

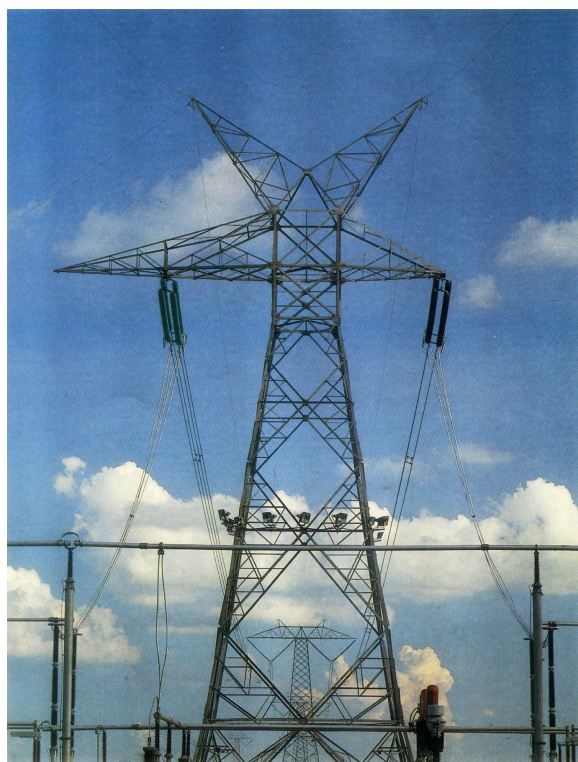


DEPARTMENT OF POWER ANNUAL REPORT 1991-92



सत्यमेव जयते

MINISTRY OF POWER AND
NON-CONVENTIONAL ENERGY SOURCES
GOVERNMENT OF INDIA, NEW DELHI



*HVDC Transmission Tower
Cover Photo - Rihand Super Thermal Power Project of NTPC*

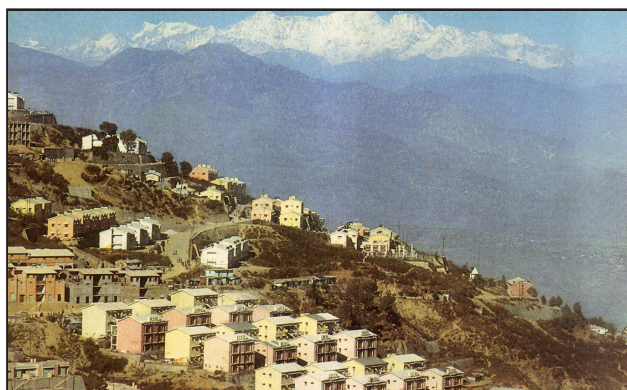
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New Tehri Town



1. DEPARTMENT OF POWER

1.1 ORGANISATION

The Ministry of Energy, comprising the Department of Power, Department of Coal and Department of Non-conventional Energy Sources, was reconstituted in June, 1991, and a new Ministry of Power and Non-conventional Energy Sources was formed comprising the Department of Power and the Department of Non-conventional Energy Sources. Shri Kalyan Singh Kalvi, Minister for Energy and Shri Babanrao Dhakne, Minister of State of Energy, demitted the charge of their offices, on the 20th June, 1991. Shri Kalp Nath Rai took over as Minister of State for Power and Non-conventional Energy Sources (Independent Charge) on the 24th June, 1991.

Shri S. Rajgopal is Secretary in the Department of Power. He is assisted by a Special Secretary and six Joint Secretaries, including the Financial Adviser.

There are six Wings in the Department of Power, each headed by a Joint Secretary. These are :

- I) Energy Management & Administration Wings:
- II) Planning & Coordination Wing:
- III) Thermal Wing:
- IV) Hydel Wing:
- V) Systems & Operation Wing: and
- VI) Finance Wing.

The Central Electricity Authority (CEA), constituted under the Electricity (Supply) Act, 1948, advises the Department 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 Hydro-electric Power Corporation (NHPC), the North-Eastern Electric Power Corporation (NEEPCO), and the National Power Transmission Corporation (NPTC). The NTPC, which was incorporated on the 23rd October, 1989, will henceforth be responsible for all the existing and future transmission projects in the Central Sector and also for the formation of the National Power Grid. Apart from the above organisations, there are two joint venture Power Corporations under the administrative control of the Department 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 Department of Power. The Department of Power also administers the Beas Construction Board (BCB), which is

a construction agency. 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 Department of Power. Programmes of rural electrification are within the purview of the Rural Electrification Corporation (REC). The Power Finance Corporation (PFC) provides term-finance to projects in the power sector.

1.2 FUNCTIONS

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

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 Department of Power.

1.3 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.

2.0 THE YEAR UNDER REVIEW



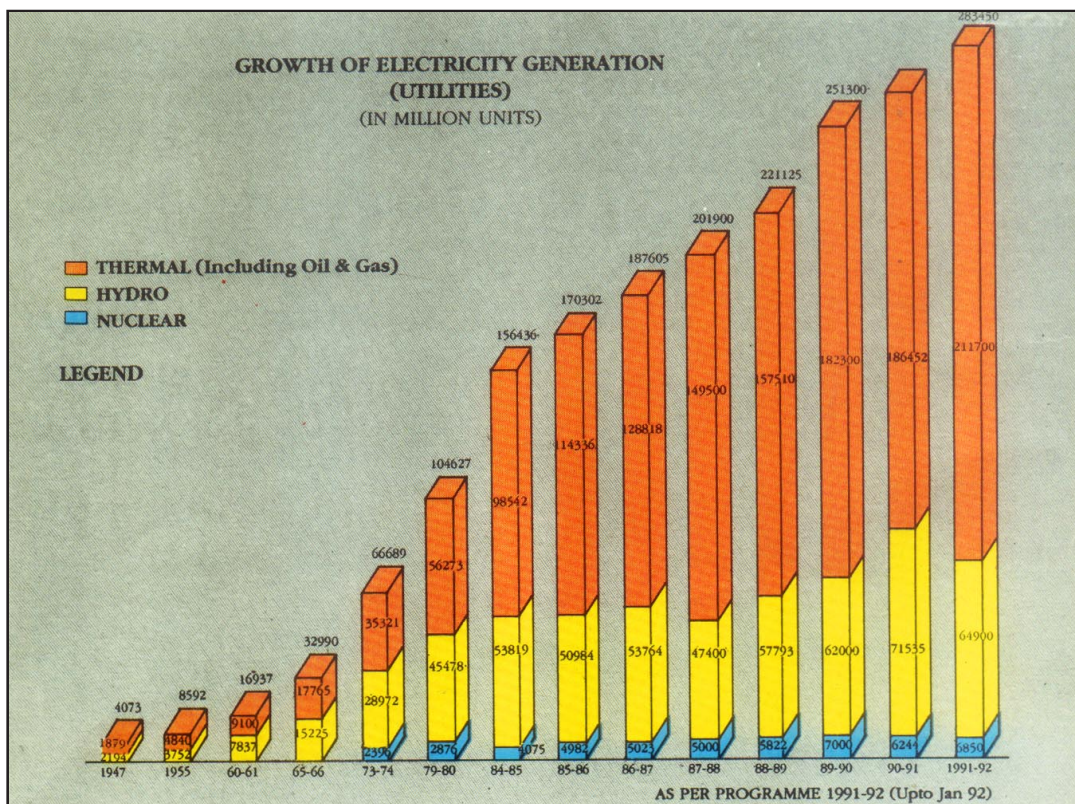
During the year 1991-92 (upto December, 1991) the National Thermal Power Corporation (NTPC) commissioned a total generating capacity of 210 MW, raising its total installed capacity to 10335 MW. The generation from the NTPC power stations during 1991-92 (upto Dec, 91) has been 44190 million units as against the target of generation of 54847 million units for the entire year. As against the target of 860 Ckt Kms of transmission lines, the NTPC completed 775 Ckt Kms of transmission lines (upto Dec, 91). A Memorandum of Understanding (MOU) for the year 1991-92 was signed between the NTPC and the Department of Power. The MOU clearly identifies the performance targets to be achieved by the NTPC during the year with respect to power generation, additional new capacity and construction of transmission lines, apart from laying down the actions to be taken by the Government to enable to the achievement of these targets.

The NTPC qualified for the meritorious productivity award for the year 1991 for achieving high standards of

performance. Four employees of the Vindhyachal STPP were awarded the Prime Minister Shram Bhushan Award in 1991 for their outstanding and meritorious work performance. The NTPC has also won the Company Standardisation Council Award in 1991.

As per the provisional estimates the NTPC earned a net profit of Rs. 700.95 crores during 1991-92.

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 2785.44 million units in 1991-92 (upto Dec, 91) as against the target generation of 2770 million units. The performance of the NHPC's transmission system also exceeded the target during the year under review. Its Jeypore-Talcher transmission system transmitted 404.56 million units of power upto December, 1991 as compared to the target of 304.68 million units during the year 1991-92.



2.1 POWER GENERATION

2.2 HIGHLIGHTS

As a result of favourable monsoon, the generation targets fixed for 1991-92 (upto December, 91) for Hydro, have been exceeded during the period April, 1991 to December, 1991. The Thermal generation was 2.7% less than the programme. However, it was 11.8% more than that of the corresponding period of last year. The Hydro generation during this period was 11.5% more than the programme and 4.4% more than that of last year.

The total energy generation in the country during 1990-91 was 264.231 BUs, showing an increase of 7.8% over the generation in 1989-90. The increase in Thermal generation during 1990-91 over the previous year was 4.4%. The Hydro generation registered an increase of 15.4% during 1990-91 over the last year because of favourable monsoon.

For the year 1991-92, the generation target of 283.450 BUs has been fixed, comprising 211.700 BUs Thermal, 6.850 BUs Nuclear and 64.900 BUs Hydro Power. This envisaged an increase of about 7.2% over the generation achieved during 1990-91.

During the period April, 1991 to December, 1991 the Hydro generation was about 4.4% more than that of last year. This was mainly due to favourable monsoon. The Thermal generation was however 2.7% less than the programme because of backing down due to low system demand, delay in commissioning and stabilisation of certain units and non availability of requisite quantity and quality of coal. The total generation during this period was 211.381 BUs which is 9.01% more than the generation during the corresponding period of the previous year. The actual generation during the period, April 1991 to December, 1991, as compared with the target is given below :-

(Figures in MU)

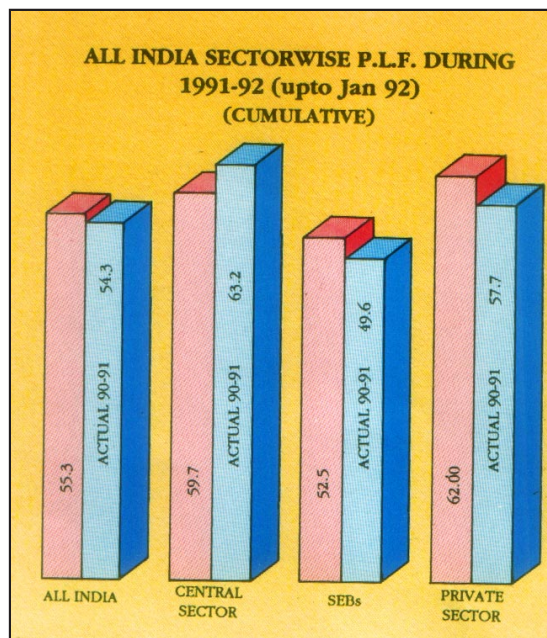
APRIL TO DECEMBER, 1991

Type of Generation	Programme 1991	Actual 1991	%age of the programme	%age of the Corresponding period/ last year
Thermal	154738	150597	97.3	111.6
Nuclear	4593	3943	85.8	82.0
Hydro	50965	56841	111.5	104.4
Total	210296	211381	100.6	109.0

2.3 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 53.2% in 1986-87. During 1987-88, the PLF increased to 56.5% which was the highest achieved in any year. During 1990-91 the PLF was 53.80%. The decrease in PLF during 1990-91 over the previous year was mainly due to favourable monsoon and consequent reduction in demand, particularly in agricultural sector, resulting in low thermal generation. During the period April, 1991 to December, 1991 the PLF has been 53.4%.

During the period April, 1991 to December, 1991, the following State Electricity Board/Corporations achieved PLF higher than the All-India average of 53.4%.





Sl. No.	State Electricity Boards/ Corporations	PLF (%)
1.	Rajasthan	61.0
2.	Punjab	54.9
3.	Gujarat	55.0
4.	Maharashtra	59.6
5.	Andhra Pradesh	57.0
6.	Karnataka Power Corporation	55.1
7.	West Bengal Power Development Corporation	64.1
8.	N.T.P.C.	66.2
9.	Neyveli	63.6
10.	A.E.Co.	68.3
11.	Trombay	54.7
12.	C.E.S.C.	59.7

In the State Sector Anpara Thermal Power Station of UPSEB achieved the highest Plant Load Factor of 69.0% during April, 1991 to December, 1991. In the private sector, Ahmadabad Electric Co, achieved the highest Plant Load Factor of 68.3 during the period. In the central sector Singrauli Super Thermal Power Station of NTPC achieved the highest PLF of 75.6% during this period.

2.4 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 1990 the following power stations received awards under this scheme:-

1. Raichur TPS	2. Vijayawada TPS
3. Tuticorin TPS	4. Bhusawal TPS
5. Gandhi Nagar TPS	6. Anpara TPS
7. Chandrapur (Mah) TPS	8. Korba West TPS
9. Kolaghat TPS	10. Parli TPS
11. Korba East TPS	12. Obra TPS
13. Koradi TPS	14. Singrauli TPS
15. Neyveli-I TPS	16. Neyveli-II TPS
17. Ropar TPS	18. Farakka TPS
19. Bokaro 'B' TPS	20. Badarpur TPS
21. Ukai TPS	22. Ennore TPS
23. Faridabad TPS	

The scheme has been continued in 1991-92 also. A provision of Rs. 250.00 lakhs has been provided in the Revised Estimate. A similar provision of Rs. 350 lakhs has been proposed in the Budget Estimates 1992-93.

During the VIII Five Year Plan 1992-93 to 1996-97, a total of Rs. 12.50 crores is likely to be spent on this scheme assuming an average expenditure of Rs. 2.50 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 VIII Five Year Plan 1992-93 to 1996-97, a total amount of Rs. 12.50 crores is estimated to be incurred assuming an expenditure of Rs. 2.50 crores during each year of the Plan.

2.5 RENOVATION AND MODERNISATION OF THERMAL POWER STATIONS

2.6 R&M PROGRAMME PHASE-I

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

The scheme covers 34 selected thermal power stations comprising 164 thermal units (including 2 units of 55 MW each damaged in fire at Durgapur TPS) aggregating to a total capacity of 13585.5 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 and Rs. 628 crores will have to be financed by the States under State Plan/Own Resources. 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 (CLA) to various State Elec. Boards/Organisations to supplement their efforts.

The Power Finance Corporation have taken over from CEA, the function of releasing CLA fund from 1988-89 onwards. A total amount of Rs. 344.22 crores has been released to various State Electricity Boards/Organisations under Central Loan Assistance upto December, 1991 against a total budgetted outlay of Rs. 435.48 crores. In addition, various State Electricity Board/Organisations

have incurred a total expenditure of Rs. 499.99 crores against total Budgetted allocation of Rs. 971.68 crores under State Plan/Own Resources upto December, 1991.

CEA continues to supervise and monitor the implementation of R&M Programme. The status of implementation of R&M activities is shown in the Exhibit enclosed. Some of the thermal units where substantial R&M works have been carried out, have shown marked improvement in their performances as shown in Table-I.

2.7 R&M PROGRAMME PHASE-II

Keeping in view the benefits being accrued out of the Phase-I R&M Programme during the VII Plan period, its second phase has been launched for completion during 8th Plan period with the objective to achieve 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 201 generating units aggregating to a total capacity of 19980.9 MW, is Rs. 1328 crores (Includes Rs. 68 crores of World Bank Loan Assistance). Of the total 46 schemes of the TPS, 40 schemes covering 174 units aggregating to a capacity of 18706 MW at a total estimated cost of Rs. 1201 crores (includes Rs. 68 crores of World Bank Loan Assistance) have been cleared by CEA and the balance 6 schemes covering 27 units aggregating a capacity of 1274.9 MW at a total tentative cost of Rs. 127 crores are under examination.

The implementation of the schemes has already commenced and a total expenditure of Rs. 5.98 crores has been incurred upto December, 1991.

TABLE-I

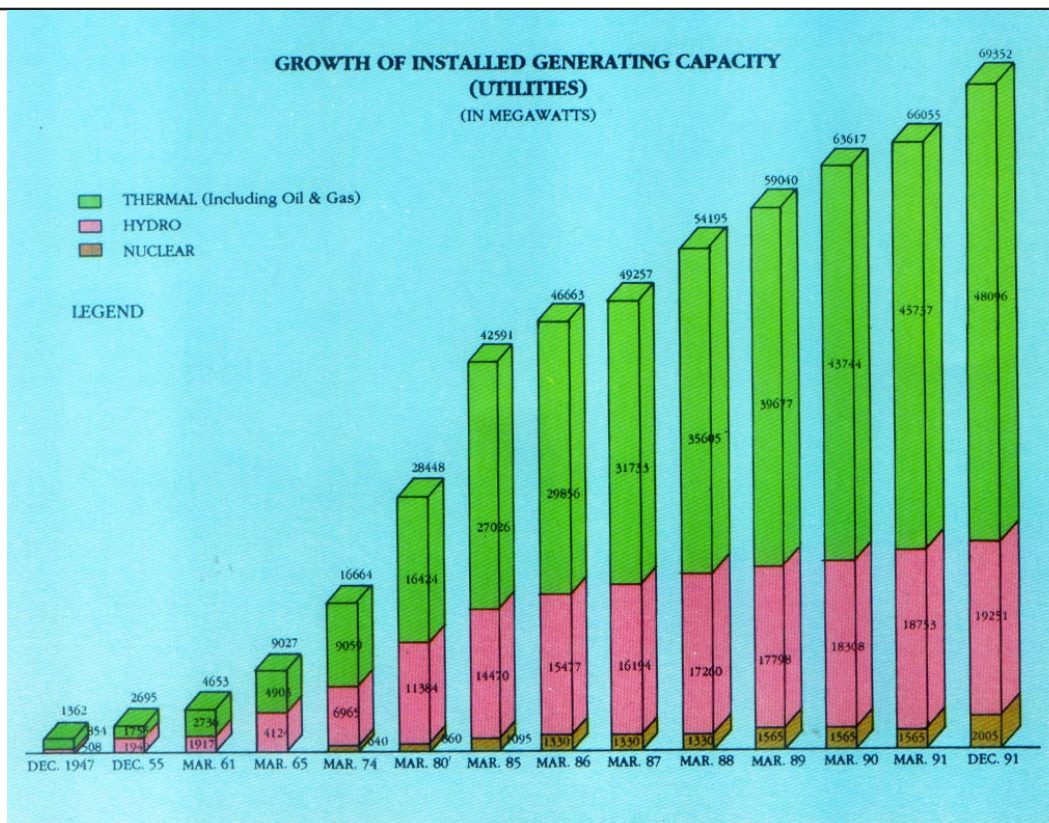
STATEMENT SHOWING IMPROVEMENT IN PLF OF THERMAL UNITS WHERE SUBSTANTIAL R&M WORKS HAVE BEEN CARRIED OUT.

