 MW comprising 432 MW hydro, 2370.5 MW thermal and 220 MW nuclear has been commissioned/rolled during 1991-92. In addition to above, 4 MW hydro capacity at Suratgarh which was outside the programme was also commissioned during 1991-92.

Details are given below:

Type	Programme for 1991-92				Achievement during 1991-92			
	CS	SS	PS	Total	CS	SS	PS	Total
Hydro	120	643.3	-	754.3	120	316	-	436
Thermal	998	1455	133.5	2586.5	998	1239	133.5	2370.5
Nuclear	470	-	-	470	220	-	-	220
Total	1588	2089.3	133.5	3810.8	1338	1555	133.5	3026.5

PROGRAMME OF ADDITIONS TO GENERATING CAPACITY DURING 1992-93

For the year 1992-93, a target of 4458.02 MW has been fixed. The details are given below:

	CENTRAL	STATE	PRIVATE	TOTAL
HYDRO	540	321.10	18	879.10
THERMAL	1920	1418.92	-	3358.92
NUCLEAR	220	-	-	220
ALL INDIA	2680	1760.02	18	4458.02

Programme & Achievement during the period April, 92-February, 1993

A total capacity of 6241.52 MW comprising 332.60 MW hydro, 2688.92 MW thermal and 220 MW nuclear were targetted for commissioning during April, 1992-February, 1993. However, the capacity commissioned/rolled during the period April, 1992-February, 1993 was 2271.65 MW comprising 231.65 MW hydro, 1820 MW thermal and 220 MW nuclear. This includes Neyveli unit 6 of 210 MW of NLC advanced from March, 1993 and Kawas ST Unit-1 of 110 MW of NTPC advanced from 93-94 programme.

CAPACITY ADDITIONS DURING THE 8TH PLAN:

The capacity addition expected during the 8th plan is 30538 MW, with the following break-up:

	(MW)
Central Sector (inclusive of Nuclear Power Corp. & Neyveli Lignite Corporation)	12858
State Sector (inclusive of 2810 MW in private sector)	17680

PLAN OUTLAY

The total public sector outlay for power is Rs. 79589.32 crores as indicated in the 8th Plan document by the National Development Council. The break-up is as follows:

	(Rs. Crores)
Centre (inclusive of NTPC&NLC)	31181.58
State	48407.74

Dadri Power Project of NTPC

ANNEXURE

GENERATING CAPACITY ADDITION PROGRAMME FOR THE YEAR 1992-93

Sl. No.	Name of the Project and Unit No.	H T N	State/ Organisation	Capacity (MW)	Commissioning schedule
NORTHERN REGION					
1.	Chamera St. I U-1	H	HP/NHPC	180	3/93
2.	Chamera St. I U-2	H	HP/NHPC	180	3/93
3.	Chamera St. I U-3	H	HP/NHPC	150	3/93
4.	Gaj U-1	H	HP	3.5	1/93
5.	Gaj U-2	H	HP	3.5	2/93
6.	Gaj U-3	H	HP	3.5	3/93
7.	Ropar	T	Punjab	210	2/93
8.	Raigarh	T	Rajasthan	3	1/93
9.	Sobla U-1	H	U.P.	3	2/93
10.	Sobla U-2	H	U.P.	3	3/93
11.	Tanda U-4	T	U.P.	110	3/93
12.	N' Capital TPP U-2	T	UP/NTPC	210	9/92
13.	N' Capital TPP U-3	T	UP/NTPC	210	3/93
14.	Dadri CCGT U-3	T	UP/NTPC	131	6/92
15.	Dadri CCGT U-4	T	UP/NTPC	131	9/92

	CENTRAL	STATE	TOTAL
HYDRO	540	16.5	556.5
THERMAL	682	323	1005.0
NUCLEAR	–	–	–
TOTAL	1222	339.5	1561.5

	WESTERN REGION				
16.	*Ultran ST U-3	T	Gujarat	33	3/92
17.	Ultran ST U-1	T	Gujarat	45	12/92
18.	Kawas CCGT U-2	T	Gujarat/NTPC	106	7/92
19.	Kawas CCGT U-3	T	Gujarat/NTPC	106	9/92
20.	Kawas CCGT U-4	T	Gujarat/NTPC	106	11/92
21.	*Kakarpara U-1	N	Gujarat/DAE	220	6/92
22.	Sikka Extn. U-2	T	Gujarat	120	2/93
23.	Birsinghpur U-1	T	M.P.	210	2/93
24.	Uran W.R. U-1	T	Maharashtra	120	3/93
25.	Ujjani U-1	H	Maharashtra	12	2/93

	CENTRAL	STATE	TOTAL
HYDRO		12	12
THERMAL	318	528	846
NUCLEAR	220		220
TOTAL	538	540	1078

SOUTHERN REGION

26.	*Penna Ahobilam U-1	H	A.P.	10	1/93
27.	*Penna Ahobilam U-2	H	A.P.	10	2/93
28.	Mallapur U-1	H	Karnataka	4.5	1/93
29.	Mallapur U-2	H	Karnataka	4.5	2/93
30.	Varahi U-1 (Mani Dam)	H	Karnataka	4.5	9/92
31.	Varahi U-2 (Mani Dam)	H	Karnataka	4.5	10/92
32.	*Ghat Prabha U-2	H	Karnataka	16	9/92
33.	Bangalore DG set U-1	T	Karnataka	21.32	9/22
34.	Bangalore DG set U-2	T	Karnataka	21.32	10/92
35.	Bangalore DG set U-3	T	Karnataka	21.32	11/92
36.	Bangalore DG set U-4	T	Karnataka	21.32	12/92
37.	Bangalore DG set U-5	T	Karnataka	21.32	1/93
38.	Bangalore DG set U-6	T	Karnataka	21.32	2/93
39.	Shivpur U-1	H	Karnataka	9	7/92
40.	Shivpur U-2	H	Karnataka	9	10/92
41.	*Kallada U-1	H	Kerala	7.5	1/93
42.	*Kallada U-2	H	Kerala	7.5	2.93
43.	Neyveli St. II U-6	T	Tamil Nadu/NLC	210	3/93

	CENTRAL	STATE	TOTAL
HYDRO		87	87
THERMAL	210	127.92	337.92
NUCLEAR			
TOTAL	210	214.92	424.92

EASTERN REGION

44.	Eastern Gandak Canal U-1	H	Bihar	5	2/93
45.	Eastern Gandak Canal U-2	H	Bihar	5	2/93
46.	Eastern Gandak Canal U-3	H	Bihar	5	2/93
47.	*Sone Western Canal U-1	H	Bihar	1.65	7/92
48.	*Sone Western Canal U-2	H	Bihar	1.65	8/92
49.	Sone Western Canal U-3	H	Bihar	1.65	10/92
50.	Sone Western Canal U-4	H	Bihar	1.65	12/92
51.	Tenughat U-1	T	Bihar	210	12/92
52.	Bokaro 'B' St. II U-3	T	Bihar/DVC	210	11/92
53.	*Upper Kolab U-4	H	Orissa	80	8/92
54.	*Rengali Extn. U-3	H	Orissa	50	8/92
55.	*Upper Rognichu U-1	H	Sikkim	2	5/92
56.	*Upper Rognichu U-2	H	Sikkim	2	7/92
57.	Upper Rognichu U-3	H	Sikkim	2	9/92
58.	Upper Rognichu U-4	H	Sikkim	2	11/92
59.	*Mayongchu U-1	H	Sikkim	2	6/92
60.	*Mayongchu U-2	H	Sikkim	2	7/92
61.	Kolaghat Extn. U-6	T	West Bengal	210	10/92
62.	Farakka STPPU-4	T	West Bengal/NTPC	500	10/92

	CENTRAL	STATE	TOTAL
HYDRO	–	163.6	163.6
THERMAL	710	420	1130
NUCLEAR	–	–	–
TOTAL	710	583.6	1293.6

ANNEXURE

GENERATING CAPACITY ADDITION PROGRAMME FOR THE YEAR 1992-93

Sl. No.	Name of the Project and Unit No.	HTN	State/ Organisation	Capacity (MW)	Commissioning schedule
NORTHERN-EASTERN REGION					
63.	*Lakwa GTU-5	T	Assam	20	12/92
64.	Lakwa GT U-6	T	Assam	20	3/93
65.	*Umiam Umtru IVU-1	H	Meghalaya	30	6/92
66.	*Umiam Umtru IVU-2	H	Meghalaya	30	7/92

	CENTRAL	STATE	TOTAL
HYDRO		60	60
THERMAL		40	40
NUCLEAR			
TOTAL		100	100

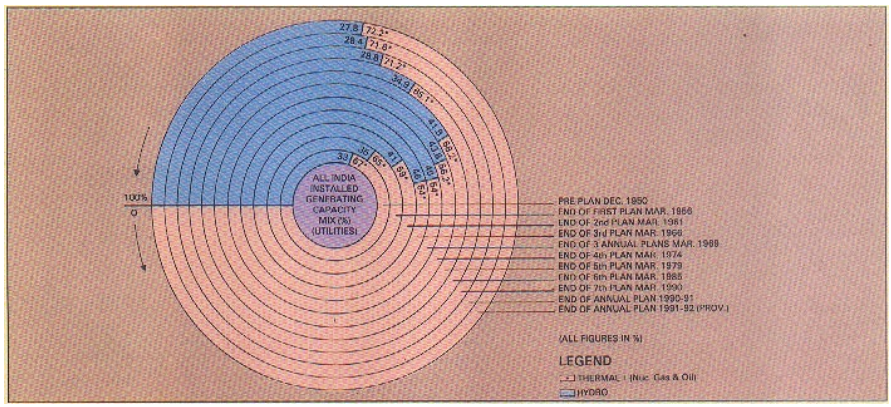
ALL INDIA

	CENTRAL	STATE	TOTAL
HYDRO	540	339.10	879.10
THERMAL	1920	1438.92	3358.92
NUCLEAR	220		220
ALL INDIA	2680	1778.02	4458.02

NOTE:

*Slippage from 1991-92

1. Pampore Gas Turbine St. II (2x25 MW) and Upper Sindh St. II (2x35 MW) slipping from 1991-92 Programme have not been included due to disturbed conditions in J&K.



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 1992-93 included construction of 2490 Ckt. km. of 400 kV and 3284 Ckt. km. of 220 kV lines alongwith the associated substation.

The progress achieved during the year 1992-93 (upto Dec. '92 in the construction of transmission lines and substations is summarised below:

400 kV lines	1504 Ckt. km.
220 kV lines	2187 Ckt. km.
400 kV Substation	3535 MVA
220 kV Substation	2641.5 MVA

CENTRAL SECTOR TRANSMISSION SYSTEMS

Central Sector Transmission lines and substations completed during the year 1992-93 (upto Dec. '92) are listed in the following table:

Transmission Lines	Executing Agency	Length Ckt. km.	Total
400 kV			
1. Dadri-Panipat-Malerkotla	Power Grid	302	302
220 kV			
1. Kakrapur-Vav D/C	Power Grid	84	
2. Kalyaneswari-Maithon D/C	DVC	20	104
Sub-Stations	**Executing Agency**	**MVA**	**Total**
400 kV			
1. Malerkotla	Power Grid	315	
2. Bihartshariff	Power Grid	315	
3. Moga	Power Grid	250	
4. Jamshedpur	Power Grid	315	
5. Durgapur (Extn.)	Power Grid	315	
6. Maithon	Power Grid	315	
7. Rourkela	Power Grid	315	2140
220 kV			
1. Durgapur (Aug. III)	DVC	150	150

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

To facilitate the exchange of power between the States and Regions, Inter-State and Inter-Regional transmission lines are being constructed under a centrally sponsored scheme, which was introduced in 1969.

During 1992-93, construction of 100 Ckt. km. of lines has been envisaged and outlay of Rs. 12.5 crores has been allocated for construction, start up of new lines already approved and some balance payments of lines already completed. During 1992-93, upto December '92, central loan assistance Rs. 3.15 crores has been released and 14 Ckt. kms. of stringing completed, and the total provision of Rs. 12.5 crores is anticipated to be fully utilised.

TRANSMISSION & DISTRIBUTION LOSSES

The average all-India transmission and distribution losses for the year 1990-91 have been estimated at about 22.90% (Provisional).

The Government of India have launched a scheme for incentive payments for the reduction of transmission and distribution (T & D) losses. Under the scheme, the SEBs/ Elecy. Deptts. and their Distribution Divisions, cities/towns are given shields on the basis of their performance relating to reduction in energy losses. In addition, cash awards are given to Distribution Division/cities/towns of the Power Utilities which achieve a prescribed minimum reduction in T&D losses. Individuals as well as institutions and organisations, who develop scientific devices or put forward practical suggestions for reduction of T&D losses also qualify for cash awards.

Under the incentive scheme, during 1992-93, recommendations relating to 1991-92 have been made for two shields to the SEB/ED of Karnataka and Pondicherry and four shields to best performing Distribution Divisions viz. Navasari C&M (GEB), Indore City (MPEB), Vishakhapatnam (APSEB), Jaipur City Circle (RSEB). Also, cash award were recommended to the 8 distribution Divisions of GEB, 3 Distribution Divisions of MPEB, 7 Distribution Division of APSEB and one city circle of RSEB.

INTEGRATED OPERATION OF GRIDS

The Regional Power Grids in the Northern, Western, Southern and Eastern Regions facilitate flow of power from surplus areas to deficit areas and assist in the optimum utilisation of the power availability in the country. The inter-State/inter-Regional assistance of energy effected during the period April, 1992 to December, 1992 is given below.

INTER-STATE/INTER-REGIONAL ASSISTANCE OF ENERGY

(All Figures in MU)

STATE	Assistance From	Assistance Dec. 1992	Assistance April-Dec. 92
Northern Region			
CHANDIGARH	Punjab	0.0	0.0
	H.P.	0.0	0.0
	S.S.T.P.S.	0.0	35.6
DELHI	B.B.M.B.	0.0	16.7
	Punjab	7.4	36.3
	H.P.	0.0	310.1
HARYANA	H.P.	0.0	28.1
	B.T.P.S.	0.0	0.0
H.P.	Haryana	3.8	3.8
	Punjab	1.2	45.9
	U.P.	16.1	241.1
	S.S.T.P.S.	12.7	16.6
J&K	S.S.T.P.S.	44.5	222.6
	B.B.M.B.	0.0	5.1
PUNJAB	H.P.	0.0	0.0
RAJASTHAN	H.P.	0.0	248
	Punjab	0.0	76.5
	M.P.	0.0	93.9
U.P.	B.B.M.B.	0.0	61.7
	H.P.	0.0	0.0
S.S.T.P.S.	Vindhyachal STPS	12.6	155.7
B.B.M.B.	S.S.T.P.S.	0.0	0.5
	Rihand	0.0	0.0
Western Region			
GUJARAT	Maharashtra	0.0	209.7
	N.R.	0.0	13.8
	S.R.	0.0	0.0
M.P.	Rajasthan	23.0	124.0
	A.P.	0.0	33.8
	N.R.	6.0	203.1
	S.R.	0.0	0.0
MAHARASHTRA	Gujarat	0.0	251.0
	Karnataka	0.0	0.0
	N.R.	0.0	2.0
	S.R.	0.0	0.0
GOA	Maharashtra	0.0	0.0
Southern Region			
A.P.	Karnataka	0.0	0.0
	Maharashtra	0.0	18.6
	M.P.	2.5	118.3
	Orissa	0.0	0.0
	Gujarat	0.0	21.8
	Goa	0.0	34.7
KARNATAKA	Kerala	0.0	0.0
	A.P.	0.0	1.7
	Maharashtra	0.0	0.0
KERALA	Karnataka	0.0	0.0
	T.N.	0.0	0.0
TAMILNADU	Kerala	0.0	0.0
Eastern Region			
BIHAR	Orissa	0.0	0.0
	D.V.C	0.0	0.0
	NTPC(SSTPS)	0.0	0.0
	NTPC(ANTA)	11.1	86.7
	NTPC(AURAIYA)	15.8	131.0
	Assam	0.9	42.5
D.V.C.	Bihar	0.0	0.0
	Orissa	0.0	0.0
	West Bengal	0.0	0.0
	Assam	6.4	16.1
ORISSA	Bihar	0.0	0.0
	NALCO	76.0	666.1
	ICCL	26.6	281.5
	R.S.P.	0.0	3.9
	A.P.	0.0	9.8
	M.P.	19.5	129.2
	Assam	0.3	4.4
WEST BENGAL	Orissa	0.0	0.0
	Bihar	0.0	0.0
	Assam	0.1	11.2
N.E.Region			
ASSAM	Eastern Region	23.1	94.2
	Meghalaya	11.2	146.4

DEVELOPMENT OF NATIONAL POWER GRID

The Union Cabinet in 1980 approved in principle the establishment of a Centrally owned and operated National Power Grid. The National Power Grid would eventually comprise strong Regional networks with suitable asynchronous (HVDC) links between the regions. Already 18315 Ckt. Kms. of 400 kV line and 5408 Ckt. kms. of lines at 220 kV level have been constructed in the Central Sector, upto Dec.'92. An inter-Regional link (Vindhayachal 2x250 MW HVDC back-to-back) connecting Western and Northern Regions is also in operation. These as well as other AC links between regions form

the important components of the evolving National Power Grid today.

In October, 1989 Government of India established the Power Grid Corporation of India Limited (erstwhile National Power Transmission Corporation) to further accelerate the development of the National Power Grid. The 'POWER GRID' have already taken over most of the existing Central Sector transmission system. 'Power Grid' also propose to take up schemes for further strengthening of the Regional Power Grids and establish HVDC back-to-back inter-Regional links. As outlined earlier, at Chandrapur, a 2x500 MW HVDC back-to-back station superimposed on the existing Chandrapur-Ramagundam 400 kV D/C line between Western and Southern Regions has been approved by PIB. Inter-Regional link between Eastern and Southern Regions covering Jeypore-Gazuwaka 400 kV D/C line and a 2x250 MW HVDC back-to-back station at Jeypore has also been techno-economically cleared by CEA. A proposal to provide HVDC link between Northern and Eastern Regions has also been appraised by CEA in March, '92 and found to be techno-economically in order. It is also planned to provide asynchronous inter-Regional link between Western-Eastern and Eastern-North Eastern Regions.

Although the Regional Grids have already been inter-connected, paving way for formation of a National Grid, further strengthening of inter-regional ties 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.

REGIONAL ELECTRICITY BOARDS AND REGIONAL LOAD DESPATCH CENTRES

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

REGIONAL LOAD DESPATCH CENTRES

In the Northern, Western and Eastern Regions, permanent Regional Load Despatch Centres (RLDCs) equipped with computer based telemetry and data acquisition systems have already been established. RLDC of Southern Region is equipped with minimum display facilities like mimic diagram board, digital cyclic telemetering system, analog load frequency control equipment, etc. An interim RLDC equipped with minimum speech communication and teleprinting facilities is also operational in the North-Eastern Region. In the Northern Region, an interim scheme for augmentation of existing load despatch and telecommunication facilities is under implementation and is likely to be completed during 1992-93. Similar schemes in respect of Eastern, Western and North-Eastern Regions are under formulation.

MASTER TELECOMMUNICATION PLAN FOR INDIAN POWER SYSTEM

Central Electricity Authority has completed the preparation of a Master Telecommunication Plan for the power sector of India with the consultancy assistance from M/s. Merz & Mclellan, U.K. and M/s. Bharat Electronics Ltd., India. The project reports from most of the State Electricity Boards have been received and their techno-economic appraisal has been done by CEA. The DOT clearance for establishing multi-channel links has also become available for KSEB, GEB, PSEB, NE Region and MSEB (Phase-I). Radio surveys have been conducted by DESU and GEB. Further action in respect of implementation of the Master Telecommunication Plan is being taken.

An Interim National Load Despatch Centre (INLDC) has been established during 1991-92 in order to collect vital power system operational data from different regional electricity boards for use in CEA and Ministry. In order to optimise the use of communication channels, a few modification works are in progress.

UPGRADING OF TECHNOLOGY

NEXT HIGHER A.C. TRANSMISSION VOLTAGE

The adoption of 800 KV class as the next higher AC transmission voltage in the country had been accepted by the Govt. of India in October, 1988. The decision had been conveyed to all State Electricity Boards/Power Utilities etc. With a view to bringing uniformity in the development of future 800 KV systems in the country, the Standing EHV Committee had constituted 10 Working Groups with representatives from Electricity Boards/Undertaking CPRI, Industry and CEA to take up the work of standardisation of 800 KV class equipment/transmission line material. Based on the studies carried out by the Working Groups and the detailed discussions held by them, a report on Standard parameters of 800 KV transmission system in India had been brought out by CEA in September, 1990. This report has been circulated to all the Electricity Boards and Power Utilities etc. for their guidance and adoption of recommended parameters.