(From 1.4.91 to 31.12.91)

Sl. No.	Name of TPS	Unit Particulars (NO.)	PLF based on present Capacity (%)			Remarks/ Original rated capacity (MW)
			Present Capacity (MW)	PLF/Before Renovation	PLF after carrying out substantial renovation works	
1	2	3	4	5	6	7
1.	Badarpur	1	95	48.1	75.1	100
		2	95	55.7	53.1	100
		3	95	60.2	68.3	100
		4	210	44.2	62.8	—
		5	210	37.0	54.4	—
2.	I.P.	3	62.5	53.5	72.0	—
		4	62.5	49.7	58.2	—
		5	60.0	50.3	69.2	—
3.	Faridabad	1	55	31.4	33.6	60
		2	55	39.8	53.7	60
		3	55	23.0	62.8	60
4.	Bhatinda	2	110	53.0	66.0	—
		3	110	45.7	55.5	—
5.	Obra	2	40	57.1	60.6	50
		6	94	40.3	41.3	100
		8	94	45.9	54.8	100
		9	200	33.3	56.1	—
		10	200	31.4	65.8	—



1	2	3	4	5	6	7
		11	200	28.4	64.3	—
		12	200	40.2	49.9	—
		13	200	35.1	56.4	—
6.	Amarkantak	3	120	39.2	54.2	—
7.	Satpura	1	62.5	51.5	53.6	—
8.	Gandhinagar	1	120	50.1	63.9	—
		2	120	48.2	62.5	—
9.	Dhuvaran	1	63.5	73.6	75.4	—
		3	63.5	71.7	72.2	—
		6	140	64.7	76.3	—
10.	Ukai	1	120	47.0	53.5	—
		2	120	38.7	55.8	—
11.	Koradi	1	115	65.9	74.6	120
		4	115	40.6	74.0	120
12.	Nasik	1	140	55.9	56.6	—
		2	140	51.9	56.7	—
13.	Paras	2	58	58.7	69.5	62.5
14.	Kothagudam	2	60	57.8	78.2	—
		3	60	53.8	62.4	—
		5	105	28.9	56.8	110
		6	105	24.3	50.2	110
		7	110	17.3	36.4	—
15.	Ennore	1	60	51.0	72.0	—
		2	60	48.1	76.5	—
		3	110	33.8	47.8	—
		4	110	25.2	60.5	—
16.	Tuticorin	1	210	46.0	69.8	—
		2	210	47.0	48.5	—
		3	210	40.4	78.5	—
17.	Neyveli	2	50	67.0	83.0	—
		3	50	71.1	81.3	—
		6	50	78.3	80.0	—
		7	100	70.6	76.1	—
		8	100	63.2	65.8	—
		9	95	69.8	87.1	100
18.	Durgapur (DVC)	3	140	39.4	39.7	—
19.	Talcher	1	60	35.1	40.2	62.5
20.	Patratu	1	40	41.0	42.0	50
		2	40	31.5	35.6	50
21.	Santalalidih	3	120	26.7	44.3	—
22.	Bandel	2	80	33.8	44.3	—
23.	DPL	3	70	0.0	24.2	—



2.8 GENERATING CAPACITY ADDITION

2.9 PROGRAMME, ANTICIPATED ACHIVEMENT AND SLIPPAGE DURING/FROM 1991-92:

In all 61 major, medium and small units with aggregate capacity of 3810.8 MW are programmed

for commissioning during the year 1991-92. This capacity comprises 35 hydel, 24 thermal and 2 nuclear units with capacity aggregating to 754.3, 2586.5 and 470 MW respectively. In view of the present status of the execution of the programme 8 hydel and 4 thermal units aggregating to 245.3 MW capacity are anticipated to slip from 1991-92.



Table-II
(All figures in MW)

Capacity Type	Details of item	Central Sector	State Sector	Private Sector	Total
Hydel	i) Prog.	120	634.3	—	754.3
	ii) Ant. Ach.	120	475.0	—	595.0
	iii) Slippage	—	159.3	—	159.3
Thermal	i) Prog.	998	1455	133.5	2586.5
	ii) Ant. Ach.	998	1369	133.5	2500.5
	iii) Slippage	—	86	—	86
Nuclear	i) Prog.	470	—	—	470
	ii) Ant. Ach.	470	—	—	470
	iii) Slippage	—	—	—	—
Total	i) Prog.	1588	2089.3	133.5	3810.5
	ii) Ant. Ach.	1588	1844	133.5	3565.5
	iii) Slippage	—	245.3	—	245.3

Programme & Achievement during April, 1991 to December 1991.

The sectoral break up of the programme and achievement during 1991-92 by type of generation is as under:-

Figures in MW

	Programme during 1991-92			Achievement during 1991-92 (Upto 12/91)		
	Central sector	State sector	Total All India	Central sector	State sector	Total All India
Hydro	120	634.3	754.3	—	91.5	91.5
Thermal	998	1588.5	2586.5	420	343.5	763.5
Nuclear	470	—	470	235	—	235.0
Total	1588	2222.8	3810.8	655	435.0	1090

Table III and Table IV give details of the capacity addition programme for 91-92 and the achievement during April-December 1991.

Table-III

**ELECTRIC POWER GENERATION CAPACITY ADDITION PROGRAMME
FOR THE YEAR 1991-92**

Sl. No.	Name of the Project and Unit No.	H/T/N	State Organisation	Capacity (MW)	Expected date of commissioning
NORTHERN REGION					
1.	Upper Sindh-II-1	H	J&K	35	11/91
2.	Upper Sindh-II-2	H	J&K	35	12/91
3.	Pampore GT St. II-1	T	J&K/PDC	25	2/92
4.	Pampore GT St. II-2	T	J&K/PDC	25	3/92
5.	UBDC-II-2	H	Punjab	15	6/91
6.	UBDC-II-3	H	Punjab	15	8/91
7.	Ropar-5	T	Punjab	210	2/92
8.	Mangrol-I	H	Rajasthan	2	6/91
9.	Mangrol-2	H	Rajasthan	2	7/91
10.	Mangrol-3	H	Rajasthan	2	8/91
11.	Ramgarh GT	T	Rajasthan	3	12/91
12.	Tanakpur-1	H	UP/NHPC	40	1/92
13.	Tanakpur-2	H	UP/NHPC	40	2/92
14.	Tanakpur-3	H	UP/NHPC	40	2/92
15.	Khara-1	H	UP	24	10/91
16.	Khara-2	H	UP	24	11/91
17.	Khara-3	H	UP	24	12/91
18.	National Capital TPP-1	T	UP/NTPC	210	8/91
19.	CCGT Project at Dadri GT-1	T	UP/NTPC	131	11/91
20.	CCGT Project at Dadri GT-2	T	UP/NTPC	121	1/91
21.	Tanda-4	T	UP	110	9/91
22.	Narora-2	N	UP/NPCL	235	7/91
		CENTRAL	STATE	TOTAL	
HYDRO		120	178	298	
THERMAL		472	373	845	
NUCLEAR		235	—	235	
TOTAL (NR)		827	551	1378	
WESTERN REGION					
23.	Kawas CCGT GT-1	T	Guj/NTPC	106	3/92
24.	Gandhinagar-4	T	Gujarat	210	10/91
25.	Vatwa CCGT-2	T	Gujarat	33	7/91
26.	Vatwa CCGT ST-1	T	Gujarat	33	10/91
27.	Utran CCGT GT-1	T	Gujarat	33	9/91
28.	Utran CCGT GT-2	T	Gujarat	33	11/91
29.	Utran CCGT GT-3	T	Gujarat	33	1/92
30.	Bansagar Tons-3	H	MP	105	9/91
31.	Birsinghpur-1	H	MP	20	8/91
32.	Chandrapur-6	T	Maharashtra	500	2/92
33.	Kakrapara-1	N	Guj/NPCL	235	12/91



Sl. No.	Name of the Project and Unit No.	H/T/N	State Organisation	Capacity (MW)	Expected date of commissioning
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	CENTRAL	STATE	TOTAL
HYDRO	–	125	125
THERMAL	106	875	981
NUCLEAR	235	–	235
TOTAL (WR)	341	1000	1341

SOUTHERN REGION

34.	Penna Ahobilam-1	H	AP	10	12/91
35.	Penna Ahobilam-2	H	AP	10	1/92
36.	Nagarjunasagar LBC-1	H	AP	30	9/91
37.	Nagarjunasagar LBC-2	H	AP	30	11/91
38.	Vijjeswaram ST-1	T	AP/APGPCL	33	12/91
39.	Ghatprabha-1	H	Karnataka	16	1/92
40.	Ghatprabha-2	H	Karnataka	16	2/92
41.	Kallada-1	H	Kerala	7.5	12/91
42.	Kallada-2	H	Kerala	7.5	1/92
43.	Neyveli 2nd Mine cut-5	T	TN/NLC	210	12/91
44.	Tuticorin-4	T	Tamil Nadu	210	12/91
45.	Narimanam GT-1	T	Tamil Nadu	5	7/91
46.	Narimanam GT-2	T	Tamil Nadu	5	9/91

	CENTRAL	STATE	TOTAL
HYDRO	–	127	127
THERMAL	210	253	463
NUCLEAR	–	–	–
TOTAL (SR)	210	380	590

EASTERN REGION

47.	Sone Western Canal-1	H	Bihar	1.65	1/92
48.	Sone Western Canal-2	H	Bihar	1.65	2/92
49.	Kahalgaon-1	T	Bihar/NTPC	210	2/92
50.	Rengali-3	H	Orissa	50	2/92
51.	Upper Kolab-4	H	Orissa	80	2/92
52.	CESC Replacement	T	WB	67.5	4/91
53.	Myangchu-1	H	Sikkim	2	1/92
54.	Myangchu-2	H	Sikkim	2	2/92
55.	Upper Rongnichu-1	H	Sikkim	2	1/92
56.	Upper Rongnichu-2	H	Sikkim	2	2/92

	CENTRAL	STATE	TOTAL
HYDRO	–	141.3	141.3
THERMAL	210	67.5	277.5
NUCLEAR	–	–	–
TOTAL (ER)	210	208.8	418.8

Sl. No.	Name of the Project and Unit No.	H/T/N	State Organisation	Capacity (MW)	Expected date of commissioning
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NORTH-EASTERN REGION

57.	Tago-2	H	Ar. Pradesh	1.5	7/91
58.	Tago-3	H	Ar. Pradesh	1.5	9/91
59.	Lakwa GT PH-II-5	T	Assam	20	3/92
60.	Umiam Umtru IV-2	H	Meghalaya	30	1/92
61.	Umiam Umtru IV-1	H	Meghalaya	30	2/92

	CENTRAL	STATE	TOTAL
HYDRO	—	63	63
THERMAL	—	20	20
NUCLEAR	—	—	—
TOTAL (NER)	—	83	83

	CENTRAL	STATE	TOTAL
HYDRO	120	634.3	754.3
THERMAL	998	1588.5	2586.5
NUCLEAR	470	—	470
ALL INDIA	1588	2222.8	3810.8

Note : The programme excludes mini/micro hydel capacity.

A dusk view of Singrauli

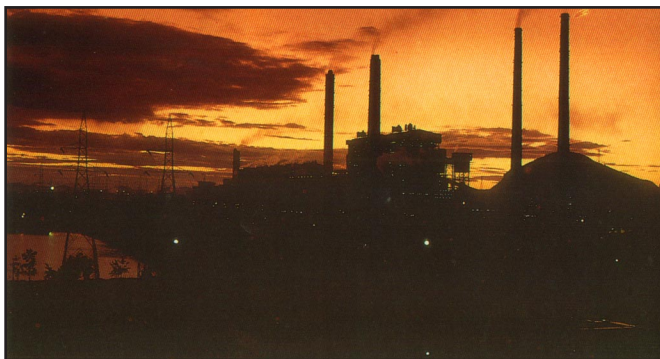




Table-IV

CAPACITY ADDITION DURING APRIL-DECEMBER 1991

Sl. No.	Name of the Project	Unit No.	Capacity (MW)	State/ Executing Agency	Remarks
HYDRO					
1.	UBDC-II	2	15	Punjab/PSEB	Rolled on 10.6.91
2.	UBDC-II	3	15	Punjab/PSEB	Rolled on 12.12.91
3.	Suratgarh	1*	2	Raj/RSEB	Rolled on 28.6.91
4.	Suratgarh	2*	2	Raj/RSEB	Rolled on 28.6.91
5.	Mangrol	1	2	Raj/RSEB	Rolled on 25.7.91
6.	Mangrol	2	2	Raj/RSEB	Rolled on 23.7.91
7.	Mangrol	3	2	Raj/RSEB	Rolled on 27.7.91
8.	Birsinghpur	1	20	MP/MPEB	Rolled on 14.8.91
9.	Nil Sagar LBC	1	30	AP/APSEB	Rolled on 11.9.91
10.	Tago	2	1.5	Ar. Pradesh	Commissioned on 7.8.91
	TOTAL (H)		91.5		
THERMAL					
1.	National Capital TPP	1	210	UP/NTPC	Commissioned on 24.10.91
2.	Vetwa CCGT	2	33	Guj/AE Co.	Commissioned on 26.6.91
3.	Vetwa CCGT	St. 1	33	Guj/GEB	Commissioned on 18.10.91
4.	Gandhinagar	4	210	Guj/GEB	Commissioned on 20.7.91
5.	CESC Rept.	2	67.5	WB/CESC	Commissioned on 10.4.91
6.	Neyveli M. Cut	5	210	TN/NLC	Commissioned on 30.12.91
	TOTAL (T)		763.5		
NUCLEAR					
1.	Narora	2	235	UP/DAE	Critical on 24.10.1991
	Total (N)		235		
	Total (H+T+N)		1090		

*Outside the Programme for 1991-92

2.10 TRANSMISSION

Transmission line projects continue to be accorded high priority in the context of the need to evacuate power from the Central Generating Stations to the beneficiary states. The programmes for 1991-92 included construction of 2878 Ckt. Km. of 400 KV lines and 3252 Ckt. km. of 220 KV lines alongwith the associated sub-stations.

The progress achieved during the year 1991-92 (upto December, 91) in the construction of transmission lines and sub-stations is summarised below :-

400 KV	1614 Ckt. km.
220 KV	2266 Ckt. km.
400 Kv Sub-station	2520 KVA
220 KV Sub-station	2150 KVA

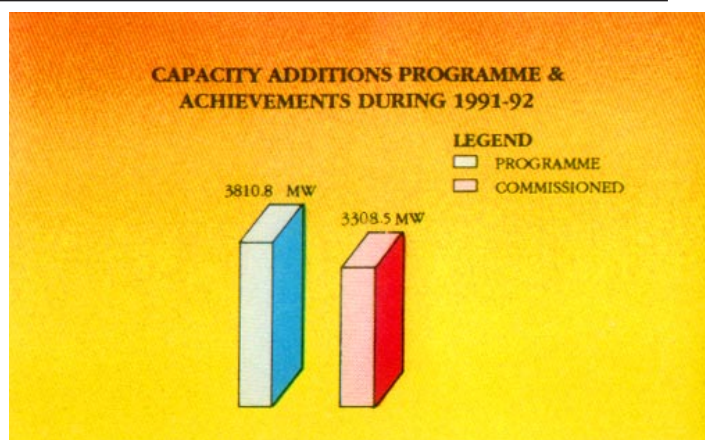
2.11 CENTRAL SECTOR TRANSMISSION SYSTEMS

Central Sector Transmission lines and sub-stations completed during the year 1991-92 (upto December, 91) are listed in the following table :

Transmission Lines	Executing Agency	Length Ckt.km.	Total
400 KV			
1. Gooty-Banglore S/C	NPTC	382	
2. Vijaywada-Gazuwaka S/C	NPTC	332	
3. Maithen-Jamshedpur D/C	NPTC	306	
4. Agra-Ballabgrah S/C	NPTC	182	
5. Ramagundam-Khammam S/C	NPTC	189	1311
220 KV			
1. LILO of Ukai-Valtaan lines at Kakarpara APP D/C	NPC	8	
2. Parulia-DSP 3 Ckts.	DVC	45	53
Sub-stations	Executing Agency	KVA	Total
400 KVA			
1. Gooty	NPTC	315	
2. Vijayawada	NPTC	315	
3. Gazuwaka	NPTC	315	
4. Biharshariff	NPTC	315	
5. Mandaula	NPTC	630	1890

The National Power Transmission Corporation (NPTC) is now executing the transmission projects associated with the generation projects of NTPC, NHPC and NEEPCO. An HVDC back-to-back link between Vindhyachal and Singrauli Super Thermal Power Stations as well as the first ± 500 KV HVDC bi-pole line from Rihand to Dadri have already been put into operation by NTPC. The schemes for providing a 1000 MW HVDC back-to-back tie between Chandrapur (in Western Region) and Ramagundam (in Southern Region) has been accorded approval of the PIB, and preliminary work has been taken up. Besides this, a scheme for providing a 500 MW HVDC back-to-back tie between Jeypore (in Eastern Region) and Gazuwaka (in Southern Region) is under process for investment approval. Both these projects will be taken up for execution by NPTC.

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 are introduced in 1969.



During the year 1991-92 (upto December, 91) the 400 KV Kolaghat - Rengali inter-state link was completed.

2.12 TRANSMISSION & DISTRIBUTION LOSSES

The average All-India transmission & 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 schemes, the SEBs/Elec. Deptts. and their Distribution Divisions which achieve a prescribed minimum reduction in T&D losses are given awards. In addition, they are given shields on the basis of their performance in reduction in energy losses and Chairmen/Heads of the concerned Elec. Boards/Deptts. are given Gold Medals. Individuals as well as institutions or organisations, who develop scientific devices or put forward practical suggestions for reduction of T&D losses also qualify for cash awards.

During the year 1991-92 Gold Medals and Shields for the year 1989-90 were awarded to State Elec. Board/Elec. Deptt. of Karnataka and Chandigarh. In addition, cash awards were given to Chandigarh, Indore distribution division of MPEB and 13 distribution divisions of Gujarat Elec. Board. Also Shields were awarded to Valsad City distribution division of GEB and Indore distribution division of MPEB.

2.13 INTERGRATED OPERATION

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 available in the country.



The Inter-State/Inter-Regional Assistance of Energy effected during the period April, 1991 to December, 1991 are listed below :

INTER-STATE/INTER-REGIONAL ASSISTANCE OF ENERGY

(All Figures in MU)

STATE	Assistance from	ASSISTANCE Dec.1991	Apr.91-Dec.91
Northern Region			
CHANDIGARH	Punjab	0.0	0.0
	H.P.	0.0	0.0
	S.S.T.P.S.	7.9	68.2
DELHI	B.B.M.B.	0.3	23.1
	Punjab	0.0	36.2
	H.P.	0.0	356.5
HARYANA	H.P.	0.0	42.8
	Punjab	1.2	45.0
	U.P.	19.7	92.9
	S.S.T.P.S.	10.8	20.4
J&K	S.S.T.P.S.	35.4	214.1
	B.B.M.B.	3.1	7.1
PUNJAB	H.P.	0.0	0.0
RAJASTHAN	H.P.	0.0	41.4
	Punjab	48.4	217.3
	M.P.	8.7	47.1
U.P.	B.B.M.B.	14.3	77.6
	H.P.	0.0	2.4
S.S.T.P.S.	Vindhyachal STPS	27.7	211.6
B.B.M.B.	S.S.T.P.S.	0.0	49.6
	Rihand	0.0	24.1
Western Region			
Gujarat	Maharashtra	87.6	698.6
	N.R.	4.5	95.2
	S.R.	0.0	20.7
	Rajasthan	0.0	62.5
M.P.	A.P.	4.9	43.3
	N.R.	32.6	323.8
	S.R.	0.0	27.2
	Gujarat	0.3	55.0
Maharashtra	Karnataka	0.0	0.0
	N.R.	0.0	10.2
	S.R.	0.0	8.1

Goa	Maharashtra	17.0	143.2
Daman DIU & Dadar Nagar			
Haveli	Gujarat	23.8	177.4
Southern Region			
A.P.	Karnataka	0.0	1.4
	Maharashtra	0.0	142.1
	M.P.	4.3	29.0
	Orissa	0.0	24.1
Karnataka	A.P.	0.0	0.0
	Kerala	0.0	0.0
	T.N.	0.0	0.0
	Maharashtra	0.0	0.4
Kerala	Karnataka	0.0	0.0
	TN	0.0	10.05
Tamil Nadu	Kerala	0.0	0.0
Eastern Region			
Bihar	West Bengal	0.0	0.0
	Orissa	0.0	0.0
	NTPC (SSTPS)	0.0	2.2
	NTPC (ANTA)	20.7	254.5
	NTPC (AURAIYA)	43.2	435.7
D.V.C.	Bihar	0.0	0.0
	Orissa	0.0	0.0
	West Bengal	0.0	0.0
Orissa	Bihar	0.0	0.0
	West Bengal	0.0	0.0
	NALCO	66.9	327.0
	ICCL	49.8	109.5
	R.S.P.	0.0	1.2
	A.P.	0.0	0.0
	M.P.	0.0	24.9
West Bengal	Orissa	0.0	0.0
	Bihar	0.0	0.0
	NER (Assam)	6.2	21.9
N.E. Region			
Assam	Eastern Region	11.0	30.7

2.14 DEVELOPMENT OF A NATIONAL POWER GRID

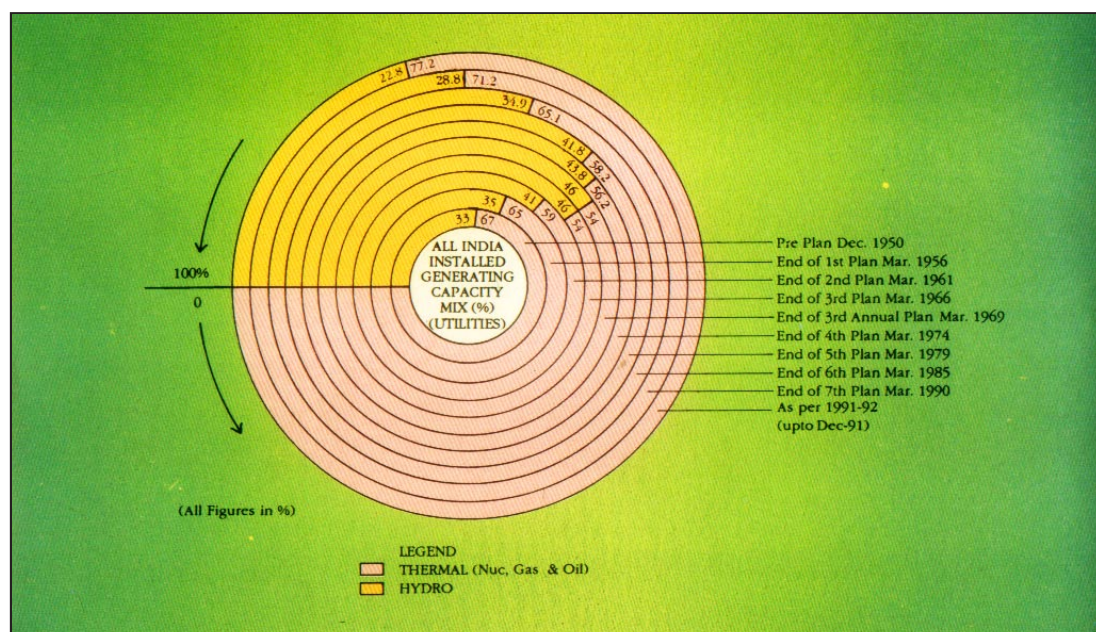
The setting up of a National Power Grid is an evolutionary Process. To achieve this objective, the strengthening and the improvement of the Regional Power Grids and their progressive integration through the setting up of inter-State transmission lines and Central Sector transmission projects which cut across State boundaries was continued

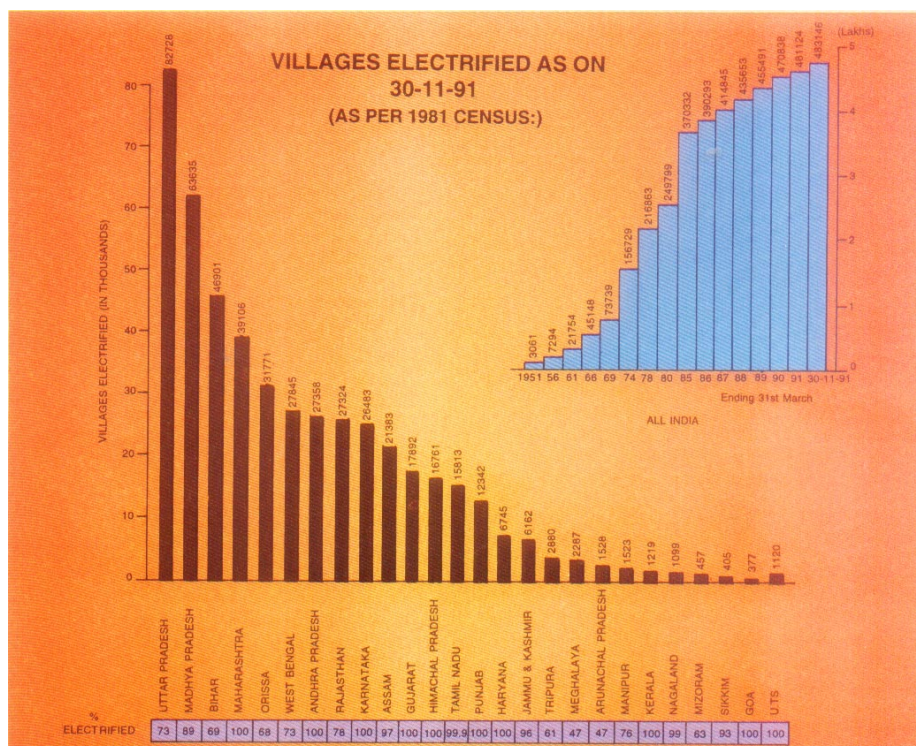
during the year. These projects, alongwith the 400 KV and 220 KV transmission systems being constructed in the Central sector are expected to constitute the basic structure of the National Power Grid. In order to accelerate the process of the formation of the Grid, the National Power Transmission Corporation set up under Department of Power in October, 1989 has started taking over the construction, ownership, operation and maintenance of the works relating to transmission and associated sub-stations from various Central power generating public undertakings in a phased manner to ensure a better integrated grid-operation and delivery of power from the central generating stations to the respective beneficiary States.

2.15 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.

To coordinate the operations of the grids of the constituent power systems and to optimise utilisation of the existing generation capacity, Regional Load Despatch Centres have been set up in each region which function under the respective Regional Electricity Boards. The Central Electricity Authority exercises overall supervisions over the Regional Load Despatch Centres (RLDCs). In the Northern, Western and Eastern regions, permanent Regional Load Despatch Centres equipped with computer based telemetry and data acquisition systems have already been established. The existing facilities in the Southern Region are proposed to be modernised based on the study and recommendations made by the Consultant M/s EdF, International. The consultants have submitted a detailed project report and technical specifications to modernise Southern Regional Load Despatch Centre. A scheme based on the above Project Report is being processed for techno-economic clearance of Central Electricity Authority. In the North-Eastern Region, an interim load despatch centre is operating. A proposal to set up a permanent RLDC with modern facilities in the North-Eastern Region is already



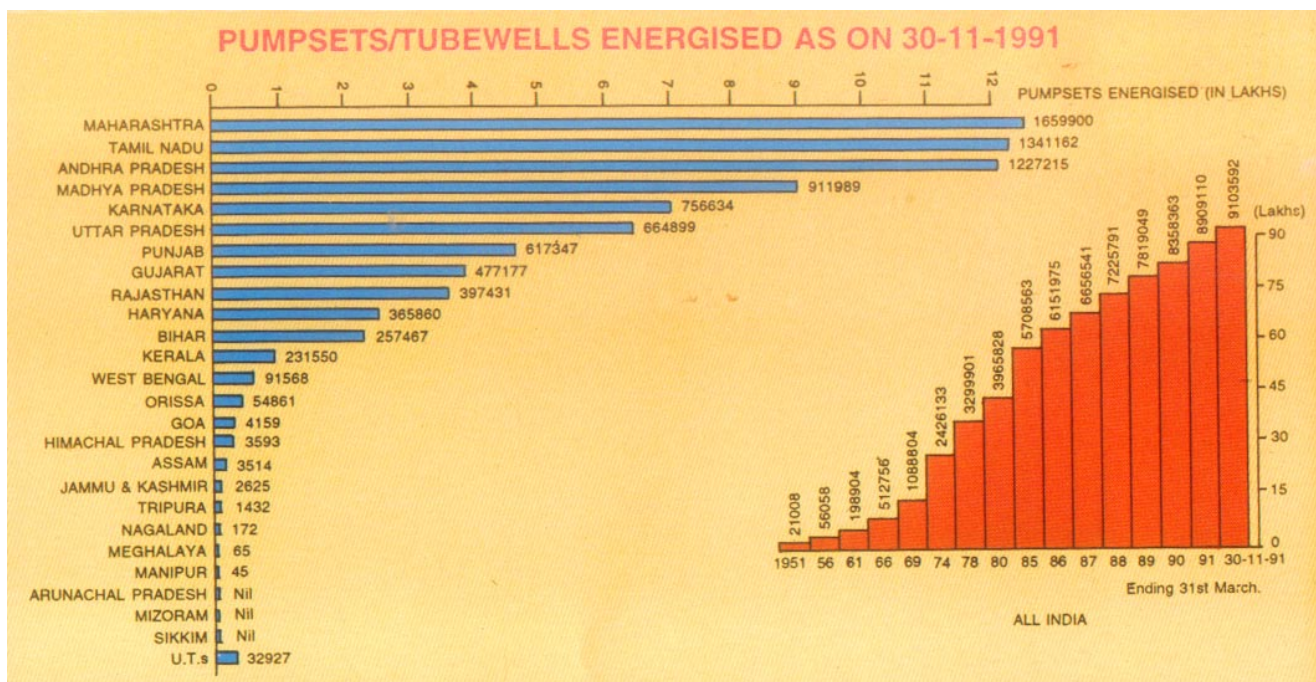


In an advanced stage and is expected to be implemented during the VIII Plan. It is proposed to take up a similar unified scheme for the establishment of long term RLDC and augmentation of existing system in the Northern Region.

2.16 MASTER TELECOM PLAN FOR INDIAN POWER SECTOR

The work of preparing a Master Telecom Plan for Indian Power Sector covering all power utilities, and Regional Electricity Boards, was awarded to M/s. Merz & Maclellan, U.K. in association with M/s. Bharat Electronics Limited, India in November, 1987. The report of the consultants has been made available to CEA in three phases and the same has been sent to concerned utilities to initiate the process of

implementation. The project reports for the independent dedicated telecom system for the State Electricity Boards of Punjab (Phase I), Kerala, Gujarat, Madhya Pradesh, Maharashtra (Phase I and Phase II), Orissa, Uttar Pradesh, Himachal Pradesh and North-Eastern Region have already been appraised by CEA. Department of Telecommunications (DOT) has been requested by CEA on behalf of the power utilities to accord their clearance for the dedicated multi-channel links by the power utilities. They have already approved the multi-channel links (Optical Fibre/Digital Microwave) for Punjab State Electricity Board, Gujarat Electricity Board & North-Eastern Region. Towards implementation of the schemes, Power utilities have already started undertaking Radio/Site surveys.



2.17 UPGRADING OF TECHNOLOGY

2.18 NEXT HIGHER AC 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 bring 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/Undertakings, 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 Group and 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.

2.19 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 Bearoor (M.P.) is being taken up for

conversion from AC to DC link. The project is being implemented in two phases. 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 and there is continuous flow of 100 MW power on this link since 20th October, 1991. The second phase has already been approved by the HVDC Hardware Development Committee and the revised cost estimates of the same are under finalisation.

Rihand-Delhi HVDC Transmission line 500 KV 1500 MW Bipole: This HVDC Bipole transmission project envisages transmission of 1500 MW of power from Rihand complex to Dadri (near Delhi) over a distance of about 820 kms. The project is being executed by M/s BHEL in collaboration with M/s ASRA, Sweden. The complete equipment for the first pole has been supplied by M/s. ABB, Sweden and for second pole, the equipment has been jointly supplied by M/s ABB & BHEL.

One pole of the Rihand-Delhi HVDC transmission system was commissioned in December, 1990 and is now under commercial operation. The restoration work on the other pole damaged in a fire incident, was completed and the pole has been in operation since December, 1991.



2.20 POWER & TELECOMMUNICATION CO-ORDINATION (PTCC)

During the year 1991-92, CEA have recommended 74 cases to DOT for issue of necessary clearance by them so that the transmission lines could be energised. CEA engineers were associated in the Low Frequency Induction tests carried out on Gooty-Bangalore and Talaguppa-Shimaga 400 KV transmission lines. CEA have also provided consultancy services to Bihar State Electricity Board in processing on computer PTCC cases. During the year three meetings were organised at Delhi, Bangalore & Patna for sorting out outstanding issues related to PTCC clearance. These meetings were attended by higher level officers from CEA, DOT and SEBs/Power Utilities.

2.21 RURAL ELECTRIFICATION PROGRAMME

During the year 1991-92, 2022 inhabited villages were declared as electrified and 194482 pumpsets energised as on 30.11.1991, against the target of 5787 villages electrification and 234530 pumpsets energisation respectively, for the year as a whole. Cumulatively, 483146 villages have been electrified and 9103592 pumpsets have been energised as on 30.11.1991. Cumulative progress of rural electrification both in terms of villages electrified and pumpsets energised as at the end of Five Year/Annual Plan is reflected in the charts at pages 18 & 19.

As regards to the electrification of tribal villages, out of a total of 111886 tribal villages in the country, 73532 villages constituting 65.7% have been electrified as on 30.11.1991. Similarly, 245583 Harijan Bastis have been electrified.

2.22 SEVENTH FIVE YEAR PALN

The salient features of the approved power programme during the Seventh Plan (1985-90) were:

- Induction of an additional generating capacity of 22,245 MW as follows:-

Thermal	15,999 MW
Hydro	5,541 MW
Nuclear	705 MW
	22,245 MW
- Construction of associated transmission and distribution facilities corresponding to the addition of 22,245 MW generating capacity.

- Electrification of 1.18 lakh villages and energisation of 23.9 lakhs pump-sets.
- Implementation of programmes of renovation and modernisation, research and development, energy conservation etc.

The achievement of the Seventh plan power programme has been impressive. An additional generating capacity of 21,401 MW comprising 17,104 MW of thermal, 3827 MW of hydro and 470 MW nuclear, has been installed, achievement being 96.2% of the target of the Seventh Plan. A 250 MW back-to-back HVDC line has been established at Vindhychal. About 13,800 Ckt. Kms of 400 KV and 13600 Ckt Kms of 220 KV lines have been added to the transmission and distribution network in the country. Electrification of 100494 villages and energisation of 26.41 lakhs of pumpsets was completed in the Seventh Plan.

A total allocation of Rs. 34273.92 crores was made in the seventh plan for the power sector against which the expenditure was Rs. 37404.19 crores (tentative), the details of which are given below :-

	(Rs. in crores)	
	Approved outlay	Actual Expenditure (Anticipated)
States	22784.18	20757.04
UTs	437.74	929.15
Centre	11052.00	15718.00*
	34273.92	37404.19

(This includes Rs. 430.00 crores for PFC also)

2.23 PROGRAMME FOR ADDITIONS TO GENERATING CAPACITY DURING 1990-91:

A target of 4212 MW was fixed for addition of installed generating capacity during the year 1990-91. The details are given below :

	(All Figures in MW)		
Type	Central Sector	State Sector	Total All India
Hydro	–	1006.5	1006.5
Thermal	732	2238.5	2970.5
Nuclear	235	–	235.0
Total:	967	3245.0	4212.0

Achievement during 1990-91:

Against the programme of 4212 MW a capacity of 2776.5 MW was commissioned/rolled during the year 1990-91. The details are given below :

Type	Central Sector	State Sector	Total
Hydro	–	445.5	445.5
Thermal	732	1599	2331
Nuclear	–	–	–
Total :	732	2044.5	2776.5

2.24 FOURTEENTH ELECTRIC POWER SURVEY COMMITTEE

The Fourteenth Power Survey Committee was set up in February, 1989, under the chairmanship of Chairman, CEA to review demand projections in details keeping in view the Eighth Plan proposals and to project the perspective demand in the country upto 2009-10. The committee submitted its report in March 1991.

2.25 INDO-SOVIET WORKING GROUP ON POWER

The Fourteenth meeting of the Indo-Soviet Working Group on Power was held in New Delhi from April 1-5, 1991. The Soviet side was led by Mr. A.P. Poddubsky, Deputy Minister for Power & Electrification, USSR, and the Indian side was led by Shri S. Rajgopal, Secretary, Department of Power.

The Working Group reviewed the progress of the Soviet assisted thermal power projects in India viz., Vindhyachal, Kahalgaon, Kayamkulam, Maithon Right Bank, Mangalore, Bakreswar and hydro projects viz., Tehri and Kol Dam. The Working Group also reviewed the progress of transmission lines such as Dulhasti-Kishenpur-Srinagar, Vindhayachal-Bina-Nagda and Vindhyacahl-Jabalpur-Itarsi. Both the sides identified measures to remove the bottle-necks and difficulties, which are encountered in project implementation, within the stipulated time schedules.

The other areas in the field of Indo-Soviet co-operation considered by the Working Group included maintenance, repair and modernisation of the Soviet made equipment installed at power stations in India, scientific and technical co-operation, training programmes, supply of BHEL equipment/services to Soviet assisted projects in India/third countries, consultancy in tidal power development and energy management.