NATIONAL HVDC PROJECT

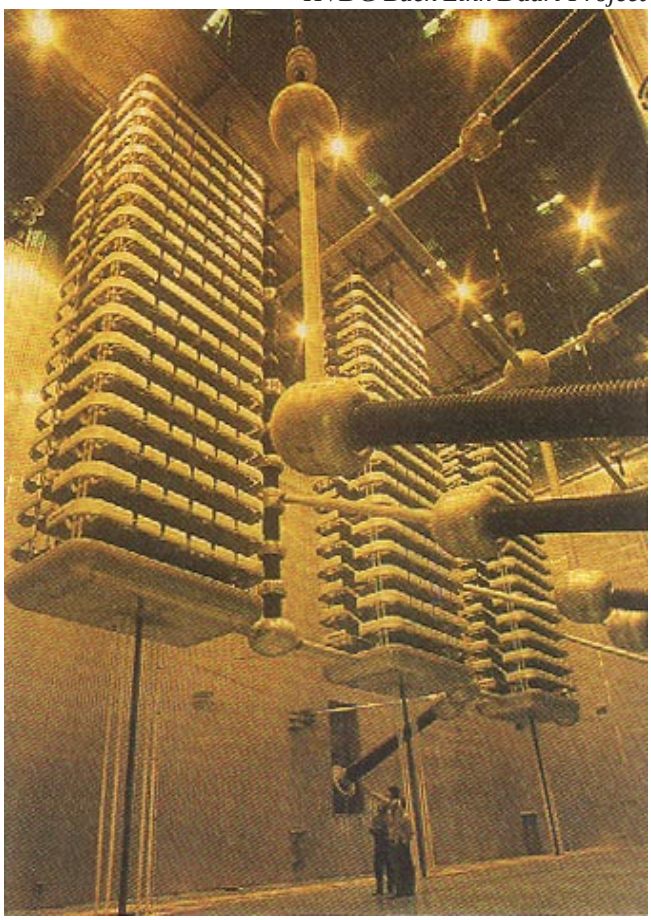
Under the National HVDC Project, one circuit of the existing D/C 220 KV AC line between Lower Sileru (A.P.) and Barsoor (M.P) is being taken up for conversion from AC to

DC link. The HVDC steering Committee has, in October, 1983 approved taking up the National HVDC Project in three stages:

Stage-I	100 MW, 100 KV	6 pulse mono pole
Stage-II	200 MW, 200 KV	12 pulse mono pole
Stage-III	400 MW, ± 200 KV	12 pulse mono pole

The first phase envisaged the conversion of one circuit to 100 KV, 100 MW DC Link. In the second phase, this link is to be uprated to 200 kV, 200 MW. The first phase has been completed at a cost of Rs. 29.21 crores and there is a continuous flow of 100 MW power on this link since 20th October, 1991. It has transmitted 231 million units of energy till Sept. '92. After the successful implementation of first phase, the second phase will now be taken up. The HVDC Hardware Development Committee has approved the estimated cost of Rs. 103.98 crores (excluding 14.71 crores of customs duty) for upgrading 100 MW, 100 kV HVDC link (Stage-I) to 200 MW, 200 kV HVDC link (Stage-II). The stage-II is scheduled for completion during 8th Plan. The proposal is awaiting PIB clearance.

HVDC Back Link Dadri Project



COOPERATION WITH BHUTAN

From the Chukha Hydroelectric Project in Bhutan, the Royal Government of Bhutan earned a revenue of over Rs. 190 crores by November, 1992 from sale of power to India thereby recovering over 75% of the project cost besides supplying power of internal consumption of Bhutan. Encouraged by the successful operation of the project Government of India and Royal Government of Bhutan have agreed to undertake preparation of detailed project report (DPR) for Chukha Stage-II (Tala Hydroelectric Project-1000 MW) and Chukha Stage-III (Wangchu Reservoir Project-175 MW) downstream of the existing Chukha Project. The detailed project report is under preparation by WAPCOS and is expected to be available by December, 1993. The two Governments have also signed a Memorandum of Understanding on preparation of DPR for Bunakha Hydroelectric Project (2 x 60 MW) upstream of the existing Chukha Project.

COOPERATION WITH NEPAL

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

FOREIGN EXCHANGE

The Liberalised Exchange Rate Management System (LERMS) was introduced during 1992-93. Under this system, foreign exchange at the official rate is available only for import of goods and services by the Ministries/Departments and for certain essential goods categorised in the order of the Ministry of Finance dated March 31, 1992. Consequently, unlike in the past, foreign exchange under free resources were not earmarked for utilisation by the Ministry of Power. However, the Ministry continued to be responsible for authorisation of foreign exchange under multilateral and bilateral aid programmes as also for granting permission to the power utilities for engaging

foreign experts. Foreign exchange equivalent to Rs. 400.91 crores was released during the year upto the end of January, 1993 for import of equipment etc. by various utilities under Lines of Credit, multilateral contracts etc. as per details below.

Sl.No.	Project	Foreign Exchange released (Rs. in Crores)	Line of Credit
1.	Import of 2616 Kms. moose conductor in respect of 400 KV D/C Kathalguri-Malda line section under 400 KV Transmission (NTPC)	29.75	OECF Loan IOP 42 & 46
2.	Import of 400 KV GIS equipment for River Bed Power House, Sardar Sarovar Narmada Nigam	89.94	IBRD Loan No. 2497-IN&IDA Credit 1552-IN
3.	Import of 245 KV GIS for Trombay Thermal Power Generating Station Switch-gear Unit-6 (TATA)	5.40	IBRD Loan 2452-IN
4.	Import of spares from different countries for 500 MW Unit No. 6 Trombay (TATA)	0.21	IBRD Loan 2452-IN
5.	Import of spares for various equipment for 500 MW Unit No. 6 of Trombay (TATA)	0.22	IBRD Loan 2452-IN
6.	Import of spares of Carbon Monoxide Analyser SGWC Pump and high pressure TDA valves (TATA)	0.67	IBRD Loan 2452-IN
7.	Import of capital goods for reversible Generating Station pumped storage plant for Bhira Hydro Electric Project (TATA)	64.28	IBRD Loan 3239-IN
8.	Import of spares for supervision and control data acquisition system (SCADA)(TATA)	1.01	IBRD Loan 2452-IN
9.	Import of spares for Boiler Flame Monitoring CCTV for 500 MW, Unit-VI Trombay (TATA)	0.06	IBRD Loan 3096-IN
10.	Import of certain rows of Blades, Turbine studs nuts & bolts for Nasik (2 x 140 MW) Unit 1 & 2 under renovation and modification scheme (Maharashtra)	10.03	IBRD Loan 2544-IN
11.	Portable reference Meters (Maharashtra)	1.09	IBRD Loan 3096-IN
12.	Procurement of 5 Nos., 72.5 KV GIS and its associated equipments (KSEB)	15.94	World Bank Loan 2582-IN
13.	Import of 11 KV XLPE Cables for Static Excitation of Sharavathy Generating Station.	0.14	World Bank Loan 2827-IN
14.	Procurement of Lot 1 of 125 Kms. XLPE underground Cables and Lot 2 of 200 Kms. of 11 KV XLPE underground Cables for Master Plan Works (both 300 MW) (KSEB)	24.58	World Bank Loan 2582-IN
15.	Import of insulation materials for 2 Nos. Turbine Generator for Karbi Langapi Hydro Electric Project (ASEB)	0.13	OECF Loan IDP-15
16.	Import of spares for R&M of 4 x 108 MW Gas Turbine for Waste Heat Recovery Plant (2 x 120 MW) at Uran (Maha.)	8.75	FRG Loan
17.	Import of Steel Plates for Koyna Hydro Electric Project Stage-IV, 4 x 250 MW (Maha.)	16.66	IBRD Loan 3096-IN
18.	Import of additional structural Steel for 400 KV Marine Malda Transmission line Section and balance requirement of 400 KV Kathalguri Marine Section (NTPC)	1.68	OECF Loan IDP42 & 46
19.	Import of Gas Turbine to be installed at Basin Bridge Gas Turbine Project (TNEB)	130.36	OECF Loan IDP62
	Total	400.91	

RURAL ELECTRIFICATION PROGRAMME

During the year 1992-93, upto end of November, 1992, 1086 inhabited villages have been declared as electrified and 197040 pumpsets energised against the target of 4240 villages electrification and 256750 pumpsets energisation respectively, for the year as a whole. It is envisaged that the targets for the year will be achieved during the fourth quarter of the year. Cumulatively, 488683 villages have been electrified and 9622503 pumpsets have been energised as on 30.11.92.

Out of a total of 111886 tribal villages in the country 75617 villages constituting 67.6% have been electrified as on 31.10.92. Similarly, 250271 Harijan Bastis have also been electrified so far.

ENERGY CONSERVATION

India is facing serious energy shortages on the one hand and scarcity of invisible resources on the other. Despite efforts to increase the installed capacity of the generating units, there is a huge gap between demand and supply which is widening. Energy demand management and conservation has therefore been identified as the most cost effective option available to the country in bridging this gap and Energy Conservation has been recognised as one of the major thrust areas in the 8th Plan. National Energy Efficiency Programme formulated by the Planning Commission, envisages a saving in installed capacity to the extent of 5000 MW by the terminal year of the 8th Plan. The Ministry of Power which functions as the nodal point for implementation of a coordinated strategy of energy conservation would be incharge of taking requisite steps to achieve this target.

The Energy Conservation measures adopted by the Ministry of Power, with the Energy Management Centre (EMC) acting as its Executive agency, are aimed at improving the efficiency of the existing supply base and reducing the energy consumption in energy intensive units. Experience gained through various energy audit programmes and other studies have shown energy saving potential to a considerable extent with minimum investment - 25% in Industrial Sector, 20% in Transport and Domestic Sectors and 30% in Agricultural Sector. Measures taken in the industrial and other core sectors of the economy include the promotion of energy savings through introduction of efficient technologies and demonstration projects, grant of fiscal incentives etc. Studies have been undertaken to evaluate specific technical and policy options and steps taken for training of professionals to create a cadre of energy managers and auditors and education of consumers through publicity campaign.

AWARENESS CAMPAIGN

During 1992, the awareness campaign carried out by the Ministry of Power and the EMC gained momentum. As done every year, 14th December, 1992 was observed as the National Energy conservation Day followed by the National Energy Conservation Week from 14th to 20th December, 1992, all over the Country by the various SEBs, State Governments, State Energy Development Agencies etc. Special supplements were brought out in the leading Newspapers on this occasion to reach the message of energy conservation among the general public. The campaign was intensified with the organising of more radio and TV spots, press advertisements, hoardings, display panels etc. on the theme of energy conservation. Many seminars, essay and drawing and poster competitions etc. organised by various organisations were also sponsored by the Ministry of Power as a part of this campaign.

A project to produce two video films on energy conservation in road transport which was sanctioned to Central Institute of Road Transport, Pune in the year 1989 has been completed now.

NATIONAL AWARDS TO INDUSTRIAL UNITS

The National Award scheme for the Industrial units showing excellent performance in efficient utilisation and conservation of energy was instituted by the Ministry of Power two years back. This scheme has attracted good response from industrial units in various sectors. The scheme motivates competitiveness and improves energy efficiency and performances of various industries. In 1992, 19 industrial units became eligible for the awards for the year 1991 and 1992.

ENERGY AUDITS

Tata Energy Research Institute completed the preliminary energy audit in nineteen small and medium industrial units using the Energy Bus. The follow-up action on the recommendations of the audit report is under way.

DEMONSTRATION PROJECTS

The agricultural sector continued to be one of the major target sectors for demonstration projects, mainly for taking up rectification of agricultural pumpsets with financial assistance from Ministry of Power. By the end of November 1992, 405 pumpsets have been completely rectified in Gujarat by Institute of Co-operative Manager (ICM), Ahmedabad. Another scheme of partial rectification of 20,000 agricultural pumpsets in Gujarat was completed this year by Gujarat Electricity Board. Its report on achievements in energy saving is in the process of finalisation. Many such project proposals received from various State Electricity Boards are under active consideration of this Ministry.

A project relating to design, installation and evolution of energy efficient and conservation devices was sanctioned to Central Power Research Institute, Bangalore, in March, 1990. The project would be completed by March, 1993. A testing and evaluation laboratory for energy efficient renewable energy devices has been sanctioned to CPRI, Bangalore, in the year 1991. The project is expected to be completed by September, 1993.

To evaluate the performance of electronic ballasts, a demonstration project has been sanctioned to CPRI, Bangalore in September, 1992. The project is in progress.

TRAINING

A Training Programme for training Boiler-Operators in Tamil Nadu has been sanctioned by this Ministry in 1992. The main objective of the training programme is to enable the operators to gain technical efficiency in operation of boilers so as to increase the efficiency of the boilers. The course is to be conducted in the local language.

Another training programme for training of 500 Officers of various organisations on energy conservation in Agricultural pumping system submitted by REC has been sanctioned in January, 1993.

STUDIES

A project to design and develop magnetic card operated single phase energy meters was sanctioned to CPRI, Bangalore in the year 1991. The first phase of the project has been successfully completed and the meter has been demonstrated to the Cabinet Secretary and other user organisations. The Project is likely to be completed in September, 1993.

INTERNATIONAL COOPERATION IN ENERGY CONSERVATION

Ministry of Power have been taking up energy conservation projects with multilateral and bilateral assistance. The UNDP assisted programme in which 4 energy buses were acquired and used by 4 lead agencies conducting energy audits has come to a close on 31st October, 1992. The 45 energy audits conducted under this programme have indicated scope for substantial saving in energy. Follow-up action on the studies is under way.

Indo EC Energy Bus Programme under which 3 energy buses were acquired for use by three lead agencies is still continuing and would come to a close on 31st March, 1993. These buses were being used for conducting on the spot energy audits of Industrial manufacturing, commercial and transport sub-sectors. Phase II of the SIDA (Swedish International Development Authority) assisted programme under which training courses were organised in fertilizers and textile sectors came to a close in 1992, SIDA Phase III Programme (Industrial Technology Demonstration Programme for Energy Efficiency) is also being processed for Government approval. Other international cooperation projects, which are at different stages of processing for approval are:

1. Indo German Technical Cooperation on Energy Conservation in Indian Industry.
2. World Bank assisted end use energy efficiency project.
3. Indo British Cooperation Programme under ODA relating to industrial energy audits with mobile vans and development of an industrial energy efficiency demonstration programme.
4. Programme for Asian Cooperation on Energy and Environment (PACEE).
5. ADB funded energy conservation and environment improving projects.
6. Indo-Finnish cooperation for energy conservation in the industrial sector.

The Ministry of Power coordinated and organised six meetings of the Consultative Committee during the year (1992-93-March to February). At these meetings the Committee discussed matters relating to "Private Sector Participation in Power Generation" (twice), " Environmental Clearance of Power Projects", "National Power Grid", "Rural Electrification Corporation" and "National Thermal Power Corporation".

AUDIT OBSERVATIONS

The organisation-wise break-up of Audit observations and Inspection Report/Audit paras pending as on 30.11.1992 are as under:

S. No.	Organisations	Inspection Reports	Inspection Reports/Paras
1.	C.E.A.	13	39
2.	B.T.P.P/B.T.P.S.	16	249
3.	C.W.C.	28	129
4.	B.B.M.B	69	206
5.	Beas Project	100	232
6.	P.E.T.S.	14	62
7.	Department of Power	6	34
Pay & Accounts Office/ Controller of Accounts:			
8.	P.A.O. (CEA) New Delhi	3	18
9.	P.A.O. (BMCC) New Delhi	2	2
10.	P.A.O. (Sectt.)	4	8
11.	P.A.O. (Hydel)	2	2
12.	Pay Accounts Office CEA (Bangalore)	2	2
13.	Principal Accounts office	1	4

INTERNAL INSPECTIONS

1. The Internal Audit Wing of the office of the Controller of Accounts, Department of Power ensures the adoption of sound procedures, regularity and propriety of final transactions and accuracy of accounts. This wing also advises the DDO's and their staff in correct implementation of rules and maintenance of proper accounts records. Internal Audit Wing also pursues the settlement of objections raised by the statutory Audit.
2. During the year performance of the Internal Audit Wing is seen in the table given below:-

Year	No. of units Due & Inspected	No. of paras raised	No. of paras settled	No. of paras outstanding upto Nov. 92
1991-92	25/24	346	147	199

IMPLEMENTATION OF OFFICIAL LANGUAGE POLICY

1. The Ministry of Power, its attached and subordinate offices and public sector undertakings under its administrative

control have continued their efforts to implement measures to promote, progress and augment the progressive use of Hindi in official work.

2. In conformity with the constitutional requirement of Section 3 (3) of the Official Language Act, 1963, all documents required to be issued bilingually are being so issued by the Ministry. The sub-committee of the Committee of Parliament on Official Language visited NPTC's project office at Secunderabad on 27/03/92 and CPRI, Bangalore on 19/5/92, to assess the progress made in implementation of various instructions/orders issued by the Government in regard of Official Language Policy from time to time.

3. The cash award schemes which were formulated and circulated by the Department of Official Language for promoting the use of Hindi continued to be followed in this Ministry, its attached and subordinate offices as well as Public Sector Undertakings under the administrative control of Ministry of Power. These schemes are yielding fruitful results as have been widely accepted by the Staff and Officers of the Ministry and other organisations etc. under the Ministry of Power. In addition to above, incentive schemes of the Department of Official Language for originating Notes/Drafts in Hindi in Official work were also introduced during the year 1992-93. The employees/officers of attached/subordinate offices and Public Undertakings under the administrative control of this Ministry continued to take part in the popularisation of use of Hindi Language during the year.

4. For according incentive to write original books in Hindi on Power Subjects, a new prize scheme is being framed to be introduced in the Ministry in the next financial year under the title "VIDYUT SAHITYA PURASKAR" which will have its scope all over the country particularly for technocrats.

5. Meetings of Official Language implementation committee of the Ministry of Power were convened regularly during the year 1992-93. Meetings of Hindi Advisory Committee of the Ministry of Power were convened on 13/10/92 and 01/01/93.

6. Hindi workshops are also being organised for encouraging the employees and the officers to do work in Hindi and to remove their hesitation for doing their official work in Hindi. About 65 employees/officers of the Ministry were given training through Hindi Work-Shops.

7. To encourage the employees to acquire proficiency in Hindi Prabodh, Praveen and Pragya, classes were conducted under the Hindi Teaching Scheme. Similarly, employees were also deputed for learning Stenography and Hindi Typewriting.

8. During the period under review some of the offices of corporations under the administrative control of this Ministry were also inspected by the officers with a view to take stock of the position regarding progressive use of Hindi. Accordingly inspection reports were prepared and guidelines issued to the concerned offices on the basis of the above inspection reports. Necessary programmes for further review in this regard are being formulated to promote use of Hindi in official work.

VIGILANCE/DISCIPLINARY CASES

At the beginning of the year 1992, there were six vigilance/disciplinary cases. In one disciplinary case, the major penalty of removal from service has been imposed during the year. One case is pending in Court and the Departmental proceedings are being taken in the remaining four cases.

INTERNAL WORK STUDY UNIT

Internal work study unit dealt with 52 cases relating to grievances which includes 18 pending cases of the last year i.e. 1991-92. All these relate to the service matters and non-settlement of pension cases of the employees/ex-employees of the Central Electricity Authority, Public Sector Undertakings under the control of the Ministry of Power.
Of the 52 grievances 38 have been settled. Action in respect of others is in hand with respective organisations under this Ministry.

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

The Prime Minister's 15-point programme on welfare of Minorities is being implemented in the Ministry of Power. It has been ensured that in case of Direct recruitment to Group 'C'and 'D' posts, a member of a minority community is included in the Selection Committee. Quarterly returns in respect of scheduled castes and scheduled tribes and minorities from Public Sector Undertakings are being regularly monitored in accordance with the guidelines on the subject.
A statement incorporating the total number of Government Servants employed in the Ministry of Power including the number of scheduled castes and scheduled tribes is given below:

S. No.	Name of Office	Group A			Group B			Group C			Group D		
		Total	SC	ST	Total	SC	ST	Total	SC	ST	Total	SC	ST
1.	Ministry of Power	33	5	–	85	5	–	118	18	1	69	35	4
2.	CEA	500	73	10	303	52	1	631	89	14	194	64	4
3.	Subordinate offices of CEA	195	31	4	77	11	–	347	38	5	216	66	11
4.	Controller of Accounts (Min. of Power)	2	1	–	14	2	–	67	5	2	10	4	1

FUNCTIONS

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

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

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

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

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

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

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

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

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

TECHNO-ECONOMIC APPRAISAL

During the year 1992-93 (till 30 Nov., 1992) Three thermal schemes were cleared/appraised by CEA and Two revised cost estimates were cleared from techno-economic angle. Brief details of these schemes/RCEs are given below:

		Schemes	RCE
1.	Type of Scheme	Utility	
2.	Total Capacity	1134	1260MW
3.	No. of Schemes	2	2
4.	Estimated Cost (Rs. lakhs)	300225	320335

Break-up details of schemes & RCEs cleared are given as per Annexure 1.