2.26 PARTICIPATION IN PROJECTS OUTSIDE INDIA CHUKHA HYDEL PROJECT, BHUTAN

From the Chukha Hydel Project, the Royal Government of Bhutan earned a revenue of over Rs. 160 crores by December, 1991 by way of sale of power to India, besides supplying power for internal consumption of Bhutan. The project has recovered more than 60% of the Project cost by sale of power to India. Encouraged by the successful operation of the Project, a Memorandum of Understanding was signed between Government of India and the Royal Government of Bhutan for investigations and preparation of a detailed Project Reports for Chukha Stage-II (Tala Hydroelectric Project-1000 MW) and Chukha Stage-III (Wangchu Reservoir Scheme - 175 MW) downstream of the existing Chukha Project, in February, 1991. The Project, when taken up, would benefit the two countries. While India would get peaking power for the Eastern Region, Bhutan, on the other hand would be able to earn substantial revenue by sale of power to India.

2.27 FOREIGN EXCHANGE

The Department of Power is responsible for the release of foreign exchange for import of equipment and spare parts required for the operation and maintenance of power stations in the country. It also assesses the need to engage foreign experts for power utilities, both in the public and private sector. Foreign Exchange of Rs. 63.65 crores under free resources was released upto January, 31, 1992 for import of equipment and spares and also for engaging foreign experts. Foreign exchange equivalent to Rs. 2.28 Crores was also released to power utilities for the import of emergency spares.

Under various lines of credit, foreign exchange equivalent to Rs. 158.92 crores, as detailed below, was released for import of equipment during the year, upto January 31, 1992.

Sl. No.	Project	Foreign Exchange released (Rs. in crores)	Line of Credit
1.	Shravati H.E. Project (Epoxy Coil winding)	0.89	World Bank Loan IBRD
2.	Bhakra Right Bank Power Plant, (BBMB) (Material for renovation/replacement)	56.62	Indo Soviet Trade Plan



Sl. No.	Project	Foreign Exchange released (Rs. in crores)	Line of Credit
3.	Thermal Power Generation Station, Trombay (TATA) (Import of Electrode Cell for electrochlorination Plant).	0.48	IBRD Loan No. 2452 IN.
4.	Kathal Guri Mariani Project (NEEPCO) Assam (Import of structural Steel for Transmission Towers)	1.40	OECE Loan No. IDP-46
5.	Srisallam HEP, APSEB (Import of 6x150 MW Generating equipment).	50.37	OECE Loan No. IDP-46
6.	Ujjaini HEP. Govt. of Maharashtra, Irrigation Department (Import of additional spares of reversible plant).	0.43	OECE Loan No. IDP-34
7.	NEEPCO, Import of structural steel for 400 KV O/C Mariani Malda Line and Kathal Guri Mariani section, associated with Assam Gas based combined Cycle Power Project.	20.14	OECE Loan No. IDP-42/46
8.	Farakka Super Thermal Power Project	1.68	Loan No. 2442-IN.
9.	Vindhyachal Super Thermal Power Project	0.37	Soviet Credit.
10.	Rihand Super Thermal Power Project	2.94	KFW Loan
11.	Rihand Super Thermal Power Project	0.04	IBRD Loan No. 2555-IN
12.	Talcher Super Thermal Power Project	1.64	IBRD Loan No. 2845-IN
13.	Talcher Super Thermal Power Project	2.19	IBRD Loan No. 2845-IN
14.	Gas Based Combined Power Project, Anta	1.84	IBRD Loan No. 2674-IN
15.	Kayamkulam and Mangalore	17.89	Soviet Credit.
Total:		158.92	

Sanctions for engaging a total of 62 foreign experts for various power projects were also issued during this period.

2.28 ENERGY CONSERVATION

Confronted as we are with the increasing energy shortages on the one hand and scarcity of investible resources on the other, the most cost effective option available to the country for bridging the gap between the demand and supply for energy is Energy Demand Management and Conservation. Energy Conservation has accordingly been identified by the Department of Power as one of the thrust areas for the Eighth Five Year Plan. It is aimed to improve the efficiency of existing supply base and reduce the energy consumption in the energy intensive units through various measures. The Department of Power functions as the nodal point for facilitating the implementation of a coordinated strategy on Energy Conservation. The Energy Management Centre (EMC) acts as its executive agency.

The strategy being followed is the promotion of energy conservation in energy intensive sectors by assessing the efficiency of energy use through energy audits, evolving action plan for reducing the level of energy consumption per unit of production, and monitoring the targets. Measures taken in the industrial and other core sectors of the economy include the promotion of energy savings through introduction of efficient technologies & demonstration projects, fiscal incentives and standardisation of electrical equipment. Studies have been undertaken to evaluate specific technical and policy options, training of professionals to create a cadre of energy managers and auditors, and education of consumers through publicity campaign.

During the Eighth Plan, the strategy proposed is to make energy conservation a mass movement, encourage consumers to undertake energy audits and to start demonstration projects, besides intensifying the other connected activities.

2. AWARENESS PROGRAMME

As a part of awareness programme, 14th December every year has been dedicated as the National Energy Conservation Day with a view to make Energy Conservation a people's movement, a part of their daily discipline and as a way of life. On 14th December, 1991, a function presided over by the President of India was organised. National Energy Conservation week was also organised all over the country from 14th December to 20th December, 1991. Simultaneously, an intensive awareness campaign was undertaken.

Phase II of the Awareness Programme at a cost of Rs. 1.26 crores was approved. The programme is being implemented by the Energy Management Centre. Under this programme, Radio and T.V. spots, press advertisements, hoardings etc. on the theme of Energy Conservation are being organised.

The Department of Power also sponsored a number of seminars, essay and drawing & poster competitions etc. in various organisations on the theme of Energy Conservation.

3. NATIONAL AWARD TO INDUSTRIAL UNITS

With a view to motivate competitiveness, improved energy efficiency and performance in the various industries, the Department of Power has instituted a National Award Scheme for the Industrial Units showing excellent performance in efficient utilisation and conservation of energy. The scheme is open to the Industrial units in various Industrial sub-sectors. On the Energy Conservation Day on 14th December, 1991 awards for the year 1990 were distributed to 15 Industrial units.

4. ENERGY AUDITS

Follow up actions on the recommendations of the energy audits completed in about 200 industrial units with the help of various consultancy organisations were taken. The reports received from some of the units revealed that they have achieved substantial savings due to the implementation of the recommendations of energy audits. The Energy Audit scheme in Industrial and Commercial sectors sanctioned to some of the organisations were progressing satisfactorily. Energy Audit manuals for 10 selected energy sectors, like steel, foundry, vanaspati, chlor-alkali, automobiles, glass, ceramics, distilleries and breweries, dairies, re-rolling and galvanized wire-drawings were prepared through National Productivity Council.

5. DEMONSTRATION PROJECTS

The agricultural sector continued to be one of the major target sectors for demonstration projects for taking up rectification of agricultural pump sets on a large scale with Grant-in-aid from the Department of Power. Out of the funds made available by the Department of Power, complete rectification of 345 agricultural pumpsets were undertaken in Gujarat. Another scheme of partial rectification of 20,000 agricultural pumpsets in Gujarat was also sanctioned. About 9000 pump sets have already been rectified. Partial rectification of 1350 pump sets in

Punjab was also approved during the current financial year. 10,000 pump sets were rectified by replacement of foot-valves in Tamil Nadu.

The system improvement schemes in electrical network in Meerut Distt. sanctioned to the Rural Electrification Corporation in 1989 were completed during this financial year.

A three year project relating to design, installation and evaluation of energy efficient and conservation devices (viz. 50 KW Vapour Compressor heat pump, sterling engine run by wood gasifier, development of 10 KW Wind Turbine and high efficiency inverter) was sanctioned to Central Power Research Institute (CPRI), Bangalore in March, 1990.

A testing and evaluation laboratory for energy efficient renewable energy devices has also been sanctioned to CPRI, Bangalore in the year 1991. The project is expected to be completed in the year 1992-93.

6. TRAINING

The Department of Power in 1991-92 entrusted a training programme on energy conservation in agricultural pumping system to Rural Electrification Corporation (REC) for training 600 officers from various organisations. The programme has been completed. The proposal regarding extension of this programme is being processed.

7. WORKING GROUP ON FLY-ASH UTILISATION

Based on the recommendations of the Working Group on Fly-Ash Utilisation and on the basis of views expressed at different fora, policy guidelines for promotion of use of fly-ash were formulated and are being processed for Government approval.

8. INTERNATIONAL COOPERATION IN ENERGY CONSERVATION

The Department of Power have taken up energy conservation projects with multilateral and bilateral external assistance. Four Energy Buses have been acquired under the UNDP Programme. The EEC also assisted in the acquisition of three Energy buses under the Energy Audit Programme. These Energy Buses are 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 Agency) assisted project in the energy conservation field, has been undertaken & is in its final stages.



an Industrial Energy Efficiency Project is proposed to be implemented with the assistance of the World Bank. The World Bank Team has completed the appraisal of the project and the project is under advanced stage of approval.

9. ENERGY MANAGEMENT CENTRE

The Energy Management Centre was established with EEC cooperation on 10.4.89 under the department of Power and is registered as an autonomous body under the Societies Registration Act 1860. It is established with the objectives of providing a core group of energy sector professionals to carry out/organise training in energy management/establish and manage a database on energy efficiency performance, in the country, and assist the Government in coordinating energy conservation activities throughout the country.

Since its inception, the EMC has organised useful activities and has been identified as a focal point for implementing a number of international cooperation programmes viz. the UNDP Energy Project, the EEC-India Energy Bus project, the Regional UNDP/ESCAP TCDC Working Group on Energy Conservation and the proposed World Bank assisted Energy Efficiency Technical Assistance Programme.

During the year 1991-92, the EMC took up various studies on energy demand management aspects. It organised energy audits, demonstration projects, and launched awareness campaign on a national level.

2.29 CONSULTATIVE COMMITTEE OF MEMBERS OF PARLIAMENT

The Consultative Committee of Members of Parliament for the Ministry of Power & N.E.S. relates to both the Departments of the Ministry viz., the Department of Power and the Department on Non-Conventional Energy Sources.

The Department of Power Coordinated and organised three meetings of the Consultative Committee during the year (1991-92). At these meetings, the committee discussed matters relating to "Introduction to Power sector" and "Introduction about Department of Non-Conventional Energy Sources", "General Discussion on Department on Non-Conventional Energy Sources", and "Review of Power Finance Corporation (PFC) and Rural Electrification Corporation (REC)".

2.30 AUDIT OBSERVATIONS

The organisation-wise break-up of Audit observations and Inspection Report/Audit Paras pending as on 31st December, 1991 are as under.

AUDIT OBJECTIONS AS ON 31.12.1991

Sl. No.	Organisations	No. of Inspection	No. of Paras/ Reports
1.	C.E.A.	13	32
2.	B.T.P.P.	6	51
	B.T.P.S.	8	130
3.	C.W.C.	27	126
4.	B.B.M.B.	69	182
5.	N.H.P.C.	100	363
6.	Beas Project	109	265
7.	P.E.T.S.	11	49
8.	Department of Power	7	48
9.	Pay & Accounts Office		
	i) P.A.O.	4	7
	C.E.A.		
	ii) P.A.O.	2	2
	B.M.C.C.		
	iii) P.A.O.	5	21
	Sectt.		
	iv) P.A.O.	2	2
	Hydel		
	v) C.E.A.	2	2
	Bangalore		
Total :		365	1280

INTERNAL INSPECTIONS

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 DDOs 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.

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 Dec. 91
1990-91	24/24	322	104	218

2.31 IMPLEMENTATION OF OFFICIAL LANGUAGE POLICY

During the year, the Department of Power continued to follow the Government's instructions relating to the implementation of progressive use of Hindi in the Department as well as in its attached/subordinate offices and Public Sector Undertakings.

During the year under review, a Committee of Parliament on Official Language visited the Department on 9.4.1991 to assess the progress achieved in the use of Hindi in the Department. The Second Sub-Committee of the Committee of Parliament on Official Language visited on 27.9.1991, the Loktak Hydroelectric Project, Manipur, which is one of the power projects of the National Hydroelectric Power Corporation, a Public Sector Undertaking under the administrative control of the Department.

Seven Corporate Offices of the Public Sector Undertakings under the administrative control of the Department of Power, were also inspected by officers of the Department during the year under review. The Corporate Offices, wherever necessary, were advised to bring improvement in their functioning with regard to the progressive use of Hindi in their official work.

To acquaint the officers/staff with the Official Language Policy and encourage them to do their maximum work in Hindi, six Hindi Workshops were organised and fifty nine officers/members of staff of the Department were given training through Hindi Workshops. A Hindi week was also organised during the year under review. To motivate and encourage the officials, Essay and Typing Competitions were also organised and prizes awarded to the successful participants. Meetings of the official Language Implementation Committee of the Department were also held during the year.

In order to popularise the use of Hindi, the Cash Awards Scheme, formulated by Department of Official Language was implemented in the Department of Power and in its attached and subordinate offices as well as in the Public Sector Undertakings under the administrative control of the Department. These schemes are yielding fruitful results and have been widely accepted by the officers/employees of the department and other organisations.

The incentive scheme of the Department of Official Language for originating notes/drafts in Hindi was also

introduced during the year and the employees who took part in this Scheme were suitably awarded.

For the promotion of original books in Hindi on power subjects, a new Scheme under the title "VIDYUT SAHITYA PURASKAR" is being introduced in the Department. The scope of the Scheme is being extended to all the members of the staff and officers working in the Department or in the attached/ subordinate offices and Public Sector Undertakings. The Scheme is likely to encourage a large number of people associated with Power Sector all over the country to write original books on the subject in Hindi.

To encourage the employees to acquire proficiency in Hindi, the Department has been nominating its staff for Prabodh, Praveen and Pragya Classes conducted by the Department of Official Language under the auspices of Hindi Teaching Scheme. The training in Hindi-typing and Hindi-stenography has also been arranged to the untrained members of the staff of the Department so as to achieve better results.

2.32 VIGILANCE / DISCIPLINARY CASES

At the beginning of the year 1991, there were five vigilance / disciplinary cases. Subsequently, one more disciplinary case, has been added. One case is pending in the Court, and the departmental proceedings are being taken in the remaining five cases.

2.33 INTERNAL WORK STUDY UNIT

26 Complaints/Petitions/Grievances were received in Internal Work Study Unit through the Deptt. of Administrative Reforms & Public Grievances, Deptt. of Pension & Pensioners Welfare, Cabinet Secretariat (Public Grievance) etc. Action was to be taken on 47 cases including the 21 pending cases. All these grievances relate to the service matters and non-settlement of pension cases of the employees/ex-employees of the Public Sector Undertakings under the control of the Department of Power.

Out of 47 grievances, 30 have been settled. Action on the rest 17 is in hand with the respective organisations under this Department.



2.34 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 Department 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 and Non-Conventional Energy Sources (Department of Power) including the number of schedule castes and schedule tribes is given below :-

Sl.	Name of Office	Group A			Group B			Group C			Group D		
		Total	SC	ST	Total	SC	ST	Total	SC	ST	Total	SC	ST
1.	Department of Power	35	5	1	84	8	–	115	17	3	69	35	4
2.	C.E.A.	652	71	8	374	47	1	1043	165	17	399	127	5
3.	Controller of Accounts (Deptt. of Power)	2	1	–	16	3	–	66	4	1	10	4	–

Tehri Project - Rehabilitation of Oustees.



3.0 CENTRAL ELECTRICITY AUTHORITY

3.1 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 or supply of electricity on such matters as would improve the operation and maintenance of their system in an efficient and coordinated manner.
4. to promote and assist in the timely completion of projects sanctioned in the power sector and to constantly monitor their implementation.
5. to make arrangements for advancing the skills of persons in the generation and distribution of electricity.
6. to promote research in matters affecting the generation, transmission and distribution of electricity.
7. to advise the Central Government on any matter on which its advice is sought or to make recommendations which would help in improving the generation, distribution and utilisation of electricity.

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.

3.2 POWER PROGRAMME FOR THE EIGHTH PLAN : (1992-97)

The Planning Commission had set up a Working Group on Power for formulation of a programme for power development in the 8th Five Year Plan (1990-95). The Working Group submitted its report in December, 1989. Taking into account the constraints of availability of funds and the physical preparedness of the 8th Plan starts, which were taken up in the 7th Plan period and the projects which could be taken up in the 8th Plan, the Working Group recommended an incremental capacity addition programme of 38,369 MW for the 8th Plan. Due to

various reasons the 8th Plan programme could not be finalised. In the meantime the plan programme for 1991-92 has already been finalised and is under implementation. In view of this and other major factors such as changes in priorities etc. the Government decided to treat the Annual plans for the years 1990-91 and 1991-92 as separate Annual Plans and that the earlier proposals submitted to the Planning Commission by the Working Group on Power for the period 1990-95, therefore, needed review to cover the period 1992-97. Accordingly a Group was constituted by Department of Power for formulation of proposals for the Eight Five Year Plan (1992-97). The Group submitted its report in October, 1991.

The overall peak power and energy shortages at the end of 7th Plan period was about 17% and 8% respectively even though we succeeded in achieving over 96% of the targeted capacity addition of 22245 MW during the plan period. The total installed power generation capacity, in utilities, at the end of the 7th Plan in the country was 63289 MW. Out of this, hydro was 18308.8 MW (29%), thermal 43417 MW (69%) and nuclear 1565 MW (2%). Thermal capacity includes gas and diesel generation capacity. The Working Group had recommended an addition of 38369 MW of Power generation capacity during the period 1990-95. Capacity addition of 3532 MW during 1990-91 and 6358.3 MW during 1991-92 was recommended by the Working Group. Against this the targets for 1990-91 and 1991-92 were fixed at 4212 MW & 3810 MW respectively. However, during 1990-91, generating units aggregating to 2776.5 MW of capacity were synchronised/rolled. There are various factors which have resulted in the low capacity addition e.g. constraints of resources, and tying up of other inputs etc. The Group on Power, which was set up by Deptt. of Power has recommended a capacity addition programme of 36646 MW in the Eight Plan. The source wise and sector wise break up of capacity addition of 36646 MW in the Eighth Plan period is given below :-

Sector	Hydro	Thermal	Nuclear	Total
State Sector	6218.9	13566.8	—	19785.7
Private Sector	168.0	1180.0	—	1348.0
Central Sector	3010.0	11327.0	1175.0	15512.0
Total	9396.9	26073.8	1175.0	36645.7



With proposed capacity commissioning of 36645.7 MW during the 8th plan period, the power generation capacity at the end of the 8th Plan period, would be 106263.4 MW comprising 74288.7 MW in thermal, 28764.7 in hydro and 3210 MW in Nuclear.

3.3 TECHNO-ECONOMIC APPRAISAL

The Central Electricity Authority is responsible for the identification of schemes for thermal as well as hydro power stations for benefits during the plan periods. The CEA is associated with the inspection of sites proposed for power projects, tying up of necessary inputs like coal, water, transport facilities, environmental clearance and civil aviation clearance. The CEA is also responsible for establishing the need for captive power projects and to recommend the same whenever required.

During the current financial year i.e. 1991-92, Central Electricity Authority accorded techno-economic approval to 35 New Schemes and 9 Revised Cost Estimates from 1.4.91 to 31.1.92 as per following details :-

i) NEW SCHEMES

As on 31.1.92			
Type of Schemes	IC(MW)/ Ckt.Kms.	No. of Schemes	Estimated Cost Rs. in Crores
A. Schemes of SEB's Generating Companies etc.			
Hydro	846.25/280 Ckt.Kms.	7	1260.10
Thermal	900	4	1696.69
T&D`	9122 Ckt.Kms.	14	1192.86
R&D Gen:	–	5	395.28
T&D		1	60.06
Sub-total (A)	1746.25 MW/ 9402 Ckt.Kms.	31	4604.99
B. Schemes of Licensees/Captive Schemes			
Hydro	90	1	71.20
Thermal	240	1	592.87
T&D	406 Ckt.Kms.	2	118.02
Sub-total (B)	330 MW/406 Ckt.Km.	4	782.09
GRAND TOTAL	2076.25 MW/ 98008 Ckt. Kms.	35	5387.08

ii) REVISED COST ESTIMATES

(Upto 31.1.92)

Type of Scheme	No. of revised estimates	I.C. (MW)/ Ckt. Kms.	Estimated Cost	
			Original	Revised (Rs. in Crores)
Hydro	5	1967 MW/ 35 Ckt. Kms.	886.93	2363.33
Thermal	1	840 MW	1174.40	2292.26
T&D	2	825 Ckt. Kms.	103.29	87.22
R&D	1	–	39.85	43.13
TOTAL	9	2807 MW/ 860 Ckt. Kms.	2204.47	4785.94

3.4 TRAINING ORGANISATIONS OF THE CEA

3.5 POWER SYSTEM TRAINING INSTITUTE (PSTI)

The Power System Training Institute, Bangalore imparts training in various disciplines, including power systems planning, operation, protection, communication in power systems, computer application and power telecommunication co-ordination. Since the inception of the Institute in 1972, 3252 engineers had been trained upto the end of 90-91. During the year 91-92, 143 more engineers were trained at the Institute.

A scheme of augmentation of training facilities of PSTI which was approved by the Government in February, 1989 at an estimated cost of Rs. 323,38 lakhs has been taken up for implementation. Civil works have been entrusted to the CPWD. Orders have been placed for the supply of Static Protective Relay cubicle.

The Institute has acquired a Despatcher Training Simulator (DTS) and a set of educational Video-tapes along with a Video Projection System as part of UNDP aided project IND/86/005. These facilities have also been integrated into the training programmes being conducted by PSTI.

3.6 HOT LINE TRAINING CENTRE (HLTC)

In order to reduce to the barest minimum the outages of transmission lines during 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. 659 personnel were trained by the Centre upto the end of 1990-91. During the year 1991-92, 31 personnel in 220 KV level (Hot-stick method) and 30 personnel in 400 KV level (Bare-Hand method) have been trained at the centre.

A scheme for augmentation of the training facilities at an approved cost of Rs. 479.48 lakhs is under implementation. Under this scheme, tools and equipment required for training using hot-stick and bare-hand techniques upto 400 KV voltage level have been procured and also about 57 acres of land have been acquired at Somanahalli near Bangalore for setting up a permanent Training Centre along with hostel, staff quarters, etc. Civil works have been entrusted to CPWD. The construction of 400 KV/220 KV experimental lines and the construction of 11 to 110 KV experimental lines along with power supply have been completed.

3.7 UNDP - AIDED PROJECT

The Central Electricity Authority completed implementation of UNDP-aided project relating to modernisation of training facilities at PSTI, Bangalore and the development of expertise in system/operation and started in April 1987 and all the activities have been completed now. Installation and commissioning of a Dispatcher Training Simulator (DTS) which constituted the main component of the project was completed in February, 1990, and the equipment was accepted in May, 1990 after a 60 days working availability test run. The system has also been integrated into different training programmes being conducted in PSTI, Bangalore. As per UNDP guidelines, the project was evaluated by UNDP designed independent consultant.

4.0 ASSISTANCE TO THE STATE ELECTRICITY BOARDS: UTTAR PRADESH:

ANPARA 'B' THERMAL POWER PROJECT

The Government of India have agreed to provide to the State of U.P. a special loan assistance of Rs. 127 Crores representing 50% of the resource gap to be mobilised by the Govt. of U.P. to meet its commitment for the year 1991-92 in respect of Anpara 'B' Thermal Power Project (2x500 MW) as the State Government had expressed its inability to continue the implementation of the project on account of resource constraint.

FEROZ GANDHI UNCHAHAR THERMAL POWER PROJECT

A Memorandum of Understanding was signed on 8th December, 1991, between the Minister of State for Power and Non-conventional Energy Sources and the U.P. Chief Minister to provide for the transfer of ownership of the Feroz Gandhi Unchahar Thermal Power Project (existing capacity 2x210 MW and approved extension capacity of 2x210 MW) of Uttar Pradesh Rajya Vidyut Utpadan Nigam to the National Thermal Power Corporation at a value of Rs. 925 crores to ensure operation of the existing Unchahar Project at its optimum capacity, commencement of work on the extension project, held up on account of resource constraints, and to liquidate its outstanding dues and future dues to the Central Agencies viz. NTPC.

ANDHRA PRADESH

A Technical Assistance Agreement has been signed with the Asian Development Bank loan assistance of 1 million US Dollars to assist the Andhra Pradesh State Electricity Board in its efforts to improve its operations in the areas of electricity demand management power system management and loss reduction in a generation, transmission and distribution; integrated data processing including computerised management information system and provision of related training.

5.0 PRIVATE SECTOR PARTICIPATION IN POWER GENERATION

5.1 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, 1910, 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 Compaines, 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 Department of Power will directly interface with prospective private enterprise entrants to the Electricity sector and help them in getting clearances. The High Powered Board 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 clearances, and resolve all outstanding issues pertaining to clearances. The Board would decide on all other matters concerning investment from non-resident Indians and foreign sources within a scheduled time-frame.

5.2 INCENTIVES UNDER THE SCHEME IN THE NEW POLICY

The scheme formulated under the policy throws the electricity generation, supply and distribution field wide open to private entrepreneurs, opening up profitable investment opportunities. That offers a package of incentives which investors, both from India and overseas, will find really attractive.

All private companies entering the Electricity Sector hereafter will be allowed a debt-equity ratio of 4:1. They will be permitted to raise upto a minimum of 20 percent of the total outlay through public issues.

Promoters 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, they must find 60 per cent of the resources from sources other than public financial institutions.

For both Licensee and Generating Companies, the following is permitted :

- Upto Hundred percent (100%) foreign equity participation can be permitted for projects set up by foreign private investors.
- 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.

Generating companies can be set up by Private entrepreneurs. For safeguarding return on investment against possible under-demand of power arising from variations in demand, generating companies can now sell power on the basis of a suitably structured two-part tariff. This will be based on operational norms and optimal PLF (Plant Load Factor) prescribed by the CEA/Government, as also on a rate of depreciation notified by the Central Government, from time to time.

The Indian Electricity Act and the Electricity (Supply) Act have been amended to bring about this new legal and financial environment for private enterprises in the Electricity Sector. As a step towards liberalisation, schemes where the total outlay does not exceed Rs. 25 crores need not be submitted to CEA for concurrence.

The specific incentives for Licenses are:

- a: Licenses of a longer duration of 30 years in the first instance and subsequent renewals of 20 years, instead of 20 and 10 years respectively as at present.
- b: Higher rate of return of 5% in place of the previous 2% above the RBI rate.
- c: Capitalisation of Interest During Construction (IDC) at actual cost (for expansion project also) as against 1% over RBI rate as at present.
- d: Special appropriations to meet debt redemption obligations.

The details of private sector projects are given in the enclosed Tables (V-XI).

Table-V

Table-VI

Existing Private Sector units

	Corporation	Capacity
1.	Tata Electric Co.	1606 MW
2.	C.E.S.C.	615 MW
3.	A.E. Co.	509 MW
4.	Gujarat Industrial Power Corp. Ltd. (GIPCL)	66 MW
5.	Andhra Pradesh Gas Power Corp.	66 MW
	TOTAL	2862 MW

Details of on-going private sector power projects

Name of the Project	Capacity (MW)	Type	State
1. Bhira Pumped Storage Scheme	150	Hydel	Maharashtra
2. Gujarat Industrial Power Corporation Ltd.	78	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	953		

Project advertised by State Governments for implementation in private sector

Table-VII

Thermal Coal	14,225 MW
Thermal Gas	5,260 MW
Hydel	1,885 MW
Others (Wind, solar, DG sets etc)	158 MW
TOTAL	21,558 MW

Projects to be implemented with foreign investment

Table-VIII

Name of the Project/ State	Capacity	Type	Agency
1. Barsingsar TPS/ Rajasthan	240 MW Lignite [2x120 MW]	Lignite	M/s Coleman & Associates Pvt. Ltd. (Australian Consortium)
2. 'Zero unit' TPS of NLC/Tamil Nadu	210 MW	Lignite	M/s ST Power Systems Inc., USA
3. Ib Valley TPS/ Orissa	2340 MW	Thermal (Coal)	M/s Southern Electric International Inc., USA
4. Dubri TPS of Kalinga Power Corp. Ltd/ Orissa	500 MW [2x250 MW]	Thermal (Coal)	M/s North East Services Inc., USA
5. Gas based	800 MW	Gas	M/s NTPC & M/s ABB
Total	4,090 MW		



Table-IX

Out of Project Advertised - Decision taken by State Govts. to entrust implementation to private firms

Name of Project/ State	Capacity	Type	Agency	Remarks
1. Pench TPS Stg.I/M.P.	420 MW	Thermal (Coal)	M/s Centuary Textiles and Industries Ltd., Bombay	
2. Baspa-II H.E./H.P.	300 MW	Hydel	M/s Jaiprakash Industries Ltd., Delhi	
3. Ghanvi H.E./H.P.	22.5 MW	Hydel	M/s Punjab Power Generation Machines Ltd	
4. TIDCO with McNally Bharat/ Tamil Nadu	1500 MW [3x500 MW]	Lignite	M/s Jayamkondam Lignite Corpn. Ltd	
5. Uhl-III/ Himachal Pradesh	70 MW	Hydel	M/s Ballarpur Industries	
6. Chandil TPS/ Bihar	500 MW	Thermal (Coal)	M/s RPG Enterprises	
7. Godavari CCGT	400 MW	Thermal Gas	M/s GVK Industries Ltd.	
3212.5 MW				

Table-X

Projects with evinced interest under examination in CEA

1. Barge mounted/ Maharashtra	110 MW	Thermal	M/s Confidence Shipping Co. Pvt. Ltd.
2. TICAPCO/ Tamil Nadu	250 MW	Lignite	M/s GM Swamy Associates
360 MW			

Table-XI

Project approved after Policy Amendment

1. Budge-Budge TPS/ West Bengal	500 MW [2x250 MW]	M/s C.E.S.C
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6.0 PUBLIC SECTOR UNDERTAKINGS & OTHER ORGANISATIONS

6.1 NATIONAL THERMAL POWER CORPORATION LTD (NTPC).

The NTPC is presently engaged in the execution of nine Super Thermal Power Project with an aggregate approved capacity of 13240 MW and four gas based combined cycle projects with an aggregate approved capacity of 2527 MW. The NTPC has also undertaken the construction of transmission lines with a total length of about 20200 ckt.kms. of high voltage lines including

about 813 ckt. kms. of HVDC transmission line and 85 sub-stations/sub-station extensions. The total approved cost of the NTPC projects including associated transmission system and other schemes is Rs. 18624.12 crores. The above includes Rs. 103.5 crores for Vindhyachal-II.

6.2 Projects under Implementation

The details of the projects of the NTPC under implementation are given below :

DETAILS OF NTPC PROJECTS

Name of the Project	Region/State	Capacity in MW		Actual/Expected date of commissioning	Approved Cost incl. associated TL System (Rs. in Crs.)
		Ultimate	Approved		
Singrauli STPP	Northern Uttar Pradesh	2000 Stage-I (3x200) Stage-II (2x200+2x500)	2000	Unit-1(200) Feb.82 Unit-2(200) Nov. 82 Unit-3(200) Mar. 83 Unit-4(200) Nov. 83 Unit-5(200) Feb. 84 Unit-6(500) Dec. 86 Unit-7(500) Nov. 87	1374.93
Korba STPP	Western Madhya Pradesh	2100 Stage-I (3x200+1x500) Stage-II (2x500)	2100	Unit-1(200) Mar. 83 Unit-2(200) Oct.83 Unit-3(200) Mar. 84 Unit-4(500) May. 87 Unit-5(500) Mar. 88 Unit-6(500) Mar. 89	1873.79
Ramagundam STPP	Southern Andhra Pradesh	2100 Stage-I (3x200+1x500) Stage-II (2x500)	2100	Unit-1(200) Oct. 83 Unit-2(200) May. 84 Unit-3(200) Dec. 84 Unit-4(500) Jun. 88 Unit-5(500) Mar. 89 Unit-6(500) Oct. 89	1985.12
Farakka STPP	Eastern West Bengal	2100 Stage-I (3x200) Stage-II (2x 500) Stage-III (1x500)	2100	Unit-1(200) Jan. 86 Unit-2(200) Dec. 86 Unit-3(200) Aug. 87 Unit-4(500) Jun. 92 Unit-5(500) Jun. 93 Unit-6(500)#	2366.69



Name of the Project	Region/State	Capacity in MW		Actual/Expected date of commissioning	Approved Cost incl. associated TL System (Rs. in Crs.)
		Ultimate	Approved		
Vindhyachal STPP	Western Madhya Pradesh	2260 Stage-I (6x210)	1260	Unit-1(210) Oct. 87 Unit-2(210) Jul. 88 Unit-3(210) Feb.89 Unit-4(210) Dec. 89 Unit-5(210) Mar. 90 Unit-6(210) Feb. 91	1773.29
Rihand STPP	Northern Uttar Pradesh	3000 Stage-I (2x500)	1000	Unit-I(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) Nov. 93 Unit-4(210) Jun. 94	1058.64
National Capital Thermal Power Project (Dadri)	Northern Uttar Pradesh	840 Stage-I (4x210)	840	Unit-1(210) Oct. 91 Unit-2(210) Sept. 92 Unit-3(210) Mar. 93 Unit-4(210) Sept. 93	1063.60
Talcher STPP	Eastern Orissa	3000 Stage-I (2x500)	1000	Unit-1(500) Apr. 94 Unit-2(500) Apr. 95	1480.85
Kawas GBPP	Western Gujarat	1295 Stage-I (4x106+2x110)	600-Nominal 645-Actual	Gas Turbine Unit-1(106) Mar. 92 Unit-2 (106) July, 92 Unit-3(106) Sept. 92 Unit-4(106) Nov. 92 Steam Turbine Unit-5(110) May, 93 Unit-6(110) Sept. 93	410.84
Auraiya GBPP	Northern Uttar Pradesh	1302 Stage-I (4x112+2x102)	600-Nominal 652-Actual	Gas Turbine Unit-1(112) Mar. 89 Unit-2(112) Jul. 89 Unit-3(112) Aug. 89 Unit-4(112) Sept. 89 Steam Turbine Unit-5(102) Dec. 89 Unit-6(102) Jun. 90	472.28

Name of the Project	Region/State	Capacity in MW		Actual/Expected date of commissioning	Approved Cost incl. associated TL System (Rs. in Crs.)
		Ultimate	Approved		
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	316.74
Dadri GBPP	Northern Uttar Pradesh	1225 Stage-I (4x131+2x146.5)	817	Gas Turbine Unit-1 (131) Jan. 92 Unit-2 (131) Mar. 92 Unit-3 (131) Jun. 92 Unit-4 (131) Sept. 92 Steam Turbine Unit-5 (146.5) May, 93 Unit-6 (146.5) Aug. 93	783.44
Central Transmission Project-I		1655 Ckt. Kms. 400 KV			388.05
Rihand Power Transmission Project		1691 Km 814.5 Km	400 KV A/C 1± 500 KV HVDC		1063.00
Vindhyachal Additional TL		1930 Km	400 KV		339.69
Total Approved		15767 MW			18439.12

Unit to be commissioned in 5 years from the date of Main Plant Award. The process of tendering and award of main plant contract will be taken up after the World Bank funding envisaged for the project becomes effective.

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.

6.3 Capacity Additions

By end March, 91 NTPC had commissioned 10, 125 MW at its various Stations. Details of capacity commissioned are given below :

Project	Capacity commissioned
Singrauli	2000 MW
Korba	2100 MW
Ramagundam	2100 MW
Farakka	500 MW
Rihand	1000 MW
Vindhyachal	1260 MW
Anta	413 MW
Auraiya	652 MW
TOTAL	10125 MW

During the year 1991-92, the NTPC has programmed to commission 788 MW comprising 210 MW from NCTPP, 210 MW from Kahalgaon, 262 MW from Dadri Gas Project and 106 MW from Kawas Gas Project. Of this, the 210 MW Unit at National Capital Thermal Power Project; Dadri has already been commissioned. With this the total installed capacity of NTPC stands increased to 10335 MW. The other Units programmed for commissioning this year are progressing satisfactorily.

6.4 Transmission Lines

By end March, 91 NTPC had completed 153.89 ckt. Kms of transmission lines. During 91-92, NTPC has programmed to add 860 Ckt. Kms. NTPC has already completed 775 ckt. kms. of transmission lines thereby raising the total length of high voltage lines laid by NTPC to 16511 Ckt. Kms.

The following transmission lines have been fully completed during the year 1991-92.

1. Agra-Chatta 400 KV S/C
2. Chatta-Ballabgarh 400 KV S/C
3. Vijayawada-Gazuwaka 400 KV S/C
4. Gooty-Bangalore 400 KV S/C
5. Maithon-Jamshedpur 400 KV D/C

6.5 Generation

As on end December, 1991 a total capacity of 10335 MW is under operation at various NTPC Stations. This comprised 22 Units of 200/210 MW at Singrauli, Korba, Ramagundam, Farakka, Vindhyachal and NCTPP, 10 Units of 500 MW at Singrauli, Korba, Ramagundam and Rihand and 10 Gas/Steam Units at Anta and Auraiya.

The generation from NTPC stations has been at a

NTPC - Kahalgaon Super Thermal Power Project



consistently high level. Till end December, 1991 the gross generation from NTPC stations is 44190 MUs against the target of 54847 MUs for the year. The generation during the previous year (1990-91) was 46,879 MUs compared to the target of 46,475 MUs.

The units under commercial operation generated 44164 MUs at a plant load factor of 67.49% during 1991-92, till the end of December, 1991. During the same period, the units under commercial operation at Singrauli, Korba, Ramagundam, Farakka, Vindhyachal, Rihand, Anta (Gas) and Auraiya (Gas) operated at a PLF of 77.47%, 68.33%, 56.22%, 59.76%, 68.21%, 72.98%, 66.11% and 68.85% respectively.

Units that achieved plant load factor in excess of 70% during their operation upto December, 91 are detailed below :

Sl. No.	Station	Capacity	Unit No.	PLF (%)
1.	Singrauli	200	1	87.54
2.	Singrauli	200	3	82.74
3.	Singrauli	200	4	88.41
4.	Singrauli	500	5	88.83
5.	Singrauli	500	6	78.67
6.	Korba	200	1	78.18
7.	Korba	200	3	87.46
8.	Korba	500	4	75.71
9.	Farakka	200	2	73.35
10.	Vindhyachal	210	1	78.48
11.	Vindhyachal	210	6	70.60
12.	Rihand	500	1	78.14
13.	Anta	88	1	70.65
14.	Anta	88	2	75.97
15.	Auraiya	112	1	73.97
16.	Auraiya	102	2	79.52

6.6 Awards

The NTPC's Ramagundam project qualified for the Meritorious productivity award for 1990 for achieving high standards of performance.