Techno-economic appraisal of Power Development Scheme (Thermal) in Private Sector

Details of techno-economic appraisal of various schemes in Private Sector during the year 1992-93 upto 16.11.1992 are as under:

(i) Utility Projects cleared (in principle) by CEA (Details at Annexure-II)

Total No. of schemes	Year	Total Capacity (MW)
2(Two)	1992-93	592

(ii) Captive Projects Techno-economically cleared by CEA. TISCO at Jagabaya of 67.5 MW at an estimated cost of Rs. 23650 Lakhs.

(iii) Utility Projects under examination in CEA (Details at Annexure-III).

Total No. of Schemes	-	Five (5)
Total Capacity	-	1495 MW

(iv) Captive Projects under examination in CEA (details at Annexure-IV).

No. of Schemes	-	3 (Three)
Capacity	-	720 MW

Annexure I

LIST OF NEW THERMAL SCHEMES CLEARED/APPRAISED DURING 1992-93

Sl. No.	Name of Scheme	Capacity (MW)	Date of Clearance	Estd.Cost (Rs. lakhs)
1.	Agartala G.T.	84	1.7.92	27350
2.	Bakreshwar TPS St. I & III	1050	27.11.92	272875*

(*Appraised schemes compliance with Sec.29 of ES Act, 1948 awaited).

LIST OF REVISED COST ESTIMATES/ADDENDUM TO FR CLEARED DURING 1992-93

1.	Yamunanagar STPS (NTPC/Haryana)	840	23.6.92	210085
2.	Feroz Gandhi Unchahar TPS St. II (NTPC/UP)	420	20.10.92	110250

Annexure-II

SCHEMES TECHNO-ECONOMICALLY CLEARED BY CEA (In Principle Clearance only) DURING 1992-93 (UNDER PRIVATE SECTOR)

1. Jegurupadu GTCCTPS by M/s GVK Industries, Hyderabad — 172 MW, — A.P.
2. Pench TPS by M/s. Century Textiles and Industries Ltd. — 2x210 MW — M.P.

Annexure-II

SCHEMES UNDER EXAMINATION IN CEA (UNDER PRIVATE SECTOR)

UTILITY PROJECT:

Name of the Scheme	Capacity (MW)
Northern Region	
Rajasthan	
Chittorgarh TPS by M/s. Century Textiles and Industries Ltd.	1x500
Eastern Region	
Orissa	
Dhubri TPS by M/s. Kalinga Power Corporation Ltd.	2x250
West Bengal	
Gouripur TPS by WBSEB and M/s. Birla Technical Services	135 (2x67.5)
Western Region	
Maharashtra	
Barge Mounted TPS by M/s. Confidence Shipping Co. Ltd.	110
Gujarat	
Mangrol (Lignite) TPS - 1x250 MW by M/s. Gujarat Power Corporation Ltd.	1x250

Annexure-IV

SCHEMES UNDER EXAMINATION IN CEA (UNDER PRIVATE SECTOR)

CAPTIVE PROJECT:

Name of Scheme	Total Capacity (MW)
Northern Region	
Uttar Pradesh	
Renusagar TPS Extn. St. IV by M/s. Renusagar Power Co. Ltd.	3x120
Western Region	
Madhya Pradesh	
Captive TPS at Raigarh by M/s. Jindal Strips Ltd.	4x15
Gujarat	
Captive Power Plant for M/s. ESSAR Gujarat Ltd. at Hazira	300

TRAINING ORGANISATIONS OF THE CENTRAL ELECTRICITY AUTHORITY

POWER SYSTEM TRAINING INSTITUTE (PSTI)

The Power System Training Institute, Bangalore imparts training in various facets of Power Engineering Practice, including power systems planning, operation, protection, communication in power systems, computer applications and power/telecommunication co-ordination etc. Since the inception of the Institute in 1972,3502 engineers had been trained upto the end of 1991-92. During the Year 1992-93, 132 more engineers were trained at the Institute upto end of September 1992.

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

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

HOT LINE TRAINING CENTRE (HLTC)

In order to reduce to the barest minimum the outages of transmission lines for maintenance, Hot Line Maintenance Techniques are being introduced. A Hot Line Training Centre to train personnel in Hot Line Maintenance Techniques upto 220 KV was set up at Bangalore in 1975. The training course at 400 KV including bare hand training techniques is being conducted from 1991-92 onwards. 676 personnel were trained by the Centre upto end of 1991-92. During the year 1992-93, 29 personnel have been trained at the Centre upto end of October, 1992.

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

UNDP-AIDED PROJECT

The Central Electricity Authority completed implementation of a UNDP-aided project relating to modernisation of training facilities at PSTI, Bangalore and the development of expertise in system operation and

load despatch techniques. The project took off in April 1987 and all the activities have been completed. Installation and commissioning of a Despatcher Training simulator (DTS) which constituted the main component of the project was completed in February 1990 and equipment was accepted in May 1990 after a 60 working days availability test run. The system has also been integrated into different training programmes being conducted at PSTI, Bangalore. As per UNDP guidelines the project was evaluated by UNDP designated independent consultant. The title of the equipment procured under the project has been transferred from UNDP to Government of India in May 1992.

ASSISTANCE TO THE STATE ELECTRICITY BOARDS.

UTTAR PRADESH

ANPARA 'B' THERMAL POWER PROJECT

A loan agreement for 13.224 billion Yen was signed between the GOI and the OECF, raising the total assistance to 101.42 billion Yen for the implementation of Anpara 'B' Thermal Power Project being executed by the UP State Electricity Board. Further, release of equipment and material received from Japan upto a limit of Rs. 156 crores of customs duty has been agreed to as a special case pending decision on the request of the State Government for a loan assistance of the like amount to meet non-reimbursable expenditure not covered under the loan assistance.

MAHARASHTRA

CHANDRAPUR THERMAL POWER PROJECT STAGE-IV (1x 500 MW)

A loan assistance of US 350 million dollars has been tied up with the world bank for the implementation of (i) the last stage of Chandrapur thermal Power station by addition of a 500 MW coal-fired unit; (ii) 735 km of a ± 500 KV 1500 MW HVDC transmission line from Chandrapur to Padghe, including the related terminal stations; (iii) an accelerated distribution reinforcement programme to reduce system losses in selected areas; and (iv) consultancy services for (a) carrying out of a programme of load research and preparation of electricity demand management measures; (b) development of the Board's environmental management capabilities; (c) preparation of private sector power projects in Maharashtra and (d) institutional review of the power sector in Maharashtra.

In addition to the above, efforts are being made to tie up financial assistance for the Amguri Combined Cycle Gas Turbine Project (360 MW) of Assam State Electricity Board and Kutch Lignite Project (70 MW) of Gujarat Electricity Board.

POST POLICY ENVIRONMENT FOR PRIVATE SECTOR INVESTMENT.

To bring in additionality of resources for the capacity addition programme in the Electricity Sector, Government has formulated a scheme to encourage greater participation by private enterprises in electricity generation, supply and distribution. The scheme widens the scope of private investment in the sector and has modified the financial, administrative and legal environment for the private enterprises to make investments in the Electricity sector attractive. The new environment is based on the amendments to the electricity legislation, namely, the Indian Electricity Act, 1990, and the Electricity (Supply) Act, 1948, on which the electricity sector in India is based.

- Private sector units can set up coal/lignite or gasbased thermal, hydel, wind and solar energy projects of any size.
- Private enterprises can set up units, either as Licensees distributing power in a licenced area from own generation or purchased power or as Generating Companies, generating power for supply to the grid.
- Licensee companies holding license to supply and distribute energy in a specified area under a license issued by the State government will function under a liberalised economic and legal environment.
- New Licenses can be issued by the State Governments to private units, willing to enter the Electricity sector.
- Captive Power Plants set up to serve an industrial or other units by the private enterprises will be permitted to sell or supply surplus power to SEBs.

Investment Promotion Cell (IPC) in the Ministry of Power will directly interface with prospective private enterprise entrants to the Electricity sector and help them in getting clearances.

The High Powered Board on Private Investment in Power Sector (HPB) under the Chairmanship of Cabinet Secretary, comprising Secretaries of concerned Ministries of the Government of India to which senior officials of the State Government concerned can be coopted, would monitor issue of clearance, and resolve all outstanding issues pertaining to clearance. The Board would decide on all other matters concerning investment from non-resident Indians and foreign sources within a scheduled timeframe.

The Foreign Investment Promotion Board (FIPB) under the Chairmanship of Principal Secretary to the Prime Minister has been set up to facilitate investment in India by multinational companies in projects including the power sectors which are considered to be of benefit to the Indian economy and do not fall within the parameters of the existing policy for clearance of foreign investment proposals.

DETAILS OF THE POLICY TO ENCOURAGE GREATER PRIVATE SECTOR PARTICIPATION IN ELECTRICITY GENERATION, SUPPLY AND DISTRIBUTION.

1. The following are the details of the scheme to encourage greater private sector participation in the electricity generation, supply and distribution:
2. The Indian electricity Act, 1910 and the Electricity (Supply) Act, 1948 have been amended to bring about a new legal, administrative and financial environment for private enterprises in the electricity Sector.

- Private Sector can set up thermal projects (coal/gas), hydel projects and wind/solar energy project of any size.
- Electricity Projects both in Public and Private Sector where the total outlay does not exceed Rs. 25 crores need not be submitted to the Central Electricity Authority for clearance.
- Private sector companies can set up enterprises to operate either as licensees or as generating companies.
- All private companies entering the Electricity Sector hereafter will be allowed a debt-equity ratio upto 4:1.
- A minimum of 20% of the total outlay should be the equity component.
- Promoter's contribution should be at least 11% of the total outlay.
- Not more than 40% of the total outlay can come from Indian Public Financial Institutions.
- To ensure that private entrepreneurs bring in additionality of resources to the sector; not more than 60% of the total outlay for the project must come from sources other than Public Financial Institutions.
- Upto hundred per cent (100%) foreign equity participation can be permitted for projects set up by foreign private investors.
- The condition of dividend balancing by export earnings which is normally being applied to cases of foreign investment upto 51% equity will not be applicable to foreign investments in the power sector.
- The rates for depreciation in respect of assets have been liberalised.
- With the approval of the Government, import of equipment for power projects will also be permitted in cases where foreign supplier(s) or agency(ies) extend concessional credit.

For generating companies the following incentives are offered:-

- Normative parameters under which generating companies will operate (comparable to international standards) providing for 16% rate of return have been notified on 30th March, 1992.
- Generating companies can sell power on the basis of a suitably structured two part tariff.
- On a case to case basis, Government of India may consider extending a counter guarantee for the payment obligations of State Electricity Boards to the private power companies on the specific request of the concerned State Government.

The specific incentives for Licensees are:

Licences of longer duration of 30 years in the first instance and subsequent renewals of 20 years instead of 20 and 10 years respectively as it was before.

Higher rate of return of 5% in place of the previous 2% above the RBI rate.

Capitalisation of Interest During Construction (IDC) at actual cost (for expansion projects also) as against 1% over RBI rate as it was before.

Special appropriations to meet debt redemption obligations.

EXISTING PRIVATE SECTOR UNITS

Sl. No.	Corporation	Capacity (MW)
1.	Tata Electric Co.	1606
2.	C.E.S.C.	620
3.	A.E.Co.	509
4.	Gujarat Industrial Power Corporation Ltd (GIPCL)	145
5.	Andhra Pradesh Gas Power Corporation	99
	Total	2979

DETAILS OF ON-GOING PRIVATE SECTOR POWER PROJECTS

Sl. No.	Name of the Project	Capacity (MW)	Type	State
1.	Bhira Pumped Storage Scheme	150	Hydel	Maharashtra
2.	Gujarat Industrial Power Corpn Ltd.	145	Thermal (Gas)	Gujarat
3.	Vijjeshwaram	33	Thermal (Gas)	Andhra Pradesh
4.	Trombay	180	CCGT	Maharashtra
5.	Dahanu-BSES (Western Maharashtra)	500	Thermal (Coal)	Maharashtra
6.	Maniyar	12	Hydel	Kerala
	Total	1020		

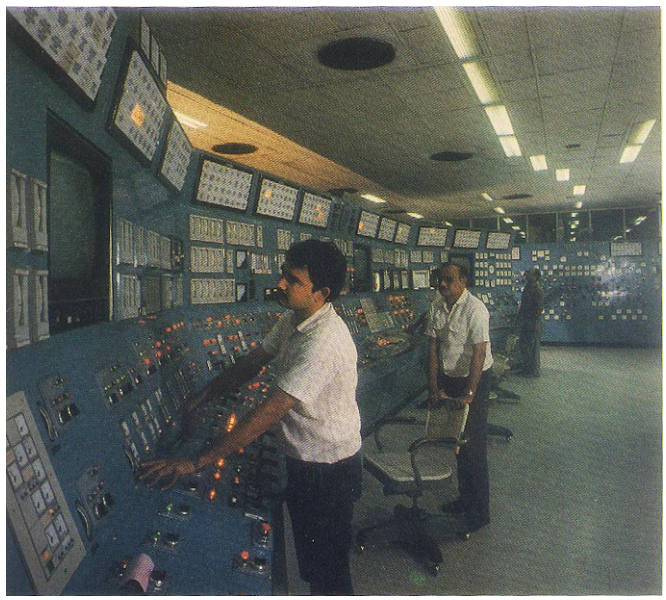
PROJECT ADVERTISED BY STATE GOVERNMENTS FOR IMPLEMENTATION IN PRIVATE SECTOR

Thermal Coal	19755.0 MW
Thermal Gas	6117.5 MW
Hydel	7612.3 MW
Other (Wind, solar, DG sets etc.)	370.0 MW
Total	33854.8 MW

NATIONAL THERMAL POWER CORPORATION LTD. (NTPC)

The NTPC is presently engaged in the operation/ execution of ten coal based Super Thermal Power Projects with an aggregate approved capacity of 13,660 MW and five gas based combined cycle projects with an aggregate approved capacity of 3,175 MW. The total approved cost of the NTPC projects excluding associated transmission systems and other schemes is Rs. 22,785 crores (excluding transmission system associated with Gandhar GPP). The above includes Rs. 103.5 crores sanctioned by the Government towards Advance Action/Stage-I approval for Vindhyachal-Stage II.

Control room of Singrauli Super Thermal Power Station



DETAILS OF NTPC PROJECTS

Name of the Project	Region/ State	Capacity in MW Ultimate	Approved	Actual/Expected Date of commissioning	Approved cost excl. associated TL System (Rs. in Crs.)
Rihand STPP	Northern Uttar Pradesh	3000 Stage-I (2x500)	1000	Unit-1 (500) Mar.88 Unit-2 (500) Jul. 89	1688.17
Kahalgaon STPP	Eastern Bihar	2840 Stage-I (4x210)	840	unit-1 (210) Mar. 92 Unit-2 (210) Mar. 93 (*) Unit-3 (210) May. 94 Unit-4 (210) Mar. 95	1715.89
National Capital Thermal Power Project (Dadri)	Northern Uttar Pradesh	840 Stage-I (4x210)	840	Unit-1 (210) Oct. 91 Unit-2 (210) Dec. 92 Unit-3 (210) Mar. 93 Unit-4 (210) June 94	1063.60
Talcher STPP	Eastern Orissa	3000 Stage-I (2x500)	1000	Unit-1 (500) Apr. 94 Unit-2 (500) Apr. 95	1404.04
Kawas GBPP	Western Gujarat	1295 Stage-I (4x106+2x110)	600-Nominal 645-Actual	Gas Turbine Unit-1 (106) Mar. 92 Unit-2 (106) May 92 Unit-3 (106) June 92 Unit-4 (106) Aug. 92 Steam Turbine Unit-5 (110) Feb. 93 Unit-6 (110) Sept. 93	373.98
Auraiya GBPP	Northern Uttar Pradesh	1302 Stage-I (4x112+2x102)	600-Nominal 652-Actual	Gas Turbine Unit-1 (112) Mar.89 Unit-2 (112) July 89 Unit-3 (112) Aug. 89 Unit-4 (112) Sept. 89 Steam Turbine Unit-5 (102) Dec. 89 Unit-6 (102) June 90	371.67
Anta GBPP	Northern Rajasthan	843 Stage-I (3x88+1x149)	430-Nominal 413-Actual	Gas Turbine Unit-1 (88) Jan. 89 Unit-2 (88) Mar. 89 Unit-3 (88) May 89 Steam Turbine Unit-4 (149) Mar. 90	265.03

(*) Due to the recent accident at the site, there has been a set back to the erection and commissioning activities. Efforts are being made to regain the momentum as fast as possible and to contain the slippage in commissioning date beyond March '93 to as minimum as possible.

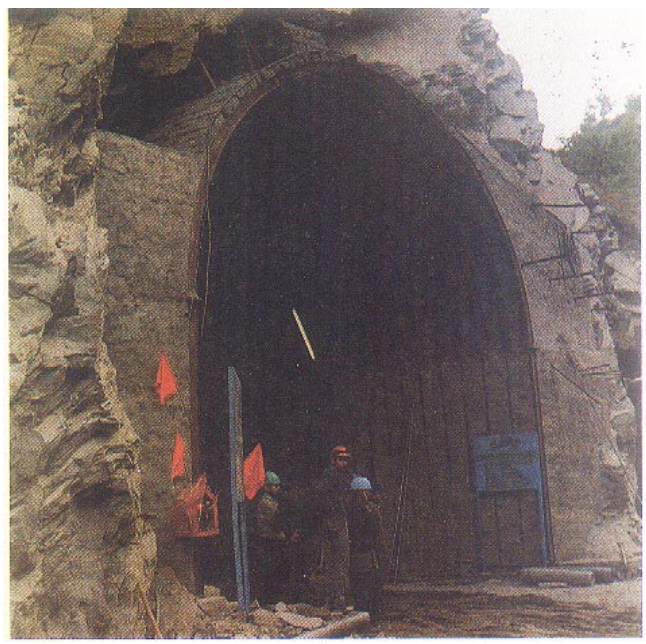
Name of the Project	Region/ State	Capacity in MW Ultimate	Approved	Actual/Expected date of commissioning	Approved Cost excl. associated TL System (Rs. in Crs.)
Singrauli STPP	Northern Uttar Pradesh	2200 Stage-I (3x200)	2000	Unit-1 (200) Feb. 82 Unit-2 (200) Nov. 82 Unit-3 (200) Mar. 83	1118.88
		Stage-II (2x200+2x500)		Unit-4 (200) Nov. 83 Unit-5 (200) Feb. 84 Unit-6 (500) Dec. 86 Unit-7 (500) Nov. 87	
Korba STPP	Western Madhya Pradesh	2100 Stage-I (3x200+1x500)	2100	Unit-1 (200) Mar. 83 Unit-2 (200) Oct. 83 Unit-3 (200) Mar. 84 Unit-4 (500) May 87	1625.25
		Stage-II (2x500)		Unit-5 (500) Mar. 88 Unit-6 (500) Feb. 89	
Ramagundam STPP	Southern Andhra Pradesh	2100 Stage-1 (3x200+1x500)	2100	Unit-1 (200) Oct. 83 Unit-2 (200) may 84 Unit-3 (200) Dec. 84 Unit-4 (500) June 88	1674.62
		Stage-II (2x500)		Unit-5 (500) Mar. 89 Unit-6 (500) Oct. 89	
Farakka STPP	Eastern West Bengal	2100 Stage-I (3x200)	2100	Unit-1 (200) Jan. 86 Unit-2 (200) Dec.86 Unit-3 (200) Aug. 87	2804.67
		Stage-II (2x500)		Unit-4 (500) Sept. 92 Unit-5 (500) Oct. 93	
		Stage-III (1x500)		Unit-6 (500) #	
Vindhyachal STPP	Western Madhya Pradesh	2260 Stage-I (6x210)	1260	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	1460.37
Dadri GBPP	Northern Uttar Pradesh	1125 Stage-I (4x131+2x146.5)	817	Gas Turbine Unit-1 (131) Feb. 92 Unit-2 (131) Mar. 92 Unit-3 (131) June 92 Unit-4 (131) Oct. 92 Steam Turbine Unit-5 (146.5) June 93 Unit-6 (146.5) Oct. 93	783.44

Name of the Project	Region/ State	Capacity in MW Ultimate	Approved	Actual/Expected date of commissioning	Approved Cost excl. associated TL System (Rs. in Crores)
Unchahar TPP	Northern Uttar Pradesh	840 Stage-1 (2x210)	420	Unit-1 (210) Nov. 88 Unit-2 (210) Nov. 89	925.00
Gandhar GBPP	Western Gujarat	648 Stage-I (3x131+255)	648	Gas Turbine Unit-1 (131) Mar. 94 Unit-2 (131) May 94 Unit-3 (131) July 94 Steam Turbine Unit-4 (255) Sept. 95	1656.3
Total Approved			16835 MW		18930.91

Unit to be commissioned in 5 years from the date of Main Plant Award. Work on the project not initiated for lack of funding tie-up.

NB: 1. In addition Govt. approval to incur Rs. 103.5 Crs. by way of advance action/Stage-I clearance accorded in March, 90 for Vindhyachal Stage-II Project.
2. Approved Cost of Other Schemes is Rs. 81.50 Crs.

Portal of Manglad adit.



CAPACITY ADDITIONS

By end March, 92 NTPC had commissioned 11,333 MW at its various stations as per the details given below:

Project	Capacity Commissioned
Singrauli	2000 MW
Korba	2100 MW
Ramagundam	2100 MW
Farakka Stage-I	600 MW
Rihand Stage-I	1000MW
Vindhyachal Stage-I	1260 MW
Anta	413 MW
Auraiya	652 MW
Kahalgaon	210 MW
NCTPP Dadri	210 MW
Kawas	106 MW
Dadri Gas	262 MW
Unchahar Stage-I	420 MW
Total	11333 MW

During the year 1992-93, as per the target indicated in the Ministry of Power's Annual Action Plan and the MOU signed between NTPC and the MOP, NTPC has programmed to commission 1500 MW generating capacity. Till end February 1993, NTPC had commissioned 1400.5 MW during the year comprising 2 Gas Turbine Units of 131 MW each at Dadri, one unit of 210 MW at NCTPP, 3 Gas Turbine Units of 106 MW each and one Steam Turbine of 110.5 MW at Kawas and one 500MW unit at Farakka bringing the total installed capacity of NTPC to 12733.5 MW. The work on other units programmed for commissioning during the year is progressing satisfactorily and it is expected that the target of commissioning of 1500 MW during the year would be met.

GENERATION

As on end February 1993 a total capacity of 12,733.5 MW is under operation at various NTPC Stations. This comprises 25 Units of 200/210 MW at Singrauli, Korba, Ramagundam, Farakka, Vindhyachal, NCTPP, Unchahar & Kahalgaon, 11 Units of 500 MW at Singrauli, Korba, Ramagundam, Rihand, and Farakka and 19 Gas/Steam turbine Units of various capacities operating at gas based combined cycle power plants at Anta, Auraiya, Kawas and Dadri Gas Power Projects.

The generation performance of NTPC stations has consistently been at a high level. Against the target of 57940 MUs for the year 1992-93, till end February, 1993 the gross generation from NTPC stations was 59747 MUs, thus already achieving the target for the year. The generation during the previous year (1991-92) was 61,382 MUs against a target of 51,000 MUs constituting 21.4% of the total generation and 29.42% of thermal power generation in the country.

During 1992-93 till the end of February, 1993, the units under commercial operation generated 54926 MUs at a Plant load factor of 67.68%. During this period, the units under commercial operation at Singrauli, Korba, Ramagundam, Farakka, Vindhyachal, Rihand, Anta (Gas) and Auraiya (Gas) operated at a PLF of 76.76%, 71.26%, 65.20%, 69.29%, 56%, 71.41%, 57.04% and 58.32% respectively.

Units that attained a plant load factor (PLF) in excess of 70% during the current year, upto February, 1993 are detailed below:

Sl. No.	Station	Capacity	Unit No.	PLF (%)
1.	Singrauli	200	1	72.99
2.	Singrauli	200	2	76.09
3.	Singrauli	200	3	81.19
4.	Singrauli	200	4	84.76
5.	Singrauli	200	5	82.27
6.	Singrauli	500	6	75.09
7.	Singrauli	500	7	73.03
8.	Korba	200	3	84.47
9.	Korba	500	5	75.32
10.	Korba	500	6	76.46
11.	Ramagundam	200	1	77.29
12.	Farakka	200	1	77.29
13.	Farakka	200	2	70.60
14.	Rihand	500	1	74.48

BUDGET UTILISATION AND FINANCIAL ASPECTS

The authorised share capital of the Corporation is Rs. 8000 crores. As of Feb. 1993, the paid up capital of NTPC was Rs. 7508.27 crores, which is wholly subscribed by the Government of India.

These figures will undergo change in pursuance of the Govt. of India ordinance regarding transfer of transmission assets to PGCIL. The assets are being evaluated.

During the financial year 1991-92, the NTPC earned a net profit of Rs. 1007.06 crores. The return on capital employed and return on net worth were 11.04% and 12.10% respectively (excluding prior period income)

AGREEMENT FOR CONSTRUCTION, OPERATION AND MANAGEMENT OF TRANSMISSION SYSTEM

During the year 1991-1992, the then National Power Transmission Corporation Ltd. (now renamed as Power Grid Corporation of India Ltd) had been vested with the management of construction and operation of NTPC's transmission lines in pursuance of the order of Ministry of

Power. The services of employees working in transmission groups in the field and corporate office were transferred to NPTC with effect from 16th August, 1991.

TAKEOVER OF FEROZE GANDHI UNCHAHAR THERMAL POWER PROJECT (FGUTPP)

By virtue of promulgation of an ordinance by the government of Uttar Pradesh, Feroze Gandhi Unchahar Thermal Power Project (FGUTPP) Stage-I, comprising two 210 MW units, of Uttar Pradesh Rajya Vidyut Utpadan Nigam (UPRVUN), was taken over by NTPC of 13th February, 1992 for a total consideration of Rs. 925 crores which has been adjusted against outstanding dues and surcharges payable by UPSEB. Further NTPC has initiated action for processing for Government approval of Expansion stage (2x210 MW) of the project and for getting the Asian Development Bank's loan of US$ 160 million for the project to UPRVUN transferred in favour of NTPC.

CONSULTANCY SERVICES

NTPC completed the major portion of work i.e. first phase of 400 KV transmission line at Dubai ahead of schedule. NTPC had been selected to execute this turnkey contract by Dubai Electricity and Water Authority in early 1991 against stiff international competition. In March, 1992 NTPC also secured the US$ 570,000 contract from the Asian Development Bank for Operational Improvement Support to Tamil Nadu Electricity Board against International Competitive Bidding.

The thrust on export assignments for turnkey implementation as well as providing services for power projects in the Middle East, South East Asia and other developing countries is being pursued vigorously.

On the home front, NTPC bagged consultancy orders worth more than Rs. 3 crores in the year 1991-92 from various State Electricity Boards, other Public Sector Undertakings as well as from the private sector. NTPC is executing Consultancy assignments for Neyveli Lignite Corporation, Orissa State Electricity Board, Bombay Suburban Electric Supply Company, North Eastern Electric Power Company, Karnataka Electricity Board and Maharashtra State electricity Board.

With a total Consultancy order booking of over Rs. 63 crores as on 31 March, 1992 and a turnover of over Rs. 33 crores during 1991-92, NTPC's expertise has been recognised in the international power scene both in the turnkey execution of projects as well as in specific functional areas.

MEMORANDUM OF UNDERSTANDING

NTPC has been one of the first few PSUs identified for signing Memorandum of Understanding (MOU). The MOU identifies the performance targets to be achieved by the NTPC during the year in respect of power generation, addition of new capacity and other performance parameters. The MOU also identifies the actions to be taken by the Government to enable achievement of these targets by NTPC.

NTPC has been entering into MOUs with GOI since 1986-87 and has been consistently achieving MOU targets for various years. In the year 1991-92 also, NTPC surpassed targets for various performance parameters such as generation, stringing of transmission lines, revenue, profit etc.

A Memorandum of Understanding (MOU) for the year 1992-93 was signed between the NTPC and the Ministry of Power on 23-10-1992. The MOU targets of NTPC for the year 1992-93 in respect of major performance parameters are given below:

CATEGORY OF PERFORMANCE

		Very Good (Target)	Excellent
1.	Capacity Addition (MW)	1500	1710
2.	Generation (MUs)	57940	60837
3.	Turnover (Rs. Crores)	3936	– (*)
4.	Profits (Rs. Crores)	656	721

(*) Based on tariff norms recommended by K.P.Rao Committee

PARTICIPATION IN JOINT VENTURE

With a view to mobilise additional resources for development of the power sector the Government of India has allowed participation of private sector under liberalised frame work. NTPC has welcomed this initiative of the Govt. and has assumed the catalyst's role for development of such projects by making available its experience of construction of power projects as per schedule and their efficient operation. Towards this end, NTPC is holding discussions with various private sector companies for setting up joint venture companies for construction and operation of power projects. Memoranda of Understanding have been signed with Asea Brown Boveri, Switzerland for implementation of a gas based project near Delhi in state sector or some similar project and with Spectrum Technologies Inc. USA for implementation of Godavari Gas Power Project in Andhra Pradesh in central sector.

NTPC has also entered into an MOU with SAIL which envisages setting up of a 500 MW power project in Bhilai through the joint venture route with majority equity participation by private sector partner(s), to be identified While the station will primarily meet the power import

requirements of Bhilai Steel Plant of SAIL, balance power generated from the station would be purchased by Madhya Pradesh Electricity Board (MPEB) for which another MOU has been signed among NTPC, SAIL and MPEB.

ENVIRONMENTAL MANAGEMENT

For effective management of environmental activities, NTPC has set up Environmental Management Groups (EMGs) in the Corporate Operation Division and at all power stations. The major functions of the group include management of all aspects related to effective functioning of pollution control devices and monitoring of parameters as per requirements of Pollution Control Boards and other statutory bodies, environmental appraisal (internal) and environment audit, providing operational feed back for improvements in design of pollution control systems, evolving and implementing modification programmes and suggesting suitable remedial actions for environmental improvement.

ENERGY CONSERVATION CELL

In order to provide positive thrust to various activities in the area of energy conservation, a separate Energy Conservation Cell has been created at NTPC's Corporate Centre and at all the power stations. The main role of this cell is coordination of energy conservation efforts through activities like optimisation of township load, installation of EPMS for ESP, commissioning of on-load cleaning system for condenser, reduction in auxiliary power consumption, adoption of solar water heating systems etc.

ASH UTILISATION

Ash Utilisation Division continued with various activities towards promotion of use of ash. A license agreement was signed with National Research Development Corporation (NRDC) for technology transfer and process know-how for manufacturing fly-ash bricks and allied products at the pilot-cum-demonstration unit to be set up at Badarpur. Also at Badarpur, the retrofitting of dry ash evacuation system by a private entrepreneur reached advanced stages of completion, which will facilitate use of 200-250 MT of ash per day for manufacture of aerated autoclaved concrete products. In addition, there are plans to build test tracks/roads using fly ash and bottom ash in consultation with Central Road Research Institute (CRRI).

Pollution Control Check Laboratory of CPRI, Bangalore

AWARDS

Productivity Award: Under the Meritorious Productivity Award Scheme of Government of India three stations namely Singrauli, Badarpur and Farakka were selected for award in recognition of efforts put in by employees of these projects in improving generation performance during the calendar year 1990.

Prime Minister's Shram Award: Four workers from Vindhyachal Project were given prestigious Prime Minister's Shram Bhushan Award for their meritorious services to the company. This is the seventh consecutive year that employees of the company have got PM's Shram Award.

Rajiv Gandhi Memorial Award for Excellent Workers and for the Best Trade Union: Two employees of Singrauli Station of NTPC were give Rajiv Gandhi Memorial Award for Excellent performance in their work and the Rashtriya Tapp Mazadoor Sangh of Singrauli won the Rajiv Gandhi Award for Best Trade Union.

AIOE and AIMO Awards: NTPC has bagged All India Organisation of Employers (AIOE) Award of Industrial Relations and Vishveswaraiya Award by All India Manufacturers Organisation (AIMO) in recognition of its achievements and performance during the year 1992-93.

Company Standardisation Awards: NTPC was awarded the Company Standardisation Commendation Award for the year 1991 by Institute of Standards Engineers. Till last year the Quality Assurance Deptt. has introduced about 500 company standards many of which are being considered as inputs for National Standards.

RESERVATION FOR SC/ST'S

Special efforts were made with a view to achieving better compliance of directives of the Government. Special training/conference of Liaison Officers was also held for better coordination in the implementation of the directives. The third special recruitment drive was launched in January, 1993.

There are some shortfalls in certain categories even after considering SC/ST candidates for promotion on relaxed standards due to non-availability of eligible SC/ST employees in the feeder cadre.

Steps taken to fill up reserved vacancies:

1. Further to three special recruitment drives during 1989-90, 1990-91 and 1992, the Fourth special recruitment drive has been launched in January, 1993.

2. Recruitment during the year was by and large restricted to SC/ST candidates only, to fill reserved vacancies.

3. The following efforts were also made to fill the reserved vacancies.

- Exclusive advertisements/notifications covering populous belts of SC/STs.
- Notification of vacancies to recognize SC/ST associations.
- Announcement of vacancies on Doordarshan/All India Radio.
- All major vacancies involving all India competitive selection tests are circulated to all accredited SC/ST associations as prescribed under the relevant Government Directives.
- Intimation of reserved vacancies in the 3rd Year of carry forward.
- Award of Annual Scholarship to SC/ST students pursuing Degree/Diploma in Engg. Courses.
- Induction of SC/ST steno-typists on relaxed norms through Special Training Scheme.

4. With a view to increasing the awareness of employees dealing with reservation aspects at various projects and to ensure better compliance with Directives of the Government, special training programmes were organised providing opportunity for periodical review of implementation of reservation policy and in taking timely action wherever required.

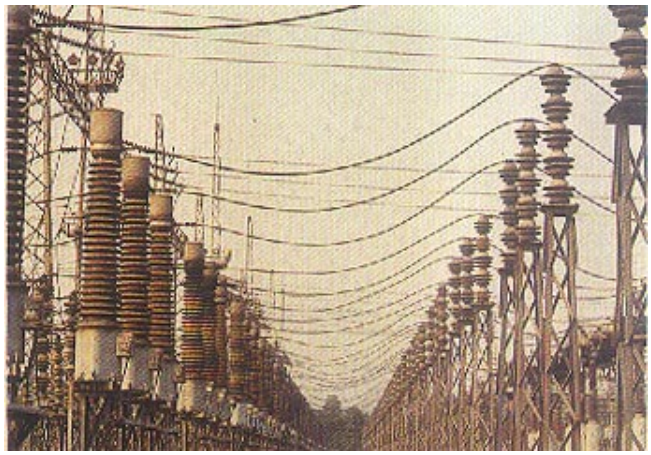
Welfare measures taken for the upliftment

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

BADARPUR THERMAL POWER STATION

PERFORMANCE

The Badarpur Thermal Power Station (BTPS) consists of 3x100 MW and 2x210 MW coal fired units with an installed



Badarpur Thermal Power Station

capacity of 720 MW. The station is owned by the Govt. of India and is being managed by NTPC since 1st April, 1978. The generation target for the year 1992-93 is 4200 MUs at 68% PLF. The generation during current financial year till February, 1993 has been 4147 MUs at a PLF of 73.38% as against corresponding period last year generation of 3611.7 MUs at a PLF of 63.72%. Station also achieved a record PLF of 82.54% for the month of February, 1993 by generating 391 MUs. This is the highest PLF in a month since inception of BTPS.

During current calendar year, 1992, BTPS has been identified as a model power station for energy conservation measures among all NTPC power stations. The efforts applied by BTPS for energy conservation have yielded a saving of about Rs.15 crores through reduction in heat rate, auxiliary power consumption, coal comsumption, fuel oil consumption and demineralised water consumption. The specific oil consumption during the financial year till February, 93 has been 3.32 ml/kwh as against 5.57 ml/kwh in the corresponding period last year. Similarly auxiliary power consumption during the financial year till February 1993 has been 10.61% as against 12.71% in the corresponding period last year.

RENOVATION AND MODERNISATION

BTPS is one of the thermal power stations identified under the centrally sponsored scheme for renovation and modernisation of the thermal utilities in India. The R&M Scheme Phase-I was carried out in the area of Boiler pressure parts modification, control & instrumentation, ash handling system, additional electrostatic precipitator etc. Encouraged by the achievement after the implementation of the first phase of the renovation and modernisation programme, the Central Electricity Authority (CEA) has cleared the second phase of Renovation and Modernisation proposals. The completion period of this R&M Phase-II programme is about five years.

NATIONAL HYDROELECTRIC POWER CORPORATION LIMITED

The National Hydroelectric Power Corporation (NHPC) was incorporated in 1975 under the Companies Act, 1956. The main objectives of the Corporation are to Plan, promote and organise an integrated development of hydro-electric power in the country. The authorised share capital of the Corporation stands at Rs.2500 crores. The paid-up capital which was Rs. 1922.41 crores as on 31st March, 1922 has increased to Rs. 2140.63 as at the end of October, 1992. The profit during the year 1991-92 was Rs.49.30 crores (before tax) as against Rs.52.76 crores in the previous year. The turnover of the Corporation during the year 1991-92 was Rs.243.94 crores as against Rs.223.95 crores in the previous year.

NHPC is responsible for the operation and maintenance of Baira Siul, Loktak and Salal (Stage-I) Power Stations located in Himachal Pradesh, Manipur and J&K respectively. The generation achieved during the year 1991-92 in the above power stations was 3567.110 MUs which is 111.54% of the targetted generation of 3198 MUs. The total generation during the year 1992-93 (upto October, 1992) was 2495.70 MUs against a target of 2424 MUs for the period. In addition to the generation in its own power stations, NHPC imported during the year 1991-92, 1396.02 MUs from the Chukha Hydel Project, Bhutan.

During the year, NHPC has been engaged in the construction of the following H.E. Projects :

(1) CHAMERA H.E. PROJECT (STAGE-I) (3X180 MW) H.P.

Works on the various components of the Projects like Main Dam, Power Tunnel, Tail Race Tunnel etc. were in progress during the year.

By October 1992, all civil works of concrete dam were completed and in addition all Spillway Gates and Sluice Gates have been erected and final testing was in progress. Tail Race Tunnel of 2414 M length has been completed. Power House concreting and erection of Unit-III has been completed. Erection of Unit-I&II was also in a satisfactory stage. In the Power Tunnel while civil works of intake structure were completed, Hydro-mechanical works were in progress. Power tunnel central portion is still on critical path in commissioning of the Project.

(2) DULHASTI H.E. PROJECT (3X130 MW) J&K:

On the Dulhasti Power Project, by March, 1992 the final design of almost all the major structures had been firmed up and detailed drawings were issued.

10847 cum. concreting of Intake Tower was completed and the silt flushing tunnel was excavated upto 1073 M. On the Head Race Tunnel, excavation by tunnel boring machine upto 1180 M from Upstream side and 581 M by conventional methods from Downstream side was done.

Excavation of Tail Race Tunnel was also nearing completion. Excavation was completed upto 9143 M in the transformer Cavern and 20626 Cum. in Power House Cavern. The drainage gallery to Head Race Tunnel was excavated upto 113 M and Dam concreting was completed upto 6859 Cum. The Head Race Tunnel was excavated upto 1200 M from Upstream and 889 M from Downstream. However, excavation of HRT from Upstream was suspended at the end of May, 1992 due to sudden ingress of water into the tunnel. Dewatering and cleaning up operations and other measures to tackle the problem have been taken up.

Consequent to contractors stopping works since Aug. 1992 interalia due to deteriorated law and order problem, the Govt. of India have set up a high level committee to look into the various problems for the implementation of this project.

(3) URI H.E. PROJECT (4X120 MW) J&K:

By October, 1992, 5.2 lakhs cum. excavation was done in barrage, cut and cover conduits, desilting basin, surplus escapes, head race canal etc. 153 M excavation was done in the main access Tunnel to the Power House and 539 M of construction adits to Head Race Tunnel, Penstock Top have been excavated. Shipment of electrical, mechanical and hydro-mechanical plant and machinery was in progress as at the end of October, 1992.

(4) TANAKPUR H.E. PROJECT (3X40 MW) U.P.:

All the three units of the Tanakpur Project have been spun and Unit-I was synchronised on 31.03.1992 while the other two Units were synchronised in the first week of April, 1992. However, due to minor seepage in the Power Channel, repair work was undertaken in accordance with the expert Committee's advice. After completion of repair works, filling of water conductor system was started at the end of June, 1992 and the machines synchronised.