Four employees of the Vindhyachal STPP have been awarded the Prime Minister's Sharm Bhushan Award in 1991 for their outstanding and meritorious work performance.

NTPC was awarded the Company Standardisation Commendation Award for the year 1991 by the Institute

of Standards Engineers. Till 1991 the Quality Assurance Deptt. has introduced about 500 company standards many of which are being considered as inputs for National Standards.

6.7 Agreement for Construction, Operation and Management of Transmission System

In pursuance of the decision of Department of Power, NTPC and National Power Transmission Corporation (NPTC) entered into a management agreement dated 13th August, 1991 vide which NPTC has transferred various transmission systems to NTPC for the purpose of Construction, Operation and Maintenance on behalf of NTPC. NTPC, however, still retains the ownership of the above transmission assets.

In pursuance of this agreement, various NTPC executives and Non-executives connected with transmission lines and associated functions also stood transferred to NPTC with effect from 16.8.1991. Completion of legal and other formalities for transfer of ownership of transmission assets to NPTC has been taken up in line with Govt. decision in this regard.

6.8 Budget Utilisation And Financial Aspects

The authorised share capital of the Corporation is Rs. 8000 crores. As of Dec. 1991 the paid up capital of NTPC was Rs. 6954.78 crores, which is wholly subscribed by the Government of India.

During the financial year 1990-91, the NTPC earned a net profit of Rs. 700.95 crores. The return on capital employed and return on net worth were 10.02% and 10.58% respectively (excluding prior period income).

The total amount raised upto 31st December, 1991 from the three public issues and three private placements of the NTPC power bond was Rs. 2083.04 crores.

Outlay For 1991-92.

Despite phenomenal expansion in construction activities, NTPC has been relying more and more on internal and extra budgetary resources for meeting its requirement of funds thereby reducing its dependence on Government of India for net budgetary support. The requirement of funds, especially for the new projects, is envisaged to be by way of international assistance and commercial borrowings.

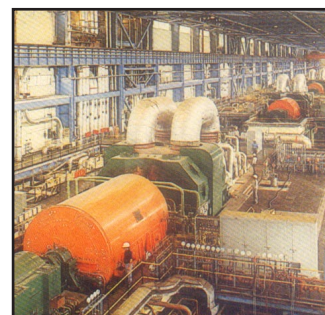
The plan outlay for 1991-92 has been proposed at Rs. 2755.77 Crs. in the revised estimate. This outlay is proposed to be financed as under :

(Rs. Crores)	
1. International assistance routed through Govt. budget	1003.00
2. External commercial borrowings	396.00
3. Internal resources	556.76
4. Power Bonds	800.00
5. Net Budgetary Support	NIL
TOTAL	2,755.77
(includes Rs. 271.75 Crs. for T/L)	

6.9 Consultancy Services

Within a year of its setting up, Consultancy Wing has made significant break through in the export market by obtaining the US\$ 17.726 million contract for turunkay execution of 400 KV transmission line project from Dubai Electricity Company against stiff international competition. NTPC has opened a Site Office at Dubai and the project is under progress. Another export assignment has been obtained from Hydroelectric Commission, Tasmania for inspection of instrument transformers for their King and Anthony Power Station. The total foreign exchange earnings for the Consultancy Wing during the year 1990-91 have been Rs. 3.46 crores.

In the domestic front also, the company has obtained several prestigious Consultancy Assignments in the year 1990-91 of a total estimated value of Rs. 635.50 lakhs. Of these, the major assignments are from Damodar Valley Corporation for Maithon Right Bank Project, GVK Industries for 400 MW gas plant at Godavari, SAIL for 60 MW Captive Power Plant, MPEB for vendor assessment and OPGC for Cooling Water Studies for Ib Thermal Power Station. In the Power Systems area also several consultancy assignments have been received. Of these the major assignments are system studies for NHPC and Karnataka Power Corporation, Tower design/review for APSEB and BSES, Sub-station engineering for Karnataka Electricity Board. The work on DESU ring main and MSEP's Chandrapur-Padghe HVDC system have been taken up in full swing. The Mandaula 220 KV sub-station which was executed on behalf of DESU has been commissioned.



*NTPC - Vindhyachal
Super Thermal Power Project*

The wing is registered with International financial institutions such as the World Bank, Asian Development Bank, African Development Bank as Consultants and also with export oriented Indian organisations such as EEPC and FIEO.

MOUs have been signed with reputed international consultants such as Hydro Quebec International of Canada, EPDC of Japan and EDF of France for joint execution of projects in third countries.

With a total Consultancy order booking of over Rs. 50 crores as on 31st March, 1991 and a turn over of Rs. 192.88 lakhs, NTPC is now well established as a consultant in the international power sector and hopes to expand this area of business considerably in future.

6.10 Ash Utilisation

With the objective of ensuring useful utilisation of the ash generated by the NTPC's power stations, an Ash utilisation division has been created with the responsibilities of identification of appropriate technologies and their adaptation for Indian conditions, setting up of pilot cum demonstration plants and participation in joint venture for manufacture of fly ash based products.

6.11 Solar Thermal Wing

NTPC is planning to enter the solar thermal era and had recently established a solar thermal power wing, which is presently working on a solar thermal plant to be located in Rajasthan as an R&D Project. This is expected to open up a new chapter in exploiting the non-conventional energy sources in the country.

6.12 MOU

A Memorandum of Understanding (MOU) for the year 1991-92 was signed between the NTPC and the Department of Power. The MOU clearly identifies the performance targets to be achieved by the NTPC during the year with respect to Power generation, addition of new capacity, construction of transmission lines, apart from laying down the actions to be taken by the Government to enable achievement of these targets.

The details of targets for the year 1991-92 are given below :

MOU Performance 1991-92

	MOU Target
1. Capacity Addition (MW)	788
2. Generation (MUs)	54847
3. Transmission (EHV) lines construction (ckt. kms.)	860
4. Turnover (Rs. Crores)	3164
5. Profits (Rs. Crores)	468

Against the above targets, NTPC, till Dec. 1991, has added 210 MW Capacity, constructed 775 ckt. kms. of transmission lines and has generated 44164 MUs of electricity.

6.13 BADARPUR THERMAL POWER STATION

Badarpur Thermal Power Station comprises 3 x 100 MW and 2 x 210 MW Units under the management of NTPC Ltd. During the period April, 1991 to December, 1991 the Station has generated a total of 2842 MUs at a PLF of 61.08%

The Generation Target and PLF for the year 1991-92 are 3900 MUs and 63.15% respectively. The Station generated 3843 MUs in the Calendar Year 1991 at a PLF of 62.23%. Specific Oil Consumption is 6.1 ml/Kwh in the year 1991. Auxiliary Power consumption in the last three months has reduced by about 3% which is



*Badarpur Thermal Power Project –
A view of the demineralisation plant*

expected to save about 120 MUs per annum. BTPS has made a profit of Rs. 4.05 Crores in the current financial year (uptill Nov., 91). Energy conservation day was organised at BTPS on 14.12.91 and BTPS has been selected as the Pilot Project for implementation of Energy Conservation by NTPC for the year 1992-93 as part of the National Energy Conservation Campaign.

Under Renovation & Modernisation Phase-II Programme of BTPS, 32 packages have been identified for implementation and the proposal for the same has been submitted to Central Electricity Authority for according their Techno-economic clearance.

6.14 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. 1619.30 crores as on 31.03.1991 has increased to Rs. 1922.41 crores as at the end of December, 91. The profit during the year 1990-91 was Rs. 52.76 crores (before tax) as against Rs. 52.50 crores in the previous year. The turnover of the Corporation during the year 1990-91. was Rs. 223.95 crores as against Rs. 209.87



crores in the previous year. The estimated profit for 1991-92 is Rs. 46 crores.

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 1990-91 in the above power stations was 3617.46 MU which is 113.12% of the targeted generation of 3198 M.U. The total generation during the year 1991-92 (upto December, '91) has been 2785.44 MUs against the target of 2770 MUs for the period.

In addition to the generation in its own power stations, NHPC imported during 1990-91, 1389.29 MUs against a target of 1374 MUs of power from the Chukha Hydel Project, Bhutan. In 1991-92, upto December, 1991 the Corporation imported 1331 MUs against the target of 1190 MUs. It also transmitted 304.52 MUs of power during 1990-91 through its Jaypore-Talcher Transmission System in Orissa. During 1991-92, upto December, 91, 404.56 MUs of power were transmitted through the Jaypore Talcher Transmission System.

In November, 1991, all the transmission Lines under construction, operation and maintenance have been transferred to the newly set up National Power Transmission Corporation Ltd. (NPTC) for construction, operation and maintenance on management basis for which necessary agreement was signed on 18th November, 1991. These Transmission Lines will be transferred to NPTC on ownership basis in due course after obtaining necessary clearances.

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

Sl. No.	Name of the Project	State	(Installed capacity in MWs)
(1)	Chamera H.E. Project (Stage-I)	H.P.	(3x180 MW)
(2)	Tanakpur H.E. Project	U.P.	(3x40 MW)
(3)	Dulhasti H.E. Project	J & K	(3x130 MW)
(4)	Uri H.E. Project	J & K	(4x120 MW)
(5)	Salal H.E. Project (Stage-II)	J & K	(3x115 MW)
(6)	Rangit H.E. Project	Sikkim	(3x20 MW)

While the Chamera Stage-I Project is being executed with financial and technical assistance from Canada, execution of the Dulhasti Project and the Uri Project with bilateral financial assistance have been awarded on turn-key basis to French and Swedish-British Consortia respectively.

The status of progress of work on these Projects is as follows :-

(1) Chamera H.E. Project (Stage-I)

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

Upto December, 1991 against a total quantity of 13.50 lakhs M³, 13.31 lakhs M³ of concrete placement was achieved in the Main Dam. Of the 6.4 KM long Power Tunnel while heading has been completed, work on benching and overt lining was affected due to poor geological strata. In the squeezed portion of the Tunnel 220 nos. of old ribs out of total of 370 nos. have been replaced and the work is in progress. As regards Tail Race Tunnel at the end of December, '91, overt lining was in progress and 1546 M, out of the total of 2414 M have been completed. In the Power House civil works for Unit-III are completed upto EL 553.5 M (Service Bay level). In Unit-Unit-II, concreting of spiral casing and generator barrel has also been completed. On the Surge Shaft 52.4 M concreting has been completed against the total height of 61 M. Erection of penstock liners and the work in switchyard area were in progress as at the end of December, 1991.

On the Chamera-Moga Transmission Line associated with the Project, out of a total of 647 nos. towers, 645 nos. have been erected and stringing completed in 233 KM out of total length of 236 KMs. The Project is scheduled for completion by December, 1992.

(2) Tanakpur H.E. Project

Most of the civil works are in final stages of completion. Initially the work on around 800 m of the left afflux bund lying in Nepal Area was not allowed to be carried out by Nepal Govt. authorities. This issue has now been resolved during the Prime Ministers meeting of India and Nepal during the Prime Minister's meeting of India and Nepal during December '91 and work has been taken up with effect from 15th December'91 and is now in full swing. As regards the Power House Installation works, Units I & III have been completed and work on Unit II is in advanced stage of completion. The work on silt ejector is progressing satisfactorily. Transmission Line work, for evacuation of power, is also progressing satisfactorily and stringing is expected to be completed by January'92. The Project is scheduled for completion by March'92.

(3) Dulhasti H.E. Project

Construction of Cofferdam has been completed and concreting of Intake Portal has been taken up. Head Race Tunnel has been excavated upto 747 M by the Tunnel Boring Machine from upstream and 232 M by conventional methods, silt flushing tunnel has been

excavated upto 571 M. 15543 M³ excavation has been completed in Power House and crane Beam concreting has been completed. The Project is scheduled for completion in July, 1994.

(4) Uri H.E. Project

Following the abduction of two Swedish Engineers, the civil works contractor stopped the work w.e.f. April, 1991. However, work on designs and drawings and manufacture of Gates, Electrical and Mechanical Equipment are progressing as per schedule. The civil works contractor has since resumed the work in the first week of December, 1991 after additional security arrangements and transportation facility, unrestricted access to relevant areas of work etc. have been ensured. The Project is scheduled for completion in Nov., 1995.

(5) Salal H.E. Project (STAGE-II)

During the year, work on Power House and Tail Race Tunnel of this Project were in progress. However, the work on the Tail Race Tunnel (inlet package) is behind schedule due to the slow progress made by the Contractor. The matter is being looked into far taking remedial action. The Project as per the present schedule is due for completion in Sept.'93 however this schedule may undergo revision on account of slow progress in the Tail Race Tunnel.

(6) Rangit H.E. Project

Infrastructure works and work on construction of diversion tunnel and Head Race Tunnel are in progress. The construction of 92 temporary residential units was completed and the diversion tunnel 345 M tunnel boring was also completed upto December, 1991. 88 M excavation of Adit of HRT from downstream side has been completed. Open excavation of Surge Shaft is also in progress. The contract for the construction of dam has been awarded and contract for power house civil works is under finalisation.

The Project is scheduled for completion is Sept., 1995.

6.15 NEW SCHEMES / PROJECTS

(1) Dhauliganga H.E. Project :

In April 1991, investment approval was accorded by the Govt. for the execution of the Project at a cost of Rs. 601.98 crores (Net including Rs. 84.53 crores as IDC for the generation portion of the Project). The land required for the Project is being identified with the help of the State Government. The infrastructure activity of land acquisition and preparation of contract packages and other relevant works etc. were in progress.

Tanakpur Barrage of NHPC.





However, no project works could be taken up so far on account of paucity of funds.

(2) Koel Karo H.E. Project :

The Koel Karo H.E. Project in Bihar has been accorded investment approval in November, 1991 for execution at an estimated revised cost of Rs. 1338.81 crores including IDC of Rs. 202.38 crores. However, work on the Project structures could not be commenced so far on account of resource constraints.

(3) Baglihar H.E. Project (3 x 150 MW) :

The environmental and forest clearance for the Project have been accorded by the Ministry of Environment and Forests. The techno-economic clearance for the Project has also been accorded by CEA in April, '91 and the Investment approval is being processed.

(4) Sawalkot H.E. Project (3 x 200 MW) :

The Pre-PIB Meeting was held on 14.6.91 and it was decided to update the estimates. Updating of estimates and firming up of technical parameters are in progress.

NHPC also proposes to take up, in the future, the execution of the following Hydroelectric Projects which are under various stages of clearance:

- i) Chamera H.E. Project (Stage-II) (3x100 MW)
- ii) Teesta H.E. Project (Stage-III) (6x200 MW)
- iii) Kachchh Tidal Power Project (900 MW)

6.16 PROJECTS UNDER INVESTIGATION:

The investigation works on Kishenganga H.E. Project (330 MW) in J & K were completed and the DPR sent to CEA in May, 1991 for Techno Economic clearance. In respect of Goriganga H.E. Project (Stage-III) in U.P. geotechnical investigations are in progress.

6.17 TRANSMISSION SYSTEMS :

Work on the construction of the following transmission lines and sub stations were in progress during the year:-

- i) 400 KV Dul Hasti Transmission System & 400/220 KV Kishenpur Sub Station.
- ii) 132 KV S/C Bongaigaon-Gaylephug Transmission System.
- iii) 400 KV D/C Moga Bhiwani Transmission Line.
- iv) 400 KV Nathpa Jhakri Transmission System.
- v) Chamera (Stage-II) Transmission System.

The following Transmission Lines were also entrusted to NHPC for execution :

- i) Uri Transmission System.
- ii) 800 KV Kishenpur-Moga Transmission Line.
- iii) Jallundhar-Ludhiana-Dasuya Transmission System.

6.18 MEMORANDUM OF UNDERSTANDING:

In October, 1991 the Corporation signed a Memorandum of Understanding with the Department of Power for the year 1991-92. The MOU identifies the performance targets to be achieved by NHPC during the year with respect to Power generation, addition of new capacity. It also lays down the support needed from the Govt. to achieve these targets.

6.19 BONDS

The Corporation has been asked to raise an amount of Rs 615 crores by issue of Bonds in 1991-92.

6.20 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 projects for strengthening and improving of sub-transmission and distribution system and improved reliability of supply.

The authorised share capital of the Corporation is Rs. 400 crores. The paid up capital upto the year 1990-91 stood at Rs. 322.60 crores. During 1991-92 (upto December, 91), the Central Govt. have contributed Rs. 40 crores towards the share capital of the Corporation, thus increasing its equity capital base to Rs. 362.60 crores.

Loans advanced by the REC to the State Electricity Boards (SEBs), State Governments and Rural Electric Cooperative Societies during the year 1990-91 amounted to Rs. 709.09 crores. Inclusive of this, the total loan amount advanced put the end of 1990-91



Rural Electrification by REC

aggregated to Rs. 5417.04 crores. During the current year, 1991-92 (upto December, 91) the REC has advanced Rs. 223 crores as loans.

During the year 1990-91, the REC approved 1990 new projects involving a loan assistance of Rs. 961.82 crores. During the current year (upto December, 91), REC approved 38 new projects involving financial assistance of Rs. 74.60 crores. Cumulatively upto December, 91, REC sanctioned 23109 rural electrification projects, involving financial assistance of Rs. 7998.97 crores.

During the year 1990-91, against the target of electrification of 8,708 villages and energisation of 329160 pumpsets, 10,219 villages were electrified and 513400 pumpsets energised. During the year 1991-92 (upto December, 1991) 2703 villages have been electrified and 2.17 lakh pumpsets have been energised. The level of rural electrification in the country has risen from mere 12.3% at the time of establishment of REC in 1969 to 83.3% as of now. About one lakh villages are left for electrification, of which over 70,000 are already covered under REC sanctioned schemes. The number of pumpsets energised, which stood at 10.9 lakhs at the time of setting up the Corporation, has risen to about 91 lakhs as of now.

As a result of a special drive launched by the Corporation for promoting household electrification in rural areas, a record number of 1.4 million connections were released during 1990-91. These connections included single point light connections provided to the households below the poverty line free of cost under Kutir Jyoti Programme.

The corporation earned a net profit of Rs. 74.90 crores after tax during 1990-91, as against Rs. 56.48 crores in

the previous year, and declared dividend of Rs. 6.636 crores for the year 1990-91.

6.21 NORTH EASTERN ELECTRIC POWER CORPORATION

The North Eastern Electric Power Corporation was constituted in 1976, under the Companies Act, with the aim of developing the large electric power potential of the North Eastern Region. The region has large water resources, gas oil reserves and coal deposits, all of which can be developed for power generation. The Corporation made a modest beginning with the implementation of the 150 MW Kopili Hydro-electric project, which has since been commissioned fully. The Corporation has also undertaken investigation of various schemes with a view to prepare a shelf of projects to be implemented according to the demand for power and availability of resources. The various projects taken up by the Corporation are as follows:-

6.22 PROJECTS COMPLETED:

Kopili Hydro Electric Project.

The project is located in the N.C. Hills District of Assam, and was commissioned in July, 1988. 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 House (2x50 MW). The Khandong Power Station was commissioned in March/April, 1984. This project has already generated over 3063 million units of power till January, 1992, and has earned a revenue of over 200 crores in terms of sale of power.