Tanakpur Power Project

During the year 1992-93 upto October, 1992 the cumulative generation from the Project was 72.73 MUs of energy against the revised target of 71 MUs based on the target of 182 MUs for the whole year.

The Revised Project Estimates have been cleared by the Public Investment Board on 4th July, 1991. Approval of the Cabinet Committee on Economic Affairs to the Revised Estimates is awaited.

(5) SALAL H.E. PROJECT (STAGE-II) (3X115 MW) J&K:

During the year under report, the work on junction of adit with tail race tunnel-II was completed and excavation of heading was started on the inlet side. 202.5 M heading towards upstream and 165.5 M towards Downstream was completed. From the outlet end of TRT-II, 606 M heading was completed. In the Power House 43674 cum. concrete was placed. Speed ring of Unit-V has also been lowered and spiral casing installation was in progress. 315 M heading towards Upstream and 262 M towards Downstream was completed in Tail Race Tunnel-II. From the outlet end of TRT-II, heading excavation had been completed upto a total length of 736 M.

However, due to entry of flood water in Power House and tail race tunnel-II work had to be stopped, in the second week of September, 1992. After restoration works were completed, construction work resumed in the Power House and the tail race tunnel-II by October, 1992. The barrel concreting in Unit-IV was completed and the area was handed over for erection of electrical equipment.

(6) RANGIT H.E. PROJECT (3X20 MW) (SIKKIM) :

During the year under report, construction of residential units and temporary building were in progress. The work of 358.8 M long diversion tunnel was completed. By end of October, 92 the Project was ready for the diversion of the river. However, due to fund constraints, the progress of work on all other components have also suffered.

In the meantime, surge shaft, pilot excavation was completed. Stripping of right and left abutments of the Dam were in the final stages of completion. Of the total quantity of 1,46,000 cum., 41,000 cum. excavation had been completed by end of October, 1992.

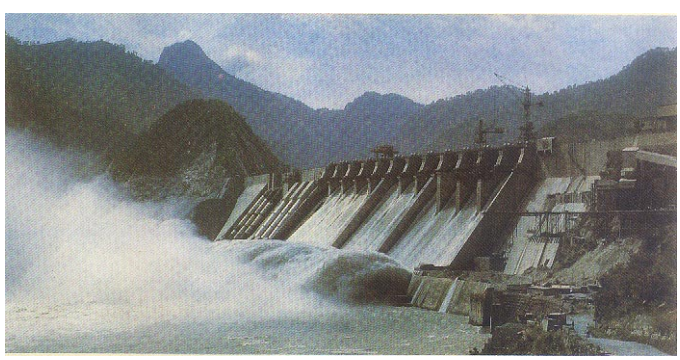
(7) KOEL KARO H.E. PROJECT (710 MW) (BIHAR) :

The Koel Karo H.E. project was approved in November, 1991 with a revised estimate of Rs. 1338.80 crores at March 1991 price level. However, no work on the project could be started due to non-availability of funds and due to resistance from the local people.

(8) DHAULIGANGA H.E. PROJECT (4X70 MW) (STAGE-I) U.P. :

The Project was approved for execution in April, 1991. The preliminary activities like land acquisition, preparation of contract packages and other related work were started but due to shortage of funds, no land could be acquired so far and no major work could be taken up.

Salal H.E. Project

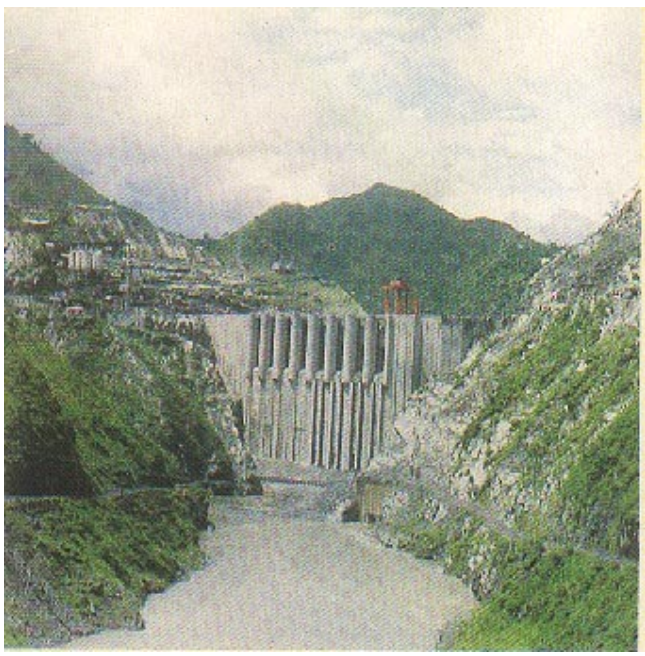


NEW SCHEMES

(1) CHAMERA H.E. PROJECT (STAGE-II) (3X100 MW) H.P.:

Bids have been invited with financing offer for execution of the project.

Chamera H.E. Project



(2) BAGLIHAR H.E. PROJECT (3X150 MW) J&K:

The World Bank has expressed interest in financing part of the Project and had desired that an International Consultancy Firm be appointed for appraisal and engineering the design of the Project. Technical bids received for this work are under evaluation.

(3) TEESTA H.E. PROJECT :

(STAGE-III-6X200 MW) SIKKIM :

Various options are being explored including private sector participation for execution of this project.

INVESTIGATION PROJECTS :

The Investigation works of Goriganga H.E. Project Stage-III and IIIB in U.P. have been completed and the Detailed Project Report sent to C.E.A. in March, 1992 for techno-economic appraisal and clearance.

Regarding the Kishengaga H.E. Project in J&K, while the Project proposal was being processed for techno-economic clearance in June, 1992, the Government of India acceded to the request of the Government of J&K for handing over the Project back to them for execution in the State Sector.

TRANSMISSION SYSTEM :

As per the decision of the Govt. of India, the transmission System of the Corporation are to be transferred to NPTC (now known as Power Grid Corporation of India Ltd.) Pending completion of the formalities of the de jure transfer, an agency agreement was signed with them on 19.11.91. Further, a Memorandum of Understanding is proposed to be executed with them for giving effect to the de jure transfer w.e.f. 01.04.1992.

During the year under report, work was completed on the following transmission lines:

i) 400 KV D/C Chamera - Moga Transmission Line.
ii) 400 KV Moga - Hissar Transmission Line.
iii) 220 KV Tanakpur - Bareilly Transmission Line.
iv) 132 KV Bongaigaon - Gaylaphug Transmission Line.

Works on the construction of the following transmission lines/substation were taken up/in progress during the year.

i) 400 KV Dulhasti-Kishenpur-Srinagar Transmission System.
ii) 400 KV/220 KV Moga Sub-station - 2x250 MVA.
iii) 2xS/C 400 KV Transmission Line from Hissar to Bhiwani.
iv) Nathpa Jhakri Transmission System.
v) Uri Transmission System.
vi) 220 KV Salal (Stage-II) Transmission System.
vii) 400 KV Chamera Stage-II Transmission System.
viii) 800 KV 2xS/C Kishenpur - Moga Transmission Line.

JALANDHAR - LUDHIANA- DASUA TRANSMISSION SYSTEM :

The System envisages strengthening of the Transmission System in the Northern Region for evacuation of Power from Hydro Projects in J&K and Himachal Pradesh. The updated cost estimates of the Project are awaiting clearance from PIB.

BONDS :

Due to financial crunch in the capital market, during 1991-92, the Corporation could raise funds through issue of bonds only to the extent of Rs.197 Crores, though the Government of India permitted it to raise funds to the extent of Rs. 615 Crores. For the year 1992-93, the Corporation has been asked to raise Rs. 500 Crores through issue of Bonds.

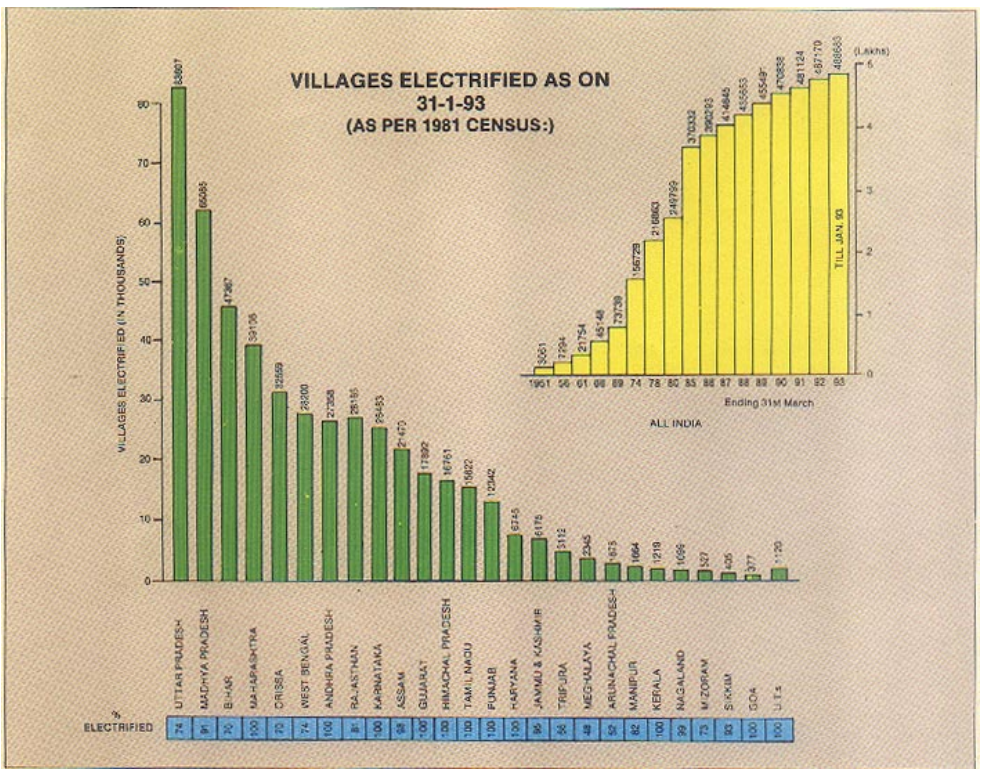
RURAL ELECTRIFICATION CORPORATION

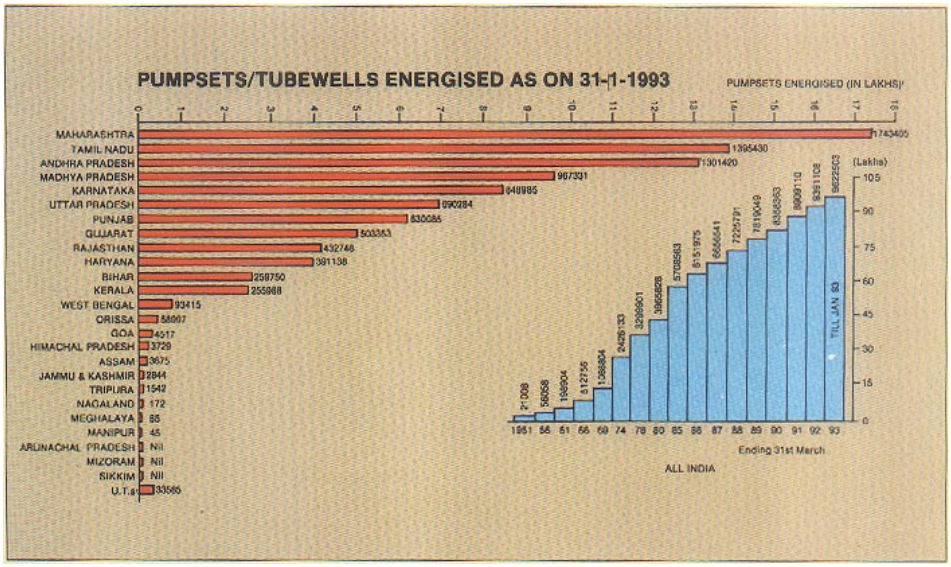
Rural Electrification Corporation (REC) was set up in 1969 with the primary objective of providing financial assistance for rural electrification programmes in the country. Rural Electrification Programmes undertaken by the REC cover electrification of villages, including tribal villages and Harijan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

The authorised Share Capital of the Corporation is Rs.600 crores. The paid-up capital of the Corporation upto the year 1991-92 stands at Rs. 362.60 crores. During the year 1992-93 (upto November, 1992), the Central Govt. have contributed Rs. 27.50 crores towards the share capital of the Corporation, increasing its equity capital base to Rs. 390.10 crores.

During the year 1991-92, the REC approved 1320 new projects involving a loan assistance of Rs. 954.15 crores (provisional). During the current year (upto November, 1992) REC approved 31 new projects involving financial assistance of Rs.38.32 crores (Provisional). Cumulatively upto November, 1992, REC sanctioned 24422 RE projects involving financial assistance of Rs.8916.84 crores (Provisional).

Loans advanced by REC to the State Electricity Boards (SEBs), State Government and Rural Electric Cooperative Societies during the year 1991-92 amounted to Rs. 587.84 crores (Provisional). Inclusive of this, the total loan amount advanced at the end of 1991-92 aggregated to Rs. 6004.88 crores (Provisional). During the current year, 1992-93, the REC has advanced Rs. 87.57 crores as loans up to November, 1992.





During the year 1991-92, against the target of electrification of 4875 villages and energisation of 220180 pumpsets, 5574 villages were reported as electrified and 398837 pumpsets energised (provisional) under REC programme. The target of pumpsets was exceeded by 81%, the highest ever margin in over two decades since inception of the Corporation. During the year 1992-93 (upto November, 1992) 152151 pumpsets (provisional) have been energised and 1044 villages have been electrified under REC programme.

The level of rural electrification in the country has risen from mere 12.8% at the time of establishment of REC in 1969 to 84% as of now. During the same period, the number of pumpsets energised has rapidly risen from 10.9 lakhs to over 95 lakhs.

As a result of special drive called "Light for Rural Millions" launched by the Corporation in 1989-90 for promoting household electrification in rural areas, a record number of 1.7 million connections were released during 1991-92 (provisional).

As a part of its strategy to improve the efficiency of the electrical network, especially to reduce power losses and improve voltage conditions in the system the Corporation continued to give special thrust for implementation of System Improvement projects. As a result the Corporation sanctioned 24 new System Improvement projects involving financial outlay of Rs.24 crores (provisional) for creation of 21 new Sub-stations during the current year upto November, 1992 for various SEBs. During the year, the Corporation also disbursed Rs.23 crores (provisional) to the SEBs for various System Improvement projects. Thus since the year 1987-88, 863 projects involving financial outlay of Rs.669 crores (provisional) stand sanctioned by the Corporation under System Improvement programme upto November 1992. During the same period, a total amount of Rs.405 crores (provisional) has been disbursed and as many as 374 new sub-stations commissioned under System Improvement projects financed by the Corporation.

The Corporation also negotiated an Agreement with Overseas Economic Cooperation Fund (OECF), Japan during 1991-92 for a financial assistance of 24.4 billion Yen to cover Power System Improvement and Small Hydro Electric Projects in selected States of the country. Under this fund, the Corporation has sanctioned so far 40 eligible System Improvement Sub-Projects and 4 Small Hydro Electric Sub Projects in these selected States.

The Corporation has been declared as a Public Financial Institution by the Govt. which would enable it to enter much wider area of activities.

The Corporation earned a net profit of Rs.86.41 crores (provisional) after tax during 1991-92, as against 74.90 crores in the previous year.

NORTH EASTERN ELECTRIC POWER CORPORATION LTD. :

The North Eastern Electric Power Corporation was constituted in 1976, under the Company's Act of 1956 on the recommendation of the NEC, with the aim of developing the large electric power potential of the N.E. Region. The region has large water resources, gas and oil reserves and coal deposits, which can be developed for power generation. The Corporation made a modest beginning with the implementation of 150 MW Kopili Hydro Electric Project, which has since been commissioned fully during the VIIth plan. Power generated from this project is being shared by the States of Assam, Meghalaya, Manipur, Mizoram, Tripura and Arunachal Pradesh through the associated 132 KV and 220 KV transmission lines which were completed by the Corporation and transferred to the National Power Transmission Corporation on de jure basis with effect from 31-3-92 to comply with the directive of Deptt. of Power, Govt. of India. The Corporation has also undertaken other hydro and gas based power projects and investigation of various schemes with a view to preparing a shelf of projects to be implemented in future according to the demand of power and availability of resources.

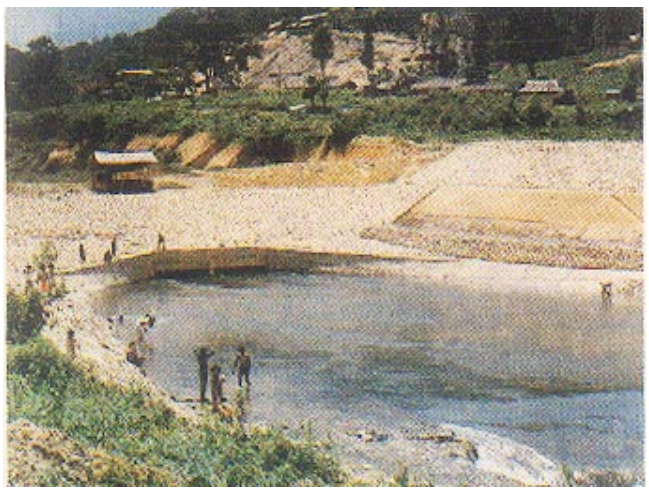
The various projects taken up by the Corporation are as follows :

PROJECTS COMPLETED (GENERATION) :

KOPILI HYDRO ELECTRIC PROJECT : 150 MW:

This Project having an installed capacity of 150 MW is located in the N.C. Hills District of Assam and was completed in March, '88 at a cost of Rs.243.82 crores. It is a twin project, consisting of two Dams and two Water Conductor Systems leading from the Kopili Reservoir to the Khandong Power House (2x25 MW) and from the Umrong Reservoir to the Kopili Power House (2x50 MW). The Khandong Power Station was commissioned in March/ April, 1984, while Kopili Power Station in March, 1988 and started commercial generation from June/July, 1988. During the current year the performance of both the Power stations have been quite satisfactory. This project has generated over 3780 Million Units of Power till November, 1992 since inception and earned a revenue of about Rs.217.64 crores in terms of sale of power.

Kopili H.E. Project (dyke works)

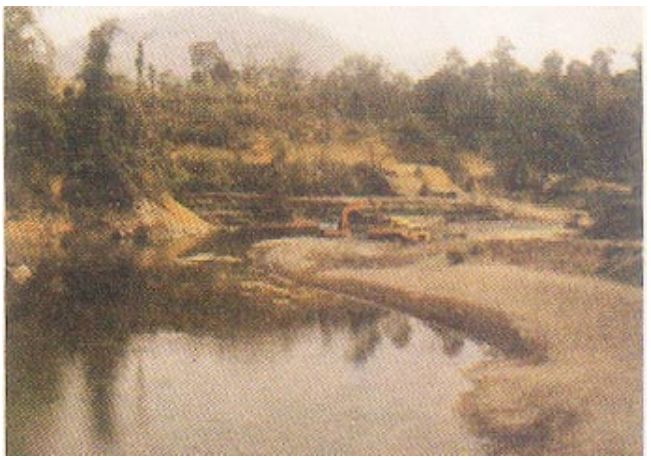


PROJECTS ON-GOING (GENERATION) :

I) DOYANG H.E. PROJECT (75 MW) - NAGALAND :

This project, administratively approved in March, 1985 is located in the Wokha District of Nagaland and has a provision of installing 3 units of 25 MW each. The project is scheduled for commissioning by July, 1996 at an estimated cost of Rs.347.35 crores (March, 92 price level). Works in respect of infrastructure development are almost completed and the main construction activities have been taken up.

Doyang H.E. Project - power house site



RANGANADI HYDRO ELECTRIC PROJECT (405 MW) - ARUNACHAL PRADESH:

This project, administratively approved in Apr. '87 is located in the Lower Subansiri District of Arunachal Pradesh and has a provision for installing 3 units of 135 MW each. The project is scheduled for commissioning in March, 1997 at an estimated cost of Rs.516.49 crores (Oct. '90 price level). Works in respect of infrastructural development are almost completed except some approach roads which are being done through Border Roads Organisation. These works are being completed in phases as per requirement.

KATHALGURI GAS BASED COMBINED CYCLE POWER PROJECT (291 MW) - ASSAM :

This project envisages installation of 6 Nos. of 30-40 MW gas Turbines and 3 Nos. of 30-40 MW Waste Heat Recovery units working in combined cycle mode, at Kathalguri, Assam for utilising the natural gas from the Assam oil fields. At current prices the project is estimated to cost Rs. 816 crores.

Land has been acquired and infrastructure is under development. The project is scheduled to be commissioned fully by March, 1996.

NEW SCHEMES :

1. AGARTALA GAS TURBINE POWER PROJECT (84 MW) - TRIPURA :

The Agartala Gas Turbine Power Project having provision of installed capacity of 84 MW (4 units of 21 MW) is to be set up at Ramchandranagar, 15 km away from Agartala town. The latest cost of the project stands at Rs. 273.50 crs. The project will be financed by the Govt. of India as a Central Sector Project with Debt-Equity Ratio of 1:1, equity being released first. Sale price per unit has been assessed at 141 paise. The project is scheduled for commissioning within 28th month from the 'zero' date or placement of order.

All statutory clearances such as Forest and Environmental Clearance, N.O.C. from State Pollution Control Board, clearance from National Airport Authority, Defence Clearance and Techno-Economic Clearance have been obtained from the respective Deptts./Authorities.

Land required for the project has been earmarked by the Govt. of Tripura and subsoil investigation of the land is being carried out by the Corporation.

Regarding supply of natural gas to this project, clearance from Ministry of Petroleum and Natural Gas has been obtained in June, 1992. Contract with GAIL is under finalisation.

2. KOPILI H.E. PROJECT - I st STAGE EXTN. (100 MW) - ASSAM:

The Project Proposal consists of installing of 2 Nos. of generation units of 50 MW each near the existing Kopili Power House of Kopili H.E. Project. A surface steel penstock of 2.75 m dia of approximately 900 metres length bifurcating into 2 Nos. 2.00 m dia penstock near the Power House will be laid from the Kopili, (Umrong) valve House Excavation for the Power House pits and first Stage concreting for the penstock was completed within the scope of existing project.

An additional annual generation of 502 MU in 90% dependable year will accrue from this extension project taking the total annual generation of Kopili H.E. Project to 1308 Million units. The additional power is proposed to be evacuated by a85 Km long 220 KV S/C line on D/C towers from Kopili Power Station to Kathiatoli (Misa) in Assam.

The updated cost of the project stands at Rs. 101.97 crs. at Feb '92 price level. Execution of main construction activities shall be started after receipt of CCEA approval.

3. KAMENG H.E. PROJECT (600 MW) - ARUNACHAL PRADESH :

Kopili H.E. Project (Khandong Dam)

The Kameng H.E. Project located in Kameng District of Arunachal Pradesh envisages the utilisation of the water of rivers Tenga and Bichom to generate 600 MW of power with 4 units of 150 MW each. Power from this Project is proposed to be evacuated through a 220 KV/DC line to Bhalukpung in Assam, for connecting with the regional grid system.

The estimated cost of the Project at Mar '92 price level was Rs. 1153.60 crores (excluding IDC and Associated Transmission Project).

CEA found the techno-economic appraisal of the Project to be in order, subject to compliance of the following :

i) Section 29 of IE Act. This has been complied with.

ii) **Clearance by MOE&F:** Necessary proposals have been submitted to MOE&F and clarifications, as asked for by them, have been furnished. MOE&F clearance is expected soon.

The project has been cleared by the pre-PIB. The MOE&F has issued in principal approval for diversion of 710 Ha forest land required for execution of the project subject to the condition that the User agency will transfer the cost of compensatory afforestation over double the degraded forest land in favour of the Forest Department. The condition imposed by the MOE&F has been accepted and duly communicated to the Secretary (Forest), Govt. of Arunachal Pradesh.

Land acquisition survey has been completed for 429 Ha. and notification in this regard has been issued by the Govt. of Arunachal Pradesh in September, 1992.

TRANSMISSION LINE PROJECTS :

All Transmission line Projects/Sub-Stations (other than those forming integral part of the generating stations) were transferred to NPTC by NEEPCO with effect from 14-11-91 on Management Service Contract basis.

The de jure transfer had also been made to NPTC with effect from 01-04-92 after concluding a MOU with them for the transfer of assets and liabilities.

INVESTIGATION SCHEMES :

Investigations of the following schemes have been taken up by the Corporation with a view to preparing a shelf of Hydro Electric Projects. All these schemes are located in Arunachal Pradesh except Kopili H.E. Project (Stage-II) which is in Assam.

1.	Ranganadi H.E. Project (Stage-II)	-	100 MW
2.	Damwe H.E. Project	-	520 MW
3.	Dikrong H.E. Project	-	100 MW
4.	Papumpam H.E. Project	-	100 MW
5.	Kopili H.E. Project (Stage-II) in Assam	-	25 MW

FINANCIAL :

The authorised capital of the Corporation is Rs.500.00 Crs. as on date. The pattern of Investment of financing the project under execution by the Corporation is generally in the ratio of 1:1 for equity and loan. The share capital and loan on 31st Mar '92 stood at Rs.338.40 crores and Rs.268.70 crores respectively including interest during construction.

PERSONNEL :

The Corporation has a manpower strength of 355 in the executive cadre and 2683 in the non-executive cadre. Continuous efforts are being made to strengthen the organisational structure of the Corporation to enable it to take up the various works in an expeditious manner.

POWER FINANCE CORPORATION LTD.:

(1) The Power Finance Corporation (PFC) was incorporated on July 10, 1986 with the objective of providing term finance for Power Generation Projects (Hydel & Thermal) Transmission and Distribution, System Improvement, Urban Distribution, Renovation & Modernisation, Survey & investigation and Training of personnel engaged in the Power Development Programme. The Corporation commenced its business during 1987-88.

(2) The funds are mainly provided to the State Electricity Boards and State Power Generation Corporations. The projects are formulated and implemented by these bodies. The funds provided by the Corporation are in the nature of additionality to Plan allocation based on merits of the individual projects.

(3) Since its inception, the Corporation has adopted a strategy to help maximise availability of power in the short-term and to guide the development of the Power sector along the optimal path in the long term. The operations of the Corporation currently aim at augmenting resources for the power sector and bringing about improvement in efficiency - both Operational and Financial during the 8th Plan period.

(4) The Authorised Share Capital of the Corporation is Rs. 2000 crores. The paid up capital stood at Rs. 985.45 crores as on Sept. 30th 1992. PFC has raised Bonds to the tune of Rs.1793.00 crores upto 30th Sept. 1992.

During the year PFC mobilised Fixed Deposits amounting to Rs. 10.84 crores (upto Sept. '92).

(5) The Loan Agreement between Govt. of India and Asian Development Bank, and the Project Agreement between ADB & PFC, for a loan of US $ 250 million, for the Power Sector Efficiency Improvement Project was signed on 23rd April '92.

Steps for action have been initiated for utilisation of World Bank loan of $ 265 million. Preparation of Bidding documents is underway.

During the year the Board of Directors of PFC has approved the establishment of a Sector Study Unit (Power Studies Cell) at PFC.

(6) Operational & Financial Action Plan (OFAP) :

As a part of Institutional Development Programme for its clients, PFC carries out diagnostic studies of each State Power utility with its active participation, and develops time-bound Operational and Financial Action Plan (OFAP). OFAP is an action plan developed by incorporating the perceptions of the field officers of the Utility; assessing the resources required and expected constraints in its implementation; having time-bound monitorable targets;

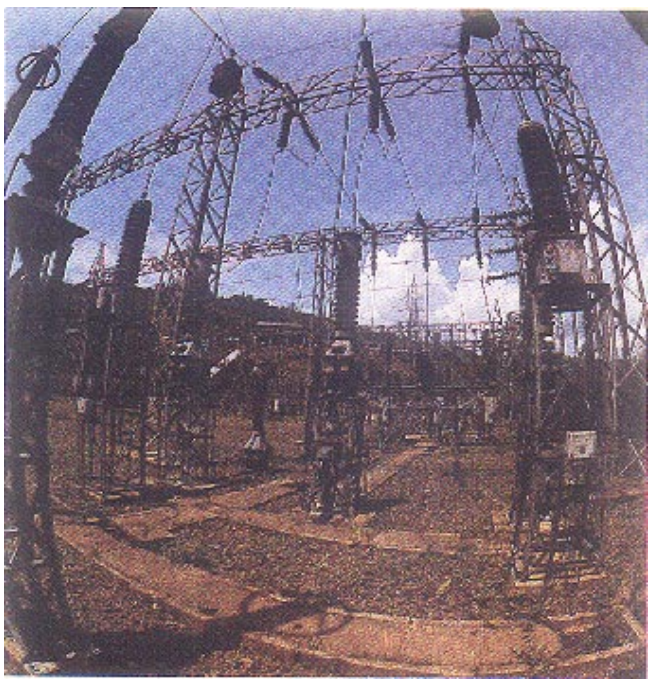
inbuilt feed-back mechanism; implementation in phases and review at the end of each phase, non-implementation of which triggers remedial steps mutually agreed in advance.

PFC has made considerable progress in involving power utilities in the Institutional Development Programme.

(7) The position relating to sanctions and disbursement is detailed below :

Scheme	1992-93 (April to Dec. '92) (Rs. in crores) Sanct-ions	Disburse-ments	Cumulative upto Dec. '92 (Rs. in crores) Sanct-ions	Disburse-ments
Renovation & Modernisation	106.37	46.24	585.29	212.63
Capacitors	37.26	31.14	216.15	142.30
Transmission	58.73	140.17	1243.10	830.78
Urban Distribution	12.23	36.45	268.20	161.26
Generation	112.77	95.33	1911.50	1785.82
Total	327.36	349.33	4224.24	3132.79

Halflong sub-station (Power Grid)



POWER GRID CORPORATION OF INDIA LIMITED (POWER GRID)

The Power Grid Corporation of India Limited (erstwhile NPTC), was incorporated in October 1989 with an initial authorised share capital of Rs. 5000 crores in order to create a unified transmission system for the country to be operated for the benefit of all participants in the power sector and to bring about optimal use of countrys' resources. The mandate for the Corporation is construction of EHV AC and HVDC Transmission Lines, Sub-stations, Load Despatch Centres and Communication Facilities in a coordinated and efficient manner, to move large blocks of power from Central Generating Stations and surplus from SEB's, if any, to load centres within and across the Regions with reliability, security and economy.

PHASED DEVELOPMENT OF POWERGRID

The work relating to the transmission lines and associated substations, load despatch centres, communication facilities as well as buying/selling of power presently being handled by Central/Centre-State joint venture organisations shall be transferred to POWERGRID in a phased manner.

(a) First Phase - Taking over commissioned/under construction and planned transmission lines and substations from the Central/Centre-State joint venture organisations, augmentation of load despatch and communication facilities, (estimated cost Rs. 50,000 millions) transfer of related manpower (6000) and wheeling of power from the participating power stations to the beneficiary States.

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

(c) Third Phase - Establish Power Pools to facilitate the exchange of power between states/regions leading to the formation of National Power Grid.

MISSION

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

OBJECTIVES

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

- Efficient Operation and Maintenance of Transmission Systems.
- Strengthen Regional Power Grids and establishing Interregional 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 co-operation and build professional relations with stakeholders, peers and other related organisations.

TRANSFER OF TRANSMISSION RELATED ASSETS

In accordance with the Government decision of transferring the transmission system from various Central/Centre-State joint venture organizations, the Ordinance was promulgated by Government of India on January 8, 1993 for dejure transfer of assets from NTPC, NHPC and NEEPCO with effect from April 1, 1992. The Bill for dejure transfer of assets has been ratified in Lok Sabha and Rajya Sabha on March 15, 1993 and March 23, 1993 respectively. The net assets value transferred from these organisations will be finalised after physical verification as indicated in their audited balance sheets as on 31/3/92. Parallel steps have also been initiated for completion of activities related to transfer of transmission assets with reference to NLC also.

The transmission system of Nuclear Power Corporation (NPC) was taken over by POWERGRID w.e.f. 28/8/91. Construction activities for the single transmission project under NPC, i.e. Kakarapara Transmission System, presently being carried out by Gujarat Electricity Board on deposit work basis, is now being owned and looked after by POWERGRID. In case of Nathpa Jhakri Power Corporation (NJPC), no separate agreement is required as their transmission work was being carried out by NHPC.

For Tehri Hydroelectric Development Corporation (THDC), a Centre-State joint venture with UP Government, transfer of the associated transmission system to POWERGRID is expected soon as the consent of the Uttar Pradesh Government has been received. The transmission line assets of Damodar Valley Corporation (DVC) and Bhakra Beas Management Board (BBMB) are to be transferred after obtaining the concurrence of the concerned State Government, which is in the process of being obtained.

FINANCIAL PERFORMANCE

The Government orders for transfer of transmission line works of NTPC, NHPC and NEEPCO envisaged that ownership of the transmission system will be transferred to POWERGRID after completion of the requisite formalities by 30th September 1991, 31st December and 31st December 1991 respectively. However, due to delay in completion of the formalities, ownership continues to be with NTPC, NHPC and NEEPCO who were doing the billing and collection upto 31st March 1992.

BUDGET

For the year 1991-92, POWERGRID had a sanctioned budget of Rs.6 crores which was later on enhanced by Government of India by Rs. 50 Crores. This budget was fully utilised for the year 1991-92. For the year 1992-93, the budget for POWERGRID was of the order of Rs. 592.88 Crores, including IDA OECF budget of Rs. 120 Crores shown in the name of NTPC, NHPC and NEEPCO for funding transmission line works under the management of POWERGRID.

OPERATIONAL PERFORMANCE

With the take over of the transmission lines and associated substations from NTPC, NHPC, NEEPCO and NPC, the total length of transmission lines under operation with POWERGRID as on 31.3.92 was 23,060 ckt. Kms. consisting of 15,280 ckt. kms. of 400 KV, 5,442 ckt. kms. of 220 KV, 708 ckt. kms. of 132 KV A/C and 1630 ckt. kms. of Rihand-Dadri HVDC transmission lines and 38 Nos. of sub-stations with a total transformation capacity of 12,467 MVA.

The operational performance of the transmission system being managed by POWERGRID has been impressive in all the regions. The overall average availability of lines during the last year, for the period under operation with POWERGRID, was 98.98%, 98.06%, 96.52%, 98.92% and 99.46% in the Northern, Eastern, North-Eastern, Southern and Western Regions respectively.

BILLING

POWERGRID has initiated the process of signing the MOUs regarding transmission charges with the various beneficiary States in the various Regions based on the existing principle of transmission tariff prevalent with other organization like NTPC, NHPC etc. to facilitate immediate billing activities once the transfer of transmission assets takes place from the various other organizations.

In North-Eastern Region, subsequent to the signing of MOU for transfer of transmission assets from NEEPCO to POWERGRID w.e.f. 1/4/92, POWERGRID has already started billing the various constituent states in the North-Eastern Region for the POWERGRID transmission services used by them. POWERGRID has also signed an agreement with Royal Government of Bhutan for purchase of power from Chukha.

CONSTRUCTION PERFORMANCE

On the construction front, during the year POWERGRID has commissioned/backcharged Ramangundam - Khammam, Khammam - Vijayawada, Vijayawada - Gajuwaka, Agra - Ballabhgarh, Chamera - Moga and Farakka - Biharshariff (D/C) 400 KV lines and Tanakpur - Bareilly I (D/C) 220 KV line.

The total length of the transmission lines commissioned during the year was 2,105 ckt. kms. consisting of 1,893 ckt. kms. of 400 KV lines and 212 ckt. kms. of 220 KV lines.

POWERGRID have also successfully commissioned ICTs and Bus Reactors of various capacities at Mandaula, Itarsi, Gooty, Vijayawada, Nagarjunsagar and Bangalore Substations.

MOU PERFORMANCE

As POWERGRID took over the transmission works of the other organizations during the middle of the year, it has not been possible to enter into a separate memorandum of Understanding (MOU) with the Government on behalf of POWERGRID, during 1991-92. However, POWERGRID has requested Government of India to consider it as an Organization which will sign the MOU with the Government of India in future.

POWERGRID have been able to surpass the MOU targets set in the MOUs of the other organisations for the transmission line. As against a stringing target of 1,358 ckt. kms., POWERGRID was able to achieve 1,534 ckt. kms. In its proposed MOU for the year 1992-93, POWERGRID envisages the targets for stringing of Transmission lines.

Stringing of Lines being completed in 1992-93

		Ckt. Km.
1.	Dadri-Malerkotla 400 KV S/C	50
2.	Moga-Hissar 400 KV D/C	168
3.	Kakarpar-Bharuch 220 KV D/C	1
4.	Kakarapara-Vapi 220 KV D/C	176
5.	Karkarpar-Vav 220 KV D/C	90
6.	Jamshedpur-Rourkela 400 KV S/C	92
	Sub Total (Full Line Completion)	**577**

Stringing during 1992-93 for Lines beyond March 1993

		Ckt. Km.
1.	Farakka-Jorhat 400 KV S/C	100
2.	Durgapur-Jamshedpur 400 KV S/C	70
3.	Hissar-Bhiwani 400 KV S/C	40
4.	Salal-Kishenpur-Sarna 220 KV D/C	20
5.	Dimapur-Misa 220 KV D/C	40
6.	Doyang-Dimapur 132 KV D/C	40
7.	Dimapur-Imphal 132 KV D/C	40
	Sub Total (Part Line Completion)	**350**
	Sub Total (Full Line Completion)	577
	Sub Total (Part Line Completion)	350
	Grand Total	**927**

EIGHTH PLAN AND NEW PROJECTS

For the Eighth Five Year Plan (1992-97), POWERGRID had submitted a minimum need based Eighth Plan proposal for Rs. 7,924 Crores. POWERGRID plans to take up various projects in the future to achieve its goals. Some of the vital projects include the Augmentation of Central Transmission System, Augmentation of Transmission System in Assam, Mizoram and Tripura, Transmission Systems of Vindhyachal-II, Rihand-II, Faridabad, Yamunanagar, North Karanpura, Vindhyachal Additional Transmission System, Strengthening of the Northern Region Transmission System, etc.

POWERGRID also plans to take up projects in the area of System improvement, and improvements in the distribution system (on a limited scale) for overall benefit of the SEBs in particular and the country as a whole. Some of these will include Time of the Day (TOD) metering and Instrumentation, SVC, Additional Transformers and Reactors, Capacitor Installation, Survey and Investigation, Infrastructure Development and Training for Hotline and Bare Hand Maintenance.

INTERNATIONAL FUND MOBILISATION

During the year, POWERGRID was appraised by the various International Financial Institutions for consideration of transfer of various loans from Organizations like NTPC, NHPC and NEEPCO to POWERGRID for the existing and on-going transmission projects. All the International Financial Institutions like World Bank, OECF of Japan, IBJ of Japan, ADB etc. have granted “in principle” approval for transfer of transmission system related loans from NTPC, NHPC and NEEPCO to POWERGRID pending finalisation of detailed modalities for modifications of loan agreements.

Considering the severe resource constraints in the country and also keeping in view the ambitious expansion programme for establishment of new transmission lines, POWERGRID is concentrating its efforts in mobilizing international assistance from International Financing Institutions like the World Bank, OECF of Japan, ADB etc. who have shown willingness to offer assistance for its future projects.

Two loans of Japanese Yen 3.878 billion and Yen 3.237 billion have been extended on January 9,1992 and December 3, 1992 for the transmission system Project associated with Gandhar Combined Cycle Gas Based Power Project. The total OECF financed portion of this project is Japanese Yen 7.115 billion.

POWERGRID has successfully initiated dialogue with ADB to provide possible financial assistance, as grant, to the tune of US $ 6,00,000 for a detailed tariff study of POWERGRID.

POWERGRID has also initiated dialogue with ADB for possible financial assistance for implementation of some important transmission projects in the North-Eastern Region in Southern Assam, Mizoram, Arunachal Pradesh and Tripura, as well as establishment of North-Eastern Region Load Despatch & Communication Facilities.

World Bank loans and IDA credit of US$ 1.2 billion for transmission system have been transferred from NTPC and NHPC to POWERGRID. World Bank has also extended a new loan of US$ 350 million for a package of projects which includes financing of additional transmission system associated with Vindhyachal STPP Stage-I, Ramagundam-Hyderabad transmission line, Southern Region Load Despatch and Communication project and system studies for transmission planning and institutional development of POWERGRID etc.

UNIFIED LOAD DESPATCH AND COMMUNICATIONS

A detailed study has been initiated with the assistance of the World Bank and ADB for a detailed action plan for the establishment of Regional & National Load Despatch and Communication facilities, which is essential pre-requisite for efficient and coordinated operation of Regional and National Power Grids.

The Load Despatch Centre in the Northern Region is already covered under partial financing of the World Bank under the Northern Region Transmission System (NRTS) Project, while the Southern Region load despatch and communication facilities is proposed to be funded under loan from World Bank. For the North-Eastern Region, assistance is being sought from ADB.