6.23 PROJECTS UNDER EXECUTION

Doyang Hydro electric Project:

This project is located in the Wokha District of Nagaland and has a provision for installing 3 units of 25 MW each. Works of infrastructure development are nearing completion and the main works have also been taken up. The project is scheduled for commissioning in July, 1995.

Ranganadi Hydro Electric Project:

The project is located in the lower Subansiri District of Arunachal Pradesh and has a provision for installing 3 units of 135 MW each. Preliminary works on this project are in an advanced stage and the critical item, i.e. the main tunnel, has already been taken up. The project is scheduled for commissioning in March, 1997.



Assam Gas Based Combined Cycle Power Projects:

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 August, 1995.

Investigation Schemes:

Investigation of the following schemes have been taken up by the Corporation with a view to prepare a shelf of hydro electric projects. All these schemes are located in Arunachal Pradesh.

1. Ranganadi HE Project (Stage-II) : 100 MW
2. Damwe HE Project : 500 MW
3. Dikrong HE Project : 100 MW
4. Papumpam HE Project : 100 MW
5. Kopili HE Project (Stage-II) in Assam : 25 MW

6.24 FINANCIAL

The authorised capital of the Corporation is Rs. 500 crores as on date. The pattern of investment for financing the project under execution by the Corporation is generally in the ratio of 1:1 for equity and loan.

6.25 POWER FINANCE CORPORATION LIMITED

1. The power Finance Corporation Limited (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 Corporation. The projects are formulated and implemented by these bodies. The funds provided by the Corporation are in the nature of additionality to Plan allocation, and are available for application based on merits of the individual projects.

3. In the past 3 years, the Corporation adopted a strategy to 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 aim at augmenting resources for the power sector and bringing about improvement in efficiency—both Operational and Financial during the 8th plan.

4. The authorised share Capital of the Corporation is Rs. 2000 crores. The Paid-up Capital is Rs. 975.45 crores which is subscribed entirely by the Central Government. To augment its resources, PFC has so far raised funds by the issue of Bonds of Rs. 1460 crores. It has also raised Rs. 232.14 crores of foreign currency loan.

5. During the 1991-92, negotiations have been completed with ADB for a direct loan of \$ 250 million for the Power Sector Efficiency Improvement Project and with World Bank for a loan of US \$ 265 millions. The Corporation has also signed an agreement with USAID for Energy Management Consultation and Training (EMCAT) programme for a grant of US \$ 14 million.

6. With a view to improving the operational efficiency and financial performance of the SEBs/SGPCs, the Corporation expects them to formulate an Operational and Financial Action Plan (OFAP). The OFAPs for Andhra Pradesh, Gujarat, Madhya Pradesh, Punjab, Orissa and Karnataka Electricity Boards, and Damodar Valley Corporation have been finalised. These regulatory lending policies have shown positive response to inculcate in the borrowers a sense of the need for prudent financial management.

7. The expected profit after tax for the year 1991-92 is Rs. 100 crores against Rs. 73.18 crores in 1990-91.

(Rs. Cr.)

Sl. No.	Scheme	Loans sanctioned/ disbursed in 1991-92		Cumulative Loans sanctioned/ disbursed upto 30/11/1991	
		Sanctioned	Disbursed	Sanctioned	Disbursed
1.	2.	3.	4.	5.	6.
1.	Renovation & Modernisation	23.69	30.66	356.06	148.93
2.	Transmission, Sub-Transmission & Urban Distribution.	86.89	134.60	1238.30	682.91
3.	Shunt Capacitors	16.40	10.83	169.70	108.05
4.	Generation Projects	44.50	214.92	1790.24	1642.54
		171.48	391.01	3554.30	2582.43

6.26 NATIONAL POWER TRANSMISSION CORPORATION LTD.

The National Power Transmission Corporation Limited (NPTC) was incorporated on 23rd October, 1989 with an authorised share capital of Rs. 5000 crores, under the Companies Act, 1956 to undertake the massive programme of laying the Extra High Voltage (EHV)/ High Voltage Direct Current (HVDC) transmission system and associated sub-stations as well as constructing load despatch and communication facilities in a coordinated and efficient manner with a view to move large blocks of power from various generating sources under the Central Sector to the load centres within the region as well as across the regions with reliability, security and economy. The registered office of the Corporation is situated at New Delhi.

The setting up of the Corporation would:

- i) help in pooling all the expertise in this field under one Central organisation and keeping abreast of the latest technology development.
- ii) bring about economies of scale in the design, construction, maintenance and operation of EHV lines.
- iii) ensure timely and economical implementation of the massive programme of transmission line construction in the 8th and 9th Plan.
- iv) provide the institutional mechanism for creation of a communication network in the power sector and the computer hardware and software for load despatch, automatic generation control, etc. (As this involves considerable system expertise, NPTC will be able to take up such schemes in a cost effective manner which will lead to more effective manner which will lead to more efficient control of the grid operation on real time basis.
- v) provide missing links which will strengthen the grid and facilitate grid operations with greater security and reliability.
- vi) would facilitate the growth of the economic exchange of power by taking up constructions of the inter-regional links. (This would ultimately lead to the formation of the National Power Grid and ensure better utilisation of the available generation resources).

- vii) ensure delivery of the entitled share of power from the central generation.
- viii) relieve central generation companies of the responsibility of construction and operation of the transmission lines, enabling them to concentrate on the massive new capacity additions programme in the 8th plan and bring up the same in the prescribed time schedule.

The Management of Transmission and work of NTPC, NHPC and NEEPCO has been taken over by NPTC. The manpower associated with this work in these Central Public Undertakings have also been transferred and absorbed in NPTC. The NTPC, NHPC, NEEPCO and NPTC have been asked to complete the required formalities for de-jure transfer of assets.

Physical Progress for 1991-92

The following 400 KV/220 KV lines will be completed during 1991-92 as under :

Lines	kms.
1. Vijayawada-Gajuwaka	332
2. Gooty-Bangalore	302
3. Maithon-Jamshedpur	306
4. Agra-Ballabgarh	182
5. Khammam-Vijayawada	126
6. Farakka-Durgapur	146
7. Ramagundam-Khammam	189
8. Chamera-Moga	472
9. 220 KV Tanakpur-Bareilly	212
Total:	<u>2267</u>

6.27 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. U.P. to execute the Tehri Hydro Power Complex in Garhwal Distt. of U.P. The Tehri Hydro Power Complex, the largest multipurpose development venture in the country, will provide both irrigation and power benefits and usher in an era of rapid development in Uttar Pradesh. The project is being executed with technical and financial assistance of the Soviet Union. The Corporation has an authorised share capital of Rs. 1200 Crores.



Salient Features:

- A 260.5 metres high earth and rockfill dam, across the river Bhagirathi at Tehri, just after its confluence with river Bhilangana for creating a storage reservoir to generate power and provide irrigation facilities.
- An underground power house of 1000 MW (4x250 MW) capacity with conventional turbine-Generating sets under Stage-I at Tehri.
- Second underground power house of 1000 MW (4x250 MW) capacity with reversible pump turbine sets under Stage-II at Tehri Pump Storage Plant).
- A 103.5 metre high concrete dam (which will provide a balancing reservoir) with a surface power house of 400 MW (4x100 MW) capacity at Koteshwar, 22 Km, downstream of Tehri dam site across the river Bhagirathi.
- Transmission system for evacuation of power generated Tehri at an Koteshwar projects, through two single circuits 6765 KV lines to Meerut for utilisation in Northern Region.

The estimated cost of the entire Tehri Hydro Power Complex is Rs. 5058 Crores at December, 1991 price level. An expenditure of about Rs. 653 Crores has been incurred on the project till December, 1991.

Project Status

- 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 Cofferdam & the Main Dam have been completed and dam raised to RL. 615 metre throughout its length.

PROJECT COST AND COMMISSIONING SCHEDULE

(Rs. in Crores)		
PROJECT	ESTIMATED COST (AT DEC., 1991 PRICE LEVEL)	COMMISSIONING SCHEDULE (PLANNED)
i) Tehri Dam & HPP (4x250 MW)	2618	1996-97
ii) Koteshwar Dam & HPP (4x100 MW)	654	1996-97
iii) Tehri Pump Storage Plant (4x250 MW)	1090	1996-97
iv) Associated Transmission System (800 KV)	696	1996-97
Total	5058	

6.28 NATHPA JHAKRI POWER CORPORATION LTD. (1500 MW)

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) for which World Bank has sanctioned a Loan of US \$ 437 million. Besides this project, NJPC has taken up pre-construction planning of Kol Dam Project (I.C. = 800 MW).

Main Features of Nathpa Jhakri Project

The Nathpa Jhakri Power Project envisages the construction of:

- 60.50 m high concrete dam on Satluj river at Nathpa to divert 405 cumecs of water through four intakes.
- underground desilting complex, comprising four chambers, each 525 m long, 16.31 m wide and 27.5 m deep, one of the largest underground complex in the World.



Managlad, Adit - Nathpa Jhakri Project

- 10.15 m dia. and 27.295 Km. long head race tunnel (the longest hydro power tunnel in the World) terminating in a 21 m dia. and 301 m deep surge shaft.
- three circular steel-lined pressure shafts, each 4.9 m dia. and 633 m long bifurcating near the power house to feed six units.
- Underground Power House with a cavern size of 216 m x 20 m x 49 m having six Francis Units of 250 MW each to utilise a design discharge of 405 cumecs and a design head of 425 m.
- 10.15m. dia and 1080m long tail race tunnel to discharge the water back into the river Satluj.

The Project is envisaged to be commissioned by March, 1997. The approved estimated cost of Generating Component of this Project at Sept., 1988 price index was Rs. 1678.02 crore including Rs. 206.02 crores as interest during construction. At December, 1990 price index the anticipated cost is Rs. 2140 crores including Rs. 275 crores I.D.C. The cost estimate and commissioning schedule is under revision.

The Project will generate 6700 million units in a 90% dependable year and 7447 million units in an average year, providing 1500 MW of peaking power to the Northern Region. Cost of generation at bus bar is estimated @ 57.63 paise/Kwh and 51.85 paise/Kwh in 90% dependable year and average year respectively (on December, 1990 price level).

Progress of Infrastructure Works

Preliminary surveys and discharge data observations are being carried out at site. Rocks & material tests are being conducted by CSMRS, New Delhi. Model studies for various components of the Project are being done at CWPRS, Pune and UPIRI, Roorkee.

220/66/22 KV Sub-station at Jeori is under construction and will be commissioned by March, 1992. Development of infrastructure is well scheduled to meet the requirements of main civil contractor's when they arrive at site.

Progress of Award of Main Works

(a) Major Civil Works

The major civil works will be put up to International Competitive Bidding in the following three contract packages :

- | | |
|----------------|--|
| Contract No. 1 | : Dam Intake and Desilting arrangement |
| Contract No. 2 | : Lot 2.1 HRT put STA 16042m and sholding works:
Lot 2.2 HRT from STA 16042m to STA 27235m and surge shaft. |
| Contract No. 3 | : Pressure Shaft, power house and TRT including its Appurtenant works. |

Pre-qualification for tendering was invited on global basis for turbine, generator and associated equipment for the project. Process of pre-qualification has been finalised.

Panel of Expert Meeting

A panel of experts (POE) meeting was organised from 9th to 16th November, 1991 wherein apart from six Indian Experts, four foreign experts also participated. Technical Memos were presented to POE. POE has submitted their report. The view of POE are being studied in detail and the same would be incorporated in existing designs and construction scheme of this prestigious project of NJPC.



Kol Dam Hydro-Electric Project (I.C. = 800 MW)

The Kol Dam Hydro-Electric Project which is located on Satluj river in Bilaspur district of Himachal Pradesh envisages utilisation of a drop about 140 mtrs. by constructing a 163 mt. high rockfill Dam and a Power Station, with an installed capacity of 800 MW, at the toe of Dam. It is expected to provide an annual energy generation of 3089 million units in a 90% dependable year. The Project is estimated to cost Rs. 1354 crores at December, 90 price level, with a generation cost of 74.06 Paise/unit.

The Project is proposed to be completed in a period of 6½ years including 1½ years for infrastructural development. M/s. Technopromexport, USSR has already submitted their Final Appraisal Report of the Kol Dam Project indicating its technical feasibility. Financial proposal of USSR's participation in execution of the project is awaited. The Project has been approved by PIB in July, 1991 and the approval of CCEA is under active consideration.

6.29 DAMODAR VALLEY CORPORATION

The Damodar Valley Corporation was established in July, 1948 under the Damodar Valley Corporation Act. The Corporation has a fulltime 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.

The installed capacity (derated) and generation of power during the year 1991-92 upto November, 1991, are as follow :-

Name of Station	Installed capacity (MW)	Generation MU upto 30th November, 1991.	
1) Bokaro	3x50 - 150 1x40 - 40	190	363.77
2) Bokaro 'B'	1x210	210	662.22
3) C.T.P.S.	3x14 - 420 3x120 - 360	780	1173.89
4) D.T.P.S.	1x140 - 140 1x210 - 210	350	717.01
			<hr/> 3268.89
Gas Turbine at Maithon	3x27.5 - 82.5	82.5	40.00
Hydel			
Tilaiya	2x2	4	10.99
Panchet	1x40	40	164.24
Maithon	3x20	60	136.92
			<hr/> 312.15
Total Generation :			3621.04

- BTPS 'A' Unit 4 derated to 40 MW from Janaury, 1990.
- Panchet unit 2 synchronised on 5.3.91 and generated 80.46 MU upto 30.11.91.

The position relating to the on-going generation and transmission projects of the Corporation is given in the table on the following page.

Work under Progress	Capacity	Target date for completion.
Generation Project		
1) Bokaro 'B' Stage-II	2x210 MW 420 MW	Unit II Synchronised on 7.11.90, Unit III, June, 1992
2) Panchet Unit Reversible pump turbine	1x40 MW 40 MW	First synchronised on 5.3.91.
3) Mejia Thermal Power Station	3x210 MW 630 MW	Unit-I Dec, 1993 Unit-II June, 1994. Unit-III Dec. '94.
4) Maithon Right Bank Thermal Power Station	4x210 MW 840 MW	This Soviet assisted project has been taken up for implementation and the agreement sign on 16.1.89, Unit-I Feb '95.
5) Maithon Gas Turbine	3x27.5 82.5 MW	After successful synchronisation and completion of trial run and performance test of all the units, the DVC has since taken over and put to commercial operation.

b) Transmission Projects

- | | |
|---|---|
| 1) 220 KV Bokaro "B" Jamshedpur line | 85% work completed
Target March, 1992 |
| 2) 220 KV Kalyaneswari - Kolipahori Majia line | Target December, 1991. |
| 3) 220 KV CTPS-DTPS - Mejia line | Target march, 1992. |
| 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 | Work completed.
Awaited commissioning, Line checking and pre-commissioning going on. |
| 7) 33 KV 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) | 80% work completed.
Target March, 1992. |
| 9) 220 KV Jamshedpur sub-stn. (Phase-II) | Completed. |
| 10) 220 KV DTPS switchyard (3rd 150 MVA Auto transformer) | 90% work completed.
Target March, 1992. |

Tail Pool Dam Panchet

Work of Tail Pool Dam on the left bank side has not yet started. On the right bank side earth work is in progress for the approach road and the position of Earth Dam extending to that side. Pending completion of the Tail Pool Dam, Panchet Hill Unit-2 (reversible pump turbine type), which is presently under advanced stage of construction, will run as conventional unit 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 from time to time. DVC has also scheme to sponsor officers for foreign training under Colombo Plan etc. on need basis.

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

The Damodar Valley Corporation constituted 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.

*Damodar Valley Corporation – 630 MW.
Mejia Thermal Power Station under Construction*





During the year 1990-91 the net deficit on power system amounted to Rs. (-) 19.89 crores. The return on Capital and resources employed was 1.22%.

6.30 BHAKRA BEAS MANAGEMENT BOARD AND B.C.B.

The administration, operation and maintenance of Bhakra Nangal & Beas projects has been entrusted to the Bhakra Beas Management Board, under the Punjab Reorganisation Act, 1966. The works on Bhakra Nangal project consist of the Bhakra Dam, two power Houses i.e. Left Bank and Right Bank power plants, Nangal Dam, Nangal Hydel Channel (NHC), two power plants namely Ganguwal and Kotla on NHC. The Beas project consists of two units namely Unit No. I and Unit No. II. Unit No. I comprises the Pandeh Dam, Pandeh Baggi Tunnel, Sundernagar Hydel Channel, Balancing Reservoir, Sundernagar Sutlej Tunnel, Dohar 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:-

Power House	Installed capacity (MW)		
1. Bhakra (Right Bank)	5x132	=	660
2. Bhakra (Left Bank)	5x108	=	540
3. Ganguwal	2x24+1x29	=	77
4. Kotla	2x24+1x29	=	77
5. Dehar	6x165	=	990
6. Pong	6x60	=	360
Total			<u>2704</u>

The BBMB also manages the Operation and Maintenance of large transmission system comprising 574.30 circuit Kms of 400 KV lines and 2975.00 circuit Kms of 220 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 & Bhiwani and eighteen 220 KV Sub-station at various other places.

Inflows into the Reservoirs:

(A) Bhakra Reservoir

The maximum reservoir level attained was (512.237 mtrs.) on 15-9-1991 against the maximum permissible level of 1685.00 (513.588 mtrs.). The total quantity of

water received in the Bhakra Reservoir during the period April to December, 1991 was 15.6854 MAF (19347.627 MOM, comprising 12.2167 MAF (15069.06 cm) of Sutlej water and 3.4687 MAF (4278.57 MOM) of Beas diverted water through BSL System. It is anticipated that during the period 1st January to 31st March, 1992, the Sutlej inflows into Bhakra Reservoir would be approximately 0.6302 MAF (777.34 MOM) and Beas diverted water 0.3531 MAF (435.542 MOM) based on dry year pattern of inflows. The total inflow ensuing the previous year were 18.0528 MAF (22268 MOM).

(B) Pong Reservoir:

The maximum reservoir level attained was 1390.28' (423.757 mtrs.) on 24.9.91 against the maximum permissible level of 1400.00' (426.72 mtrs.). The total quantity of water received during the period April to December, 91 is 5.7509 MAF (7093.62 MOM). It is expected that 0.2237 MAF (276 MOM) would be received in Pong Reservoir during the period 1st January to 31st March, 1992 based on dry year pattern of inflows. The total inflows during the previous year were 9.3060 MAF (11479 MOM).

Generation

The actual generation from BBMB Power Houses during the period 1st April 91 to December 1991 was 10120 MUs. The estimated generation during the period January, 1992 to March, 92 would be about 2120 MUs. Thus the total estimated generation from BBMB Power Houses during the year 1991-92 would be about 12240 MUs against the Generation target of 11010 MUs for the year. 1991-92 fixed by CEA.

B.C.B. Works

400 KV Dehra-Bhiwani Line and allied works have been handed over to BBMB on 23-10-90. During the year under report, disposal of surplus stores, machinery & other spares etc. for an amount of Rs. 456.64 lacs (upto 31/12/91) has been done & further for an amount of Rs. 100.00 lacs approx. is expected upto 31/3/92.