CONSULTANCY

POWERGRID have been able to gain significant ground in the potential area of consultancy. It is providing consultancy/project supervision services in the different areas to Delhi Electric Supply Undertaking (DESU), Power Development Department of the Government of Jammu and Kashmir, Brahamputra Board and Orissa State Electricity Board. It is also entrusted by the Department of Power, Royal Government of Bhutan, the work for Operation and Maintenance of 132 KV Salakati-Geylegphag line and 132 KV bays at Salakati and Geylegphag, and for studying and recommending modifications in their transmission & distribution system.

POWERGRID has also inititated steps to register itself as Consultant with the various International Financing Agencies such as World Bank, ADB, African Development Bank, etc.

HUMAN RESOURCE MANAGEMENT

The total manpower strength of the Corporation is about 5500 personnel which includes personnel transferred from other organizations like NTPC, NHPC, NEEPCO as also some direct recruits. The total number of personnel transferred from NHPC is 35.5%, from NEEPCO 17% and the remaining from NTPC and direct recruits. Workmen category constituted about 61%, Supervisory category 14.5% and remaining 24% is Executives.

To facilitate organizational integration and to have an insight into the challenges ahead for POWERGRID, top management workshops were organized during December, 1991 and September, 1992, under the guidance of an eminent management consultant. POWERGRID have also signed an MOU with CPRI, BANGALORE to provide impetus to the Research and Development activities of the organisation.

Pumpset energisation

TEHRI HYDRO DEVELOPMENT CORPORATION LIMITED

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

SALIENT FEATURES OF TEHRI HYDRO POWER COMPLEX :

Tehri Hydro Power Complex is located on river Bhagirathi having two dams, one just downstream of Tehri Town and the other 22 Km below it. The complex comprises of following four components :

- A 260.5 metre high earth and rockfill dam at Tehri with an underground power house of 1000 MW (4x250MW) capacity with conventional turbine - Generating sets.
- Second underground power house of 1000 MW (4x250 MW) capacity with reversible pump turbine sets at Tehri.
- A 103.5 metre high concrete dam (which will provide a balancing reservoir) with a surface power house of 400 MW (4x100MW) capacity at Koteshwar.
- Transmission system for evacuation of power generated at Tehri and Koteshwar Projects, through two single circuits 765/400 KV lines for distribution of power in Northern region.

The estimated cost of the entire Tehri Hydro Power Complex is Rs.5583 Crores at Sept. 1992 price level. An expenditure of about Rs. 747 Crores has been incurred on the project till November 1992.

PROJECT BENEFITS :

The Tehri Hydro Power Complex, the largest multi-purpose development venture in the country, will provide both irrigation and power benefits and usher in an era of rapid development in Uttar Pradesh. The main benefits from the Project are :

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

PROJECT STATUS:

Inspite of handicaps and financial constraints the project made rapid progress in various activities and has now reached a stage where very fast progress can be made. Following is the brief status of works :

- Infrastructure works completed.
- 4 Nos. diversion tunnels 11 M. dia each completed.
- 4 Nos. 8.5 M dia each Head Race Tunnel excavation completed and lining works is nearing completion.
- Various approach adits to underground Power House cavern completed.
- Foundation work of Coffer Dam & the Main Dam have been completed and dam raised to 15 metre above river bed level in its entire length of 1.1 K.M.
- Considerable works have also been completed for rehabilitation of rural and urban oustees; the first stage rehabilitation of rural oustees is nearly complete.

PROJECT COST AND COMMISSIONING SCHEDULE

(Rs. in Crores)

	Project	Estimated Cost (At Sept. 1992 Price Level)	Commissioning Schedule for 8th Plan
i)	Tehri Dam & HPP (4x250 MW)	2815	1996-97(500 MW)
ii)	Koteshwar Dam & HPP (4x100 MW)	725	1996-97(200 MW)
iii)	Tehri Pump Storage Plant (4x250 MW)	1224	-
iv)	Associated Transmission System (800 KV)	819	1996-97(800 KV S/C Line from Tehri to Meerut)

NATHPA JHAKRI POWER CORPORATION (NJPC)

Nathpa Jhakri Power Corporation (NJPC) was incorporated on 24th May, 1988 as a Joint Venture of Govt. of India and Government of Himachal Pradesh both sharing the cost of the projects in the ratio of 3:1 respectively to plan, promote, organise and execute Hydroelectric Power Projects in the Satluj river basin in Himachal Pradesh.

NJPC is presently executing its first project Nathpa Jhakri Hydro-electric Project (installed capacity = 1500 MW) in Distt. Kinnaur/Shimla (HP). Besides this project, NJPC is likely to take up very shortly the execution of 800 MW Kol Dam Project on river Satluj for which techno-economic, environment, forest and PIB clearances have already been obtained.

NATHPA JHAKRI HYDRO-ELECTRIC PROJECT

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

- a 60.50 m high concrete dam on Satluj river at Nathpa to divert 405 cumecs of water through four intakes.
- an underground desilting complex, comprising four chambers, each 525 m long, 16.31 m wide and 27.5 deep to exclude particles down to 0.2 mm size.
- a 10.15 m dia. and 27.30 km long head race tunnel terminating in a 21 m diameter and 301 m deep surge shaft.
- an underground Power House at Jhakri with a cavern size of 216m* 20m* 49m having six Francis Units of 250 MW each, utilising a design discharge of 405 cumecs and a design head of 425 m.
- three circular steel-lined pressure shafts, each 409 m in dia. and 633 m long taking off from the surge shaft bifurcating near the underground power house to feed six Francis units.
- a 10.15 m dia. and 1080 m long tail race tunnel to lead the water back into the river Satluj.

The project will generate 6700 million units of electrical energy in a 90% dependable year and 7447 million units in an average year, besides providing 1500 MW of valuable peaking power to the Northern Region. The project is estimated to cost Rs. 4883.00 crores at July 1992 price level including Rs. 952.00 crores as I.D.C. The cost of civil and electrical components (generation only) being Rs. 2780.50 crores and Rs. 1150.50 crores respectively. The cost of energy generation at bus bar works out to 77.12 paise/KWh and 69.38 paise/KWh in a 90% dependable and average year respectively.

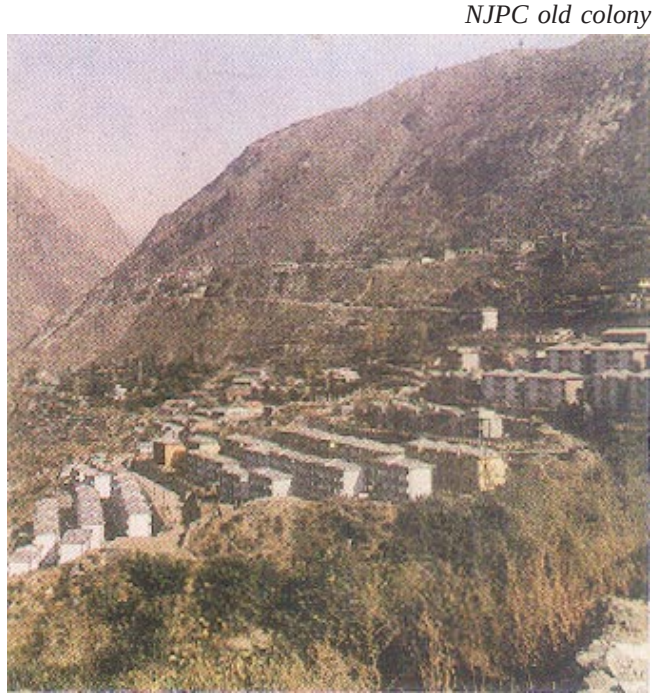
Original sanctioned cost of the project was Rs. 1678.02 crores including 206.02 crores as I.D.C. at Sept., 88 price level. The project is now estimated to cost Rs. 4883 crores at July, 1992 price level.

Nathpa Jhakri project being a run-of-river scheme involves the construction of only a diversion dam and has virtually no impoundment except for diurnal storage. Accordingly, the related problems associated with ecology, displacement of population and deforestation are minimal. Only 69 families have been displaced from their environs. A meagre 118 hectare of forest land is being acquired for the project needs and requisite compensatory afforestation programme is being implemented. The small area coming under the diurnal reservoir has not displaced any flora, fauna or population.

The World Bank has agreed to give a loan of 437 million U.S. Dollars through Government of India for generation component of this project. The loan agreement was signed on 18.5.1989 and the loan has become effective from 31.1.1990.

At present pre-construction activities are under full swing. The pre-construction investigations are almost complete. Development of infrastructure is well scheduled to meet the requirements of main civil contractors when they arrive at the site during 1993. All the six units are scheduled to be commissioned by June, 1998.

NJPC old colony



PRESENT STATUS OF NATHPA JHAKRI PROJECT

Physical Status : At present the pre-construction investigations and infrastructure works are under progress. The physical status of these works ending December, 1992 is given below :

Items	Total quantity	Quantity Executed	Balance	Remarks
Land Acquisition	562.00 ha	484.70 ha	77.3 ha	Besides, 36 ha is in physical possession with Project Authorities.
Drifts	3379.05 m	3379.05 m	–	Completed
Drilling	4916.00 m	4796.35 m	1119.65 m	To be completed by 3/93
Roads	64.00 Kms	61.054 Kms	2.946 Kms	To be completed by 3/93
Buildings	108684.00 Sqm	44969 Sqm	63715 Sqm	
Adits	6712.60 m	4640.35 m	2072.25 m	Out of nine adits five would be completed by 3/93
22 KV D/C HT LINE	29.745 Kms	29.745 Kms	–	Completed
22 KV S/C HT LINE	35.3 Kms	35.3 Kms	–	Completed
220/66/22 KV Sub-station	–	–	–	First phase i.e. 66/22 KV Sub-Station is ready & the second phase i.e. 220/66 KV is near completion.

AWARD OF MAIN CONTRACTS

MAJOR CIVIL WORKS :

International Competitive Bidding for major civil works were invited for the following three contract packages : Dam Intake and Desilting arrangement
Lot 2.1 HRT upto STA 16042 m and Sholding works;
Lot 2.2 HRT from STA 16042 m to STA 27295 m and surge shaft. Pressure shaft, power house and TRT including its appurtenant works which are expected to be awarded by early 1993.

GENERATING AND ASSOCIATED EQUIPMENT

ELECTRICAL WORKS PACKAGES

Power house equipment proposed to be procured on ICB and LICB basis has been divided into three packages :
Turbine, Generator, MIV, Governor, E.O.T. Crane and station control system.
Butter Fly Valves and E.O.T. Crane.
Part-I Gas Insulated Switchgear and CGI Ducts.
Part-II Transformers and Bus Ducts (under LCB).

INFORMATION COMMUNICATION SYSTEM

SATELLITE DATA COMMUNICATION SYSTEM

For effective Data Communications for Nathpa Jhakri Project, four micro-earth terminals at Nathpa, Jhakri, Shimla/Solan and Delhi are being installed. The Data Transmission would take place through Indian National Satellite and will be on NICNET facility of NIC. The system is likely to be operative by Jan/Feb., 93.

SPEECH COMMUNICATION SYSTEM

To provide speech communication between various project sites, 400 lines EPABX exchange for Jhakri, 200 lines EPABX at Nathpa and 100 lines at Jeori have been proposed. The 400 lines exchange at Jhakri has been commissioned and action to commission the other two is in progress. The exchanges at Jhakri and Jeori are to be ultimately connected on STD/ISD net work through Deptt. of Telecommunication by May 1993.

WIRELESS COMMUNICATION

It is proposed to have wireless communication between Delhi, Nathpa, Jeori, Jhakri, Solan, Karcham, and Kol for which approval of Assistant Wireless Adviser have already been obtained. The wireless system for Nathpa Jhakri project is likely to be operative by March, 93.

MANPOWER

REGULAR MANPOWER TAKEN OVER FROM HPSEB

Prior to the creation of NJPC, the NJPP was being executed by the HPSEB. Even after formation of NJPC, the works were being carried out by HPSEB on Agency basis. The effective control of the project was taken over by NJPC w.e.f. 1st August, 1991 following the agreement of 23rd July, 1991, between Minister of State I.C. (P&NES), Government of India, and Chief Minister of Himachal Pradesh. Level wise summary of manpower as on date is given below :

Level	Corporate Office	Jhakri	Total
Total Exec.	135	116	251
Non Exec.	295	1115	1410
TOTAL REG.	430	1231	1661
D/W	45	895	940

EXPENDITURE

Total expenditure incurred on the project upto March, 1992 works out to Rs. 147.67 crores. The expenditure incurred on the project, ending Dec., 92 during the year has been estimated as Rs. 27.14 crores. Thus the total expenditure upto Dec., 92 is of the order of Rs. 174.81 crores.

The original Budget Estimate provision for Nathpa Jhakri HEP for the year 1992-93 was Rs. 198 crores. The Revised Estimate of Nathpa Jhakri HEP proposed for the year 1992-93 is Rs. 111 crores.

KOL DAM PROJECT

Kol Dam Project which has been already cleared from techno-economic, environmental and forest angle has a project cost of Rs. 1565.41 crores including Rs. 202.15 crores as IDC.

The project was included for bilateral assistance in the Indo-Soviet Protocol signed between Govt. of India and Govt. of USSR during 1988. In accordance with this protocol, the Soviet Experts appraised the Project and found it techno-economically feasible. After disintegration of USSR, Russian Federation has taken all liabilities of former USSR, in respect of Kol Dam Project and Hydro Project Institute, Moscow has submitted draft contracts for preparation of DPR and its construction on TURNKEY basis. Both the proposals were examined and comments of NJPC were sent to HPI, Moscow during Nov. 92. HPI, Moscow has now intimated that financing arrangements of Kol Dam Project will be on the pattern of funding being worked out by them for Tehri HPP, PSP and Koteshwar Scheme. The definite financing proposal is awaited as yet.

The matter regarding transfer of Kol Dam Project to NJPC from HPSEB has been pending for sometime as modalities of transfer could not be worked out so far. The Budget estimate of Kol Dam Project proposed for the year 1992-93 is Rs. 10 crores.

PLANNING AND INVESTIGATIONS OF OTHER HE PROJECTS IN SATLUJ BASIN

NJPC also intends to take up investigations and planning of some very attractive schemes in Satluj basin like 600 MW Karcham Wangtoo HEP, 640 MW Rampur Behna HEP, 1080 MW Suni Dam etc. The Budget estimate for investigations proposed for the year 1992-93 is Rs. 2 crores.

DAMODAR VALLEY CORPORATION

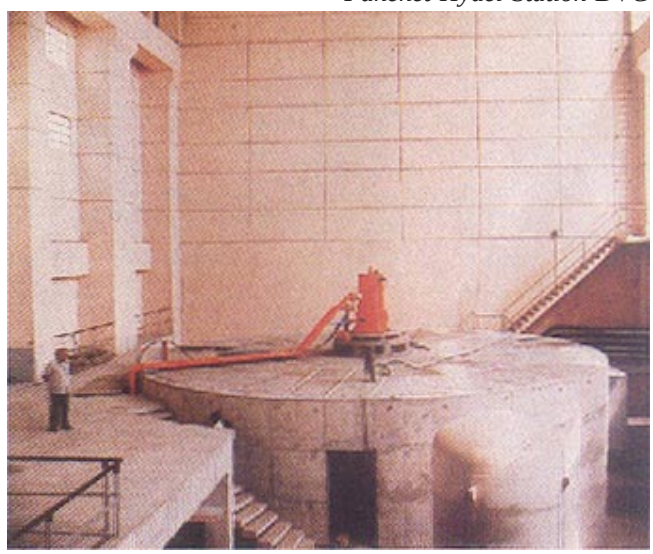
The Damodar Valley Corporation was established in July, 1948 under the Damodar Valley Corporation Act. The Corporation has a full-time Chairman and two part-time Members. The part-time Members represent the States of Bihar and West Bengal.

The Functions of the Corporation include :

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

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

Panchet Hydel Station DVC



The installed capacity (derated) and generation of power during the year 1992-93 upto November 1992 are as follows:

Name of Station	Installed capacity (MW)		Generation in MU upto 30th Nov.'92
A) THERMAL			
1) Bokaro	3x50 - 150		
	1x40 - 40	190	449.249
2) Bokaro 'B'	2x210	420	872.980
3) C.T.P.S.	3x140 - 420		
	3x120 - 360	780	1216.223
4) D.T.P.S.	1x140 -140		
	1x210 - 210	350	490.555
Total Thermal		1740	3029.007
B) GAS			
Gas Turbine Station at Maithon	3x27.5	82.5	47.878
C) HYDEL STATIONS			
1) Tilaiya	2x2	4	2.919
2) Panchet	2x40	80	104.960
3) Maithon	3x20	60	79.081
Total Hydel		144	186.960
Total Generation			**3263.845**

* BTPS 'A' Unit-4 derated to 40 MW from January, 1990.
* Panchet Unit 2 synchronised on 5.3.91 and generated 153.633 MU upto 30.11.92 turbine mode.

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

Work under Progress	Capacity	Target date for completion
a) Generation Project		
1) Bokaro 'B' Thermal Power Station (Stage-II)	(2x210 MW) 420 MW	Unit-II Synchronised on 7.11.90 and on commercial operation from 15.12.91. Unit-III Synchronisation expected in March 1993.
2) Mejia Thermal Power Station	(3x210 MW) 630 MW	Unit-I December '94 Unit-II June, '95 Unit-III Dec, '95
3) Panchet Unit-II (Reversible Pump–Turbine)	1x40 MW 40 MW	First synchronised on 5.3.91. Commercial operation started from 11.4.91 (in Turbine mode)
4) Maithon Right Bank Thermal Power Station (proposed)	4x210 MW 840 MW	The funds for the project are yet to be tied up.
5 (a) Maithon Gas Turbine Station	3x27.5 82.5 MW	After successful synchronisation and completion of trial run and performance test of all the units DVC has since taken over and put to commercial operation. Residual work including Railway siding between Kumardhubi ad GTP site are under execution.
5 (b) Transmission Projects (Major Works)		
1) 220 KV Bokaro 'B' - Jamshedpur line		96% of the work completed. Target within Nov.'92.
2) 220 KV Kalyaneswari Kalipahari Mejia line		22% of the work completed. Target June, 1993.
3) 220 KV CTPS-DTPS-Mejia line		66% of the work completed. Target March, 1993.
4) 132 KV Sindri-Prodhan Khanta line		Completed.
5) 33 KV Ramgarh-West Bokaro line		Forest clearance still awaited.
6) 33 KV West Bokaro-Kalda line		Completed.
7) 33KV line for supply of Power to Karo Special (CCL)		Receiving point not yet finalised by CCL.
8) 220 KV CTPS switchyard (3rd 150 MVA Auto transformer)		82% of the work completed. Target Dec '92.
9) 220 KV Jamshedpur Sub-station (Phase-II)		Completed
10) 220 KV DTPS switchyard (3rd 150 MV Auto transformer)		Completed charged in Aug. '92.
11) 220 KV Kalyaneswari-NTPC line		Line charged in Sept '92
12) 132 KV Konar-Hazaribagh line		28% completed. Target March, '93.
13) 220 KV Kalyaneswari S/Y 2 Nos. bays		40% completed. Target March, '93.
14) 220 KV Purulia		43% completed. Target Aug. '93.
15) 132 KV BASL S/S		
a) 3 Nos.132 KV bays		48% completed. Target 9/93.
b) 1 No. 81.5 MVA Transformer		Transformer charged.

TAIL POOL DAM, PANCHET

Till date about 67% of diversion and river care and 48.5% of concrete cut off wall and 50% of right dyke (W.B. side) pertaining to earth dam and dyke has been completed. Pending completion of the Tail Pool Dam, Panchet Hill Unit-2 (reversible pump-turbine type) which has already been commissioned, will run as conventional unit (Turbine mode) during the monsoon period only.

TRAINING

DVC introduced modern training methods in collaboration with PETS and a Training Institute has been set up at Chandrapura Thermal Power Station to impart training to Graduate Engineers (Trainee) of all disciplines and operatives. In addition officers of different disciplines are sponsored for training in different institutions under Executive Development Scheme for time to time. DVC has scheme to sponsor officers for foreign training under Colombo Plan etc. on need basis.

PETS class room

The Capital Expenditure of DVC is met from its internal resources and is supplemented by Market Borrowing.

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

During the year 1991-92 the net supply on power system amounted to Rs.8.98 crores. The return on Capital and resources employed was 3.62%.

BHAKRA BEAS MANAGEMENT BOARD

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

The installed capacity of the Power Plants is as under :

Sl.No.	Power Houses	Installed capacity (MW)	
1.	Bhakra (Right Bank)	5x132	= 660
2.	Bhakra (Left bank)	5x108	= 540
3.	Ganguwal	2x24+1x29	= 077
4.	Kotla	2x24+1x29	= 077
5.	Dehar	6x165	= 990
6.	Pong	6x60	= 360
	Total		2704

The BBMB also manages the Operation & Maintenance of large transmission system comprising 574.30 circuit Kms. of 400 KV line and 2975.00 circuit Kms of 220 KV lines extending from Bhakra, Pong and Dehar to Delhi passing through Himachal Pradesh, Punjab and Haryana and having three Nos. 400 KV Sub-Stations at Dehar, Panipat and Bhiwani and eighteen 220 KV Sub-Stations at various other places.

INFLOWS INTO THE RESERVOIRS :

(A) Bhakra Reservoir

The maximum reservoir level attained was El. 1679.21' (511.823 mtrs) on 12.9.1992 against the maximum permissible level of 1685.00' (513.588 mtrs). (The Board has reduced the level to El. 1680' (512.064 mtrs) for flood absorption).
The total quantity of water received in the Bhakra Reservoir during the Period April, 1992 to 31st Jan. 1993 was 14.87 MAF (18342 MOM) comprising 11.24 MAF (13864 MOM) of Sutlej water and 3.63 MAF (4478 MOM) of Beas diverted water through BSL system. It is anticipated that during the period Feb. 1993 to 31st March 1993, the Sultej inflows into Bhakra Reservoir would be approximately 0.411 MAF (507 MOM) and Beas diverted water

0.248 MAF(306 MOM) based on dry year pattern of inflows. The total inflows during the previous year were 17.0497 MAF(21030 MOM).

(B) Pong Reservoir

The Maximum reservoir level attained was 1394.65' (425.089 mtrs) on 29.8.92 against the maximum permissible level of 1400.00' (426.672 mtrs). The Board has reduced the level to El. 1390' (423.672 mtrs). The total quantity of water received during the period April 1992 to 31st Jan. 1993 is 8.28 MAF (10213 MOM). It is expected that 0.141 MAF (174 MOM) would be received in Pong Reservoir during the period Feb. 1993 to 31st March 1993 based on dry year pattern of inflows. The total inflows during the previous year were 6.6290 MAF (8177 MOM).

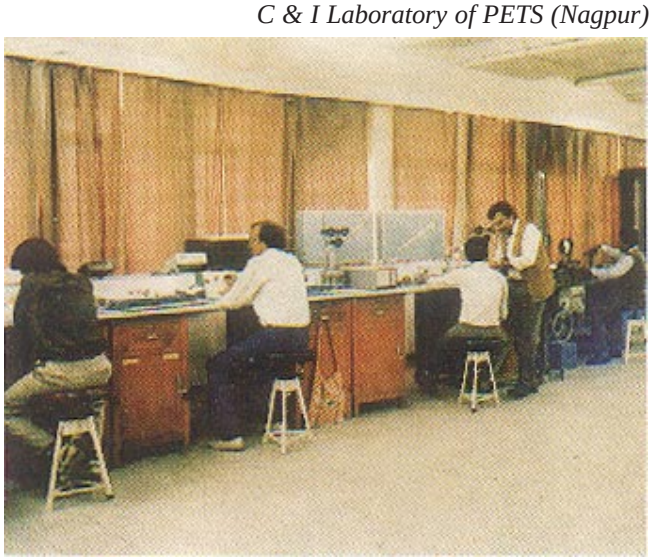
GENERATION

The actual generation from BBMB Power Houses during the period 1st April 1992 to 31st Jan. 1993 was 10902 MUs. The estimated generation during the period Feb. 1993 to March, 1993 would be about 1357 MUs. Thus the total estimated generation from BBMB Power houses during the year 1992-93 would be about 12259 MUs against the generation target of 11010 MUs for the year 1992-93 fixed by C.E.A.

POWER ENGINEERS TRAINING SOCIETY (PETS)

The Power Engineers Training Society (PETS) was established by the Government of India in 1980 to function as national apex body for meeting the training needs of the power sector. The existing four Thermal Power Station Personnel Training Institutes at Neyveli (Tamil Nadu),

C & I Laboratory of PETS (Nagpur)



Durgapur (West Bengal), Badarpur (New Delhi) and Nagpur (Maharashtra) were set up in 1965, 1968, 1974 and 1975, respectively under the overall control of the Central Electricity Authority (CEA). These Institutions were engaged in the training of engineers and operators of thermal power stations. To achieve better coordination of training activities, PETS was formed in 1980 as an autonomous body and all the four Institutes were transferred to PETS. The Power Engineers Training Society has since been organising training programmes for Power Engineers, operators and technicians in its Institutes.

The training courses conducted at the Regional/ Institutes of PETS include the following :

- Induction Level Courses for Graduate Engineers (Thermal/Hydro/Power System)
- Induction Level Courses for Operators (Thermal/Power System)
- Induction Level Courses for Technicians
- Courses on Power Station Chemistry for Chemists
- Short-term courses for Supervisors/Technicians (Mechanical), (Electrical), (Control & Instrumentation).
- Simulator courses for Graduate Engineers/Shift Changer Engineers, Unit controller/Desk Controllers etc.

PETS has been organising training programmes for Power Sector and have trained 34,000 personnel upto march, 1992. The number of persons trained in the different courses at the Institutes during 1992-93 (upto November, 1992) is as follows :

Sl. No.	Courses	No. of Trainees
(1)	Regular Courses for Engineers	155
(2)	Condensed courses for Engineers	29
(3)	Operators courses	150
(4)	Short-term courses for Engineers	458
(5)	Maintenance courses for technicians	471
(6)	On Plant/On-site courses	400
(7)	Simulator courses	269
	Total	1932

The Simulator for 310 MW Units installed with UNDP assistance at Badarpur Institute in 1983, has provided training to more than 2600 engineers by 30th November, 1992.

The following short-term courses/workshops have been organised or proposed to be be organised by PETS:

(i) National Seminar on "Project Management" from 22nd to 24th July, 1992 at New Delhi.

(ii) National Seminar on Pumped Storage Power Plants from 17-19th November, 1992 at New Delhi in collaboration with BEI, U.K.

(iii) Three-day National Seminar on "Management of Thermal Power Station" from 19th to 21st January, 1993 a New Delhi in collaboration with BEI, U.K.

(iv) Three day seminar on "Material Management" at Calcutta from 2nd to 4th March, 1993, in collaboration with Calcutta Electric Supply company is also being organised.

For the current financial year 1992-93, the Ministry of Power has released Rs.134 lakhs as plan and Rs.123 lakhs as Non-Plan grants-in-aid to PETS. The training fee during 1992-93 is targetted to fetch a revenue of Rs.82.44 lakhs.

During 1990-91, the Government has sanctioned schemes for installation of one 500 MW Simulator at Badarpur and one 210 MW Simulator at Nagpur Institutes. Action has already been taken for supply and installation of 500/210 MW Simulators. The schemes are targetted to be completed by July, 1994.

The scheme for Housing complex for Badarpur Institute sanctioned on 26.12.88 at an estimated cost of Rs.345.68 lakhs is in final stage of completion. The revised cost estimate of scheme now works out to be Rs.570.18 lakhs is under consideration for approval.

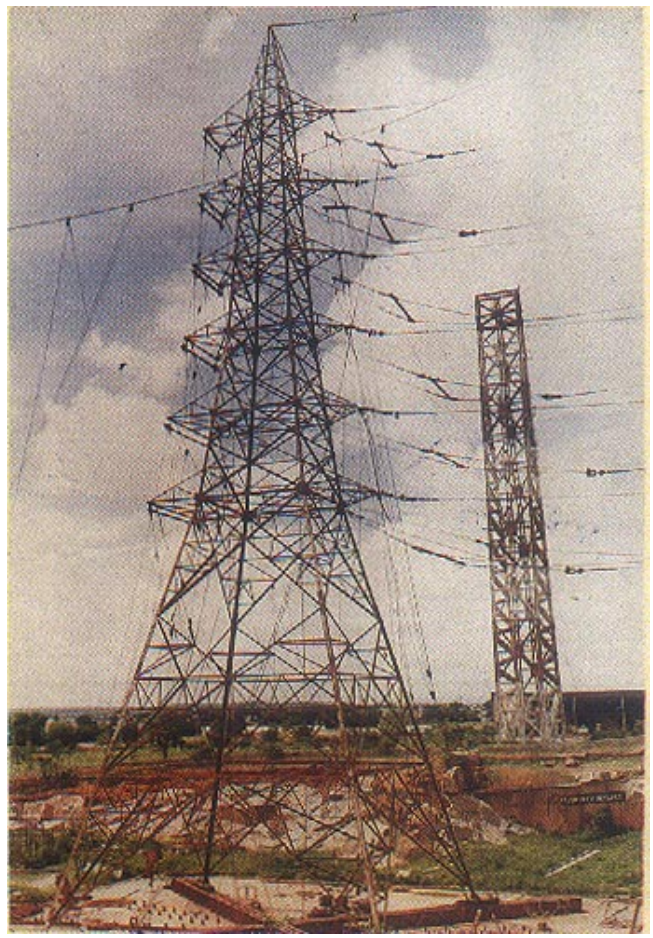
The scheme for conversion of existing Power Engineers Training Society (PETS) into National Power Training Institute (NPTI) was sanctioned in February 1991 at an estimated cost of Rs.1273.14 lakhs. The scheme envisages (a) upgrading the PETS into NPTI and (b) setting up of an institute of Advanced Learning and Management Studies (INALMAS) at Faridabad, Haryana. Pending civil works, various other action required under this scheme such as diversification of courses, standardisation of course material, providing consultancy etc. have been initiated. It has also been got registered on 17.11.92 as a society under the Societies Registration Act, 1860 with the office of Registrar of Firms and Societies, Haryana and it is proposed to transfer the assets/liabilities of PETS to NPTI w.e.f. 1st April, 1993.

TRAINING RESOURCE UNIT

A Training Resources Unit (TRU) is also functioning at PETS HQ to develop training material to meet the training needs of the power sector. During 1992-93, it has published five manuals. Course material for 20 short-term courses on different subjects are in the process of printing. Video Cassettes on 30 different aspects like Management, Computer Applications, Safety Maintenance Workshop Practices in Power Stations etc. have been procured as training aid.

A Computer Cell has been formed at PETS HQ. In order to produce high quality material, Desk Top Publishing System has been installed. PC-LAN System has also been installed for development of computer based learning system, collection of case studies and question bank. As input to the power system courses, computer based power system study packages with 1000 buses and 20 HVDC lines have been installed. Officers from each institute and HQ. have been trained for utilisation of Power System Study Packages.

132 KV testing tower of CPRI, Bangalore



CENTRAL POWER RESEARCH INSTITUTE (CPRI)

The Central Power Research Institute (CPRI) was established in Bangalore by Government of India in 1960 and was re-organised in year 1978, as autonomous society. The main objectives of the Institute are :

- to serve as a national centre for applied research in electrical power engineering
- function as an independent National Testing & Certification Authority for electrical equipment and components and
- to improve, innovate and develop new products in Power Sector.

The Institute has several research laboratories and testing installations engaged in different specialised fields. The Head Office and the main unit - Central Research & Testing Laboratory are located at Bangalore. The other units of CPRI are: Switchgear Testing & Development Station, Bhopal, UHV Research Laboratory, Hyderabad, Thermal Research centre, Nagpur, Regional Testing Laboratory, Muradnagar, Energy Research Laboratory, Thiruvananthapuram, Demonstration Centre for Utilisation of Fly ash for value added products at Raichur.

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

As a result of its R&D efforts, the Institute has been able to develop a number of new products and processes useful to the power sector. These efforts relate to energy saving, power system improvement, profitable utilization of waste products, curtailing distribution losses, etc. Many of the products and processes have been transferred to entrepreneurs for commercial exploitation.

With a view to expose the engineers & scientists in the power sector to the latest developments in the professional field, seminars/workshops on different subjects are organised periodically. During the year Institute organized four national seminars/workshops.

Thirteen technical reports were issued upto 30 November 1992 bringing out the results of R&D investigations carried out. The engineers and scientists of the Institute presented/published a large number of research papers during the year in various symposia/technical Journals in India and abroad.

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

The Institute has tested 4230 samples upto 30 November 1992 and 1437 organizations have availed themselves of the testing and certification facilities during the same period.

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

1990-91	1991-92	1992-93 (upto 31 October 1992)
Rs. 502 lakhs	Rs. 595 lakhs	Rs. 301.45 lakhs

During 1990-91 and 1991-92 the Institute had earned adequate revenue to meet its Non-Plan expenditure. No grant-in-aid was therefore availed from the Government during these years to meet the non-plan expenditure.

The following major capital projects continued to be under various stages of execution by the Institute during the year :

1. 2500 MVA High Power Testing Station (RCE for Rs. 12460.17 lakhs is under consideration in this Ministry)	Rs.9744.00 lakhs
2. UHV Research Laboratory, Hyderabad (RCE for Rs. 2684.45 lakhs is under consideration in this Ministry)	Rs.1705.00 lakhs
3. Thermal Research Centre, Koradi (Nagpur)	Rs. 1718.17 lakhs
4. Regional Testing Laboratory, Muradnagar (UP)	Rs. 636.00 lakhs
5. Second Short Circuit Alternator for STDS Bhopal	Rs. 5067.86 lakhs

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

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

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

In order to popularise its activities, CPRI participated in exhibitions and trade fairs including the India International Trade Fair held at New Delhi. The response from the public, utilities and other organisations in the power sector was overwhelming.

ENERGY MANAGEMENT CENTRE

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

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

ROLE AS COORDINATOR :

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

This is where the Energy Management Centre steps in as a policy group, to guide, promote and coordinate, development of overall strategic vision, supported by quantitative analysis, to improve energy efficiency in the country.

ORGANIZATION OF THE CENTRE :

EMC has been registered as a Society under the Registration of Societies Act, 1860, so that it functions as an independent and autonomous body. This gives it the responsibility and required flexibility to make its operations more dynamic.

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

ACTIVITIES :

- Ten one-week Training of Trainers Programmes organised and Training Modules prepared.
- Institution building and development of network of seven Energy Management Advisory Service Centres through lead agencies.
- Development of a Energy Usage Data Base through energy audits conducted under UNDP and EEC Programmes.
- In 45 Energy Audits under UNDP Project, potential savings of Rs. 45 crores have been identified and annual recurring savings of Rs. 12 crores achieved.
- Creation of general awareness on Energy Conservation through information and promotional campaigns.

ACTIVITIES OF THE CENTRE:

The activities of EMC are as follows:

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

INTERNATIONAL COOPERATION

PROJECTS:

EMC is implementing the following projects:

Multilateral and bilateral aided conservation projects. Under this arrangement, the following projects have been successfully managed:

(i) India-UNDP Project on Energy Audits in Selected Areas

(ii) India-EEO Energy Bus Project

(iii) ESCAP regional Working Group on Energy Conservation

Having successfully and professionally managed the above projects, Energy Management Centre is today entering into new strategic tie-ups with Germany, Sweden, Britain, Finland and organisations such as ADB and World Bank for:

- Technical Assistance
- Technology Demonstration
- Environment Improvement

Expenditure during the year 1991-92 and budget estimates for the year 1992-93

The total expenditure of the EMC during the year 1991-92 was Rs. 105 lakhs besides DOP Agency Projects expenditure of Rs. 83 lakhs. The budget estimates for the year 1992-93 for EMC is Rs. 114.28 lakhs and Agency Projects of Rs. 163 lakhs.

ACC- BABCOCK LIMITED (ABL)

ACC-Babcock Ltd. (ABL), which is one of the two premier boiler manufacturing units in the country, and placed under the administrative control of Ministry of Power as part of IDBI/BIFR package, has been making steady progress in various fields, thereby confirming the confidence posed in it by financial institutions for its revival. During the year the company has made the following achievements:

1. For the first time, since its re-opening in June 1988 the manufacturing units of the company have made operating profits during Nov. '92 & Dec '92 and there are bright prospects that the company will have an overall marginal profit in 1992-93.

2. ABL have successfully bagged a number of orders and as at the end of Dec '92 the company has an outstanding order book position of almost Rs. 730 crores comprising of orders form Calcutta Electric Supply Corporation Ltd. for their 250 MW Budge Budge TPS, supply of 140 TPH boilers for Mangalore Refineries & Petrochemicals Ltd., retrofitting of Electrostatic international competitive bidding) and renovation & modernisation of units 1 & 9 at the Neyveli TPS for the Neyveli Lignite Corporation Ltd.

3. Despite one of their potential resources of realisations from WBPDCL in respect of Bakreswar Project having dried up due to withdrawal of Soviet credit facility, ABL have managed their financial constraints/stringency creditably.

4. The Company has for the first time secured an export order form Al Khaleej Sugar Co. Dubai against stiff competition from other suppliers in India as well as abroad. This will help in improving its image in Export Market.

5. The company has made remarkable progress in the erection & commissioning of following projects which are in advanced stage of completion and commissioning:

i) Kolaghat 1x210 MW Boiler

ii) Bokaro 1x210 MW Boiler

iii) TISCO 1X15 MW Boiler

ELECTRICITY STATISTICS AT A GLANCE

ELECTRICITY - INSTALLED CAPACITY, GENERATION & CONSUMPTION

	Unit	1970-71	71-75	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	90-91*	91-92*
Installed capacity																
Utilities + Non-Utilities	MW	16271	20345	31307	33316	35781	39235	43706	47705	52273	54980	60500	66564	71752	74699	78000
Utilities	MW	14709	18317	28148	30214	32345	35363	39339	42585	46769	49266	54155	59040	63636	66087	69075
Hydro	MW	6383	7529	11384	11791	12173	13056	13856	14460	15472	16196	17265	17798	18308	18754	19194
Nuclear	MW	420	640	640	860	860	860	1095	1095	1330	1330	1330	1565	1565	1565	1735
Thermal (Coal)	MW	7508	9753	15991	17128	18695	20712	23648	26211	28809	30394	34237	37943	41237	43004	44792
Oil&Gas	MW	398	395	433	440	617	735	740	719	1158	1346	1323	1734	2526	2764	3304
Non-Utilities	MW	1562	2028	2859	3102	3436	3872	4367	5120	5504	5714	6345	7524	8116	8612	8925
Generation (U+NU)	BU	61.21	76.68	112.82	119.26	131.12	140.30	150.99	169.21	183.39	201.28	218.98	241.31	268.66	289.44	314.49
Utilities	BU	55.83	70.20	104.63	110.84	122.10	130.26	140.18	156.86	170.35	187.71	202.09	221.40	245.44	264.33	286.99
Hydro	BU	25.25	27.88	45.48	46.54	49.56	48.37	49.95	53.95	51.02	53.84	47.44	57.87	62.12	71.64	72.73
Nuclear	BU	2.42	2.21	2.88	3.00	2.02	2.02	3.55	4.07	4.98	5.02	5.04	5.82	4.63	6.14	5.52
Thermal (Coal)	BU	27.80	39.50	55.72	60.71	68.75	77.91	84.44	96.96	112.54	125.45	145.81	154.90	172.64	178.32	197.16
Oil &Gas	BU	0.36	0.57	0.55	0.59	0.77	1.96	2.24	1.88	1.81	3.40	3.80	2.81	6.05	8.23	11.58
Non-Utilities	BU	5.38	6.46	8.19	8.42	9.02	10.04	10.81	12.35	13.04	13.57	16.89	19.91	23.22	25.11	27.50
Auxiliary Consumption (U+NU)	BU	3.44	4.86	7.35	8.20	9.38	10.21	11.41	13.28	14.84	15.96	18.20	19.64	21.57	22.76	24.38
T&D Losses	BU	9.31	13.56	20.06	21.32	23.59	25.64	27.69	31.21	34.19	37.78	42.23	46.03	53.26	56.52	61.64
Consumption (U+NU)	BU	43.46	58.26	85.39	89.74	98.15	104.45	111.89	124.72	134.36	147.84	158.55	175.64	193.83	210.16	228.49
Industrial	BU	34.33	38.31	53.24	55.40	60.89	61.75	66.55	73.56	79.44	81.95	82.94	92.02	100.37	105.35	110.84
Transport	BU	1.37	1.53	2.30	2.27	2.50	2.83	2.71	2.88	3.00	3.26	3.65	3.80	4.10	4.15	4.50
Agriculture	BU	4.47	7.76	13.45	14.49	15.00	17.82	18.23	20.96	23.47	29.44	35.27	38.88	44.06	50.32	58.10
Domestic Commercial and Services	BU	8.29	10.66	16.40	17.59	19.56	22.25	24.40	27.32	28.42	37.89	36.69	40.94	45.30	50.34	55.05

* Provisional

* Tentative

£ Includes net energy exported to neighbouring countries.