6.31 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 need of the power sector. The existing four Thermal Power Stations Personnel Training Institutes at Neyveli, Durgapur, Badarpur and Nagpur were set up by the Govt. of India 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.

2. The training courses conducted at the Regional Institutes of PETS include the following:-

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

3. PETS has been organising, training programmes for Power Sector and have trained about 30,141 personnel upto March, 1991. The number of persons trained in the different courses at the Institutes during 1991-92 (upto November, 1991) is as follows :-

Sl. No.	Courses	No. of trainees
(1)	Regular courses for Engineers	101
(2)	Condensed course for Engineers	97
(3)	Operator courses	108
(4)	Short-term courses for Engineers	484
(5)	Maintenance courses for Technicians	504
(6)	On Plant/On-site courses	1169
(7)	PETS-BHEL courses on 210 MW TPS Operations	50
(8)	Simulator course	202
	Total:	<u>2715</u>

4. The Simulator for 210 MW Units installed with UNDP assistance at Badarpur Institute in 1983, has provided training to more than 2300 engineers by 30th November, 1991.

5. The following short-term courses/workshops have been organised or are planned to be organised by PETS in collaboration with BEI, U.K.:-

- (i) National Seminar on Power Plant Rehabilitation and Modernisation from 25-27th November, 1991 at New Delhi.
- (ii) Three-day Residential programme on Environmental Management conducted at Goa from 11-13th February, 1992.

6. For the current financial year 1991-92, the Department of Power has released Rs. 100 lakhs as Plan and Rs. 191 lakhs as Non-plan grants-in-aid to PETS. The training fee during 1991-92 is targetted to fetch a revenue of Rs. 72.36 lakhs.

7. During 1990-91, the Government has sanctioned schemes for installation of one 500 MW Simulator at Badarpur and one 210 MW Simulator at Nagpur Insititute. 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 other Regional Power Training Institutes are proposed to be augmented during the Ninth Plan Period.

8. The scheme for Housing Complex for Badarpur Institute Sanctioned on 26.12.88 at an estimated cost of Rs. 345.68 lakhs is in an advanced stage of completion.

9. 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 envisaged - (a) Upgrading the present PETS into NPTI; and (b) Setting up of an Institute for Advanced Learning and Management Studies (INALMAS) at Faridabad, Haryana. Action has already been taken to introduce different courses as required under NTPI. A number of long-term courses as per statutory requirement and specialised short-term courses are also being conducted in Hydro and Power System areas. As input to the power system courses, orders have been placed for computer based power system study packages for development of software with 1000 buses and 20 HVDC lines. Computer based hardware required for the same is also being procured. A Desk Top publishing system is under installation at PETS HQ for development of training material.

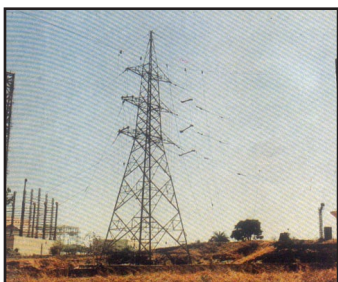
6.32 CENTRAL POWER RESEARCH INSTITUTE (CPRI)

The Central Power Research Institute (CPRI) was established in 1960 by the Government of India, to serve as a national laboratory for applied research in electrical Power engineering and also to function as an independent authority for testing and certification of electrical equipments manufactured in the country. CPRI was re-organized into an autonomous society in 1978 under the Ministry of Energy (Department of Power), Government of India.

2. The Institute has its main laboratories and corporate office at Bangalore and a unit at Bhopal for testing and development of switchgears. A research facility in UHV AC transmission technology is coming up near Hyderabad. The work has just started at the Thermal Power Research Centre at Koradi near Nagpur, Regional Testing Laboratory at Muradnagar and the one Energy Research Centre at Thiruvananthapuram. A Flyash Utilization Demonstration Centre has been commissioned at Raichur Thermal Power Station, Karnataka.

3. 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 and finding solutions in the form of sponsored research projects.

*Central Power Research Institute –
Testing of 220 KV Transmission Tower*



4. As a result of its R&D efforts, the Institute has been able to develop a number of new products and processes useful in the power sector. They are found to be of great importance in energy saving, power system improvement, profitable utilization of waste products, curtailing distribution losses, etc. Many of these products and processes are transferred to entrepreneurs for commercial exploitation.

5. With a view to expose the engineers & scientists to the latest developments in the professional field, the Institute organises seminars/workshops on different subjects. During the year Institute has organized four national seminars/workshops. A large number of technical papers were presented and discussed at these seminars/workshops.

6. Forty six technical reports were issued upto 31 December 1991 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.

7. The CPRI provides testing and consultancy services to electricity supply utilities, manufacturing industries and other organisations for new product development and quality assurance. It has also helped towards import substitution.

8. The Institute is fully equipped for development testing of switchgear and fusegear, transformers, powercables, capacitors solid insulating materials, insulation oils and varnishes, transmission linetowers etc. For effective quality control, facilities are available for testing impulse and power frequency of power equipment, short circuit testing of switchgear and 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.

9. Upto 31 December, 1991, the Institute has tested 3223 samples and 1229 organizations have availed themselves of the testing and certification facilities during the year.

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

1989-90	1990-91	1991-92 (upto 31 Dec 1991)
Rs. 477 Lakhs	Rs. 502 Lakhs	Rs. 436 Lakhs

11. During 1989-90 the Institute had earned adequate revenue to meet its non-plan expenditure. No grant-in-aid was therefore released from the Government during these years to meet the non-plan expenditure.

The Institute was self-sufficient during 1991-92 also in so far as non-plan expenditure is concerned.

12. 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	Rs. 9744.00 Lakhs
(2) UHV/AC Research Laboratory, Hyderabad	Rs. 1705.53 Lakhs
(3) Thermal Power Research Centre, Koradi (Nagpur)	Rs. 1718.17 Lakhs
(4) Regional Testing Laboratory, Murandnagar (U.P.)	Rs. 636.00 Lakhs

13. Under Phase I 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.

14. CPRI received one award each from Institute of Electrical Engineers, Japan, National Design Award by Institution of Engineers (India) and 3 awards from CBI & P during the year 1991.

15. Training programme for middle level officers to give exposure to Research and Development work as well as testing facilities at CPRI were conducted.

16. 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.

6.33 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 has 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 Department of Power, Ministry of Power & NES, formulates policy, designs the energy management programme and ensures effective

co-ordination between interested Ministries and other entities. The Energy Management Centre is the executive agency under this policy function, designed to implement and monitor the Energy Conservation programme.

Role as Coordinator:

There are a number of institutions in the field of energy management today which are doing highly competent and effective works in this field. It has been felt that there has to be an organisation for taking over overall strategic vision supported by quantitative analysis of work being done in the field of energy management so far in the country and also steps to be taken to improve energy efficiency further. Energy Management Centre has therefore been set up as a Centre of excellence for research, training and information in energy policy and management. The Centre is a focal point of institutional network between India and the European Communities.

Organisation 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 of the Centre:

The activities of EMC are as follows:

- develop a National Energy database by collecting and analysing 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 and labels and setting of consumption targets, - provide planning assistance to government agencies, organise public information and promotional campaigns on an on-going basis;
- organise 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 enterprises and provide recommendations to improve energy efficiency



and fuel substitution;

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

International Cooperation Projects:

At present the EMC is implementing the following projects:

- (i) UNDP-Energy Bus Project
- (ii) EEC-India Energy Bus Programme
- (iii) ESCAP Regional TCDC Working Group on Energy Conservation
- (iv) World Bank Industrial Efficiency Project

Expenditure during the year 1990-91 and budget estimates for the year 1991-92

The total expenditure of the EMC during the year 1990-91 was Rs. 157.24 lakhs. The budget estimates for the year 1991-92 is Rs. 122.68 lakhs against which an expenditure of Rs. 58.28 lakhs has been incurred till November, 1991.

6.34 ACC BABCOCK LIMITED

By a decision of Government, March 1989, ACC Babcock Limited (ABL), the premier boiler manufacturing company, was placed under the administrative control of Department of Power. The manufacturing range of ABL, apart from power and industrial boilers, includes Cement manufacturing machinery, Pressure vessels, Electro-static precipitators (ESPs) air quality control system, machinery for chemical, metallurgical, sugar, defence and mineral ore processing industry, miscellaneous Engg. equipment and foundry products. ABL's manufacturing units are in Durgapur, in West Bengal and Shahabad in Karnataka. ABL has a subsidiary, namely Babcock & Wilcox India Limited (B&WI), located in Clacutta, which specialises in erection and commissioning.

With over a quarter of century of proven experience, ABL is one of the largest heavy engineering companies in India with a wealth of expertise garnered from the renowned promoters and other well known organisations through technical collaboration. ABL which started functioning in 1962, ceased functioning following filing of a winding-up petition before Bombay High Court by its previous management in October, 1986. Under an IDBI/BIFR package, which was approved by Government, ABL

resumed operations in June, 1988, under the administrative control of Department of Power (Government of India). The Department of Atomic Energy and Department of Power of Government of India have extended a long term interest free loan to the extent of Rs. 13 crores each, totalling to Rs. 26 crores. Financial institutions led by IDBI have extended assistance for the revival of the company. The State Governments of Karnataka and West Bengal have extended concessions regarding collection of Central sales tax from ABL's units located in these States.

Department of Power had submitted a proposal to Govt. on future course of action for rehabilitation of ACC Babcock Limited. The proposal was approved on 7th February, 1992. The basic thrust of Department of Power's proposal was to furnish guarantees/counter guarantees to ABL for financial assistance from the SBI and other financial institutions amounting to Rs. 180.54 crores.

Major Orders booked during the period under review includes:

Order	Value (Rs. Crores)
1. 2x250 MW Budge-Budge TPs of CESC	190.00
2. Retrofit of ESPs for BALCO Managed by NTPC	23.00
3. Retrofit of ESPs for Nasik TPS of MSEB	16.00
4. Conversion boilers for HPC-30% advance for supply	12.00
5. Recovery boiler for Bhadrachalam paper Board	6.00
6. Boilers of Madras Refinery	19.00

The company after revival has Successfully commissioned the following projects:

1. Kolaghat of (WBPDCL) (1x210 MW)
2. Bokaro of (DVC) (1x210 MW)
3. Khammam Heavy Water plant of (DAE) (3x265 TPH)
4. Boilers for Manadya Paper Mills
5. Boilers for Bhadrachalam paper Boards
6. Boilers for Ballarpur Industries

Working on the revival plan, an improved order book position and identification of new opportunities for diversification, ABL is expected to contribute its mite in the power sector as a reputed manufacturer of boilers.

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*
Installed Capacity															
Utilities+Non-Utilities	MW	16271	20345	31307	33316	35781	39235	43706	47705	52273	54980	60500	65560	70501	74456
Utilities	MW	14709	18317	28148	30214	32345	35363	39339	42585	46769	49266	54155	59040	63627	66055
Hydro	MW	6383	7529	11384	11791	12173	13056	13856	14460	15472	16196	17265	17798	18308	18753
Nuclear	MW	420	640	640	860	860	860	1095	1095	1330	1330	1330	1565	1565	1565
Thermal (Coal)	MW	7508	9753	15991	17128	18695	20712	23648	26311	28809	30394	34237	37943	41510	43379
Oil & Gas	MW	398	395	433	440	617	735	740	719	1158	1346	1323	1734	2244	2358
Non-Utilities	MW	1562	2028	2859	3102	3436	3872	4367	5120	5504	5714	6345	6520	6874	8402
Generation (U+NU)															
Utilities	BU	61.21	76.68	112.82	119.26	131.12	140.30	150.99	169.21	183.39	201.28	218.98	240.35	266.20	288.71
Utilities	BU	55.83	70.20	104.63	110.84	122.10	130.26	140.18	156.86	170.35	187.71	202.09	221.38	245.40	264.61
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	62.05	71.68
Nuclear	BU	2.42	2.21	2.88	3.00	3.02	2.02	3.55	4.07	4.98	5.02	5.04	5.82	4.63	6.14
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	154.87	172.68	179.70
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	2.82	6.04	7.09
Non-Utilities Auxiliary	BU	5.38	6.48	8.19	8.42	9.02	10.04	10.81	12.35	13.04	13.57	16.89	18.97	20.80	24.10
Consumption (U+NU)															
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	19.46	22.66	22.57
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	44.51	52.21	56.52
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	176.38	191.33	209.62
Industrial	BU	34.33	38.31	53.24	55.40	60.89	61.75	66.55	73.56	79.44	81.95	82.94	92.68	98.19	106.21
Transport	BU	1.37	1.53	2.30	2.27	2.50	2.83	2.71	2.88	3.08	3.26	3.65	4.07	4.18	4.15
Agriculture	BU	4.47	7.76	13.45	14.49	15.0	17.82	18.23	20.96	23.42	29.44	35.27	38.85	43.64	49.47
Domestic, Commercial and Services	BU	8.29	10.66	16.40	17.58	19.56	22.25	24.40	27.32	28.42	32.89	36.69	40.78	45.32	49.79

Includes not energy exported to neighbouring countries.

*** Provisional**

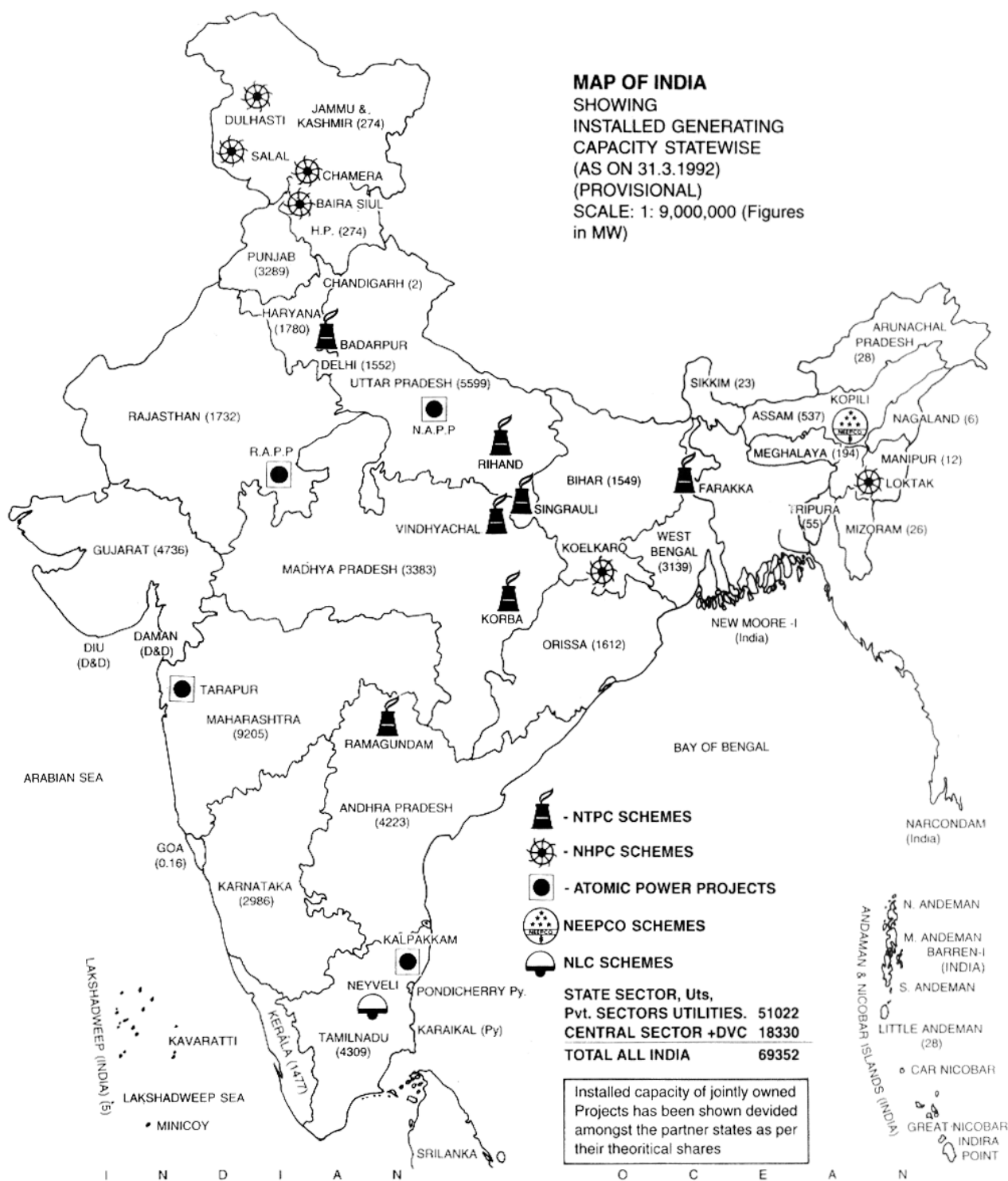


Tehri Project—View of Bhagirathi River Diversion

INSTALLED GENERATING CAPACITY AS ON 31.3.92 (UTILITIES)*

REGION/STATE/UT	<u>HYDRO</u>		<u>THERMAL</u>		<u>NUCLEAR</u>		TOTAL
	(MW)	(%)	(MW)	(%)	(MW)	(%)	
HARYANA	883.90	49.6	896.42	50.4	0.00	0.0	1780.32
HIMACHAL PRADESH	272.07	99.5	1.50	0.5	0.00	0.0	273.57
JAMMU & KASHMIR	180.31	68.8	81.76	31.2	0.00	0.0	262.07
PUNJAB	1798.94	54.7	1490.00	45.3	0.00	0.0	3288.94
RAJASTHAN	962.93	55.7	765.00	44.3	0.00	0.0	1727.93
UTTAR PRADESH	1504.55	26.4	4204.69	73.6	0.00	0.0	5709.24
CHANDIGARH	0.00	0.0	2.00	100.0	0.00	0.0	2.00
DELHI	0.00	0.0	551.60	100.0	0.00	0.0	551.60
CENTRAL SECTOR	645.00	9.4	5307.00	77.3	910.00	13.3	6862.00
TOTAL (NR)	6247.70	30.5	13299.97	65.0	910.00	4.4	20457.67
GUJARAT	425.00	9.0	4314.33	91.0	0.00	0.0	4739.33
MADHYA PRADESH	725.09	21.4	2657.50	78.6	0.00	0.0	3382.59
MAHARASHTRA	1570.22	17.1	7634.50	82.9	0.00	0.0	9204.72
GOA	0.00	ERR	0.00	ERR	0.00	ERR	0.00
D&N HAVELI	0.00	ERR	0.00	ERR	0.00	ERR	0.00
CENTRAL SECTOR	0.00	0.0	3496.00	84.2	655.00	15.8	4151.00
TOTAL (WR)	2720.31	12.7	18102.33	84.3	655.00	3.0	21477.64
ANDHRA PRADESH	2511.94	59.5	1711.50	40.5	0.00	0.0	4223.44
KARNATAKA	2372.20	79.0	630.00	21.0	0.00	0.0	3002.20
KERALA	1491.50	100.0	0.00	0.0	0.00	0.0	1491.50
TAMIL NADU	1944.95	45.3	2350.00	54.7	0.00	0.0	4294.95
PONDICHERRY	0.00	ERR	0.00	ERR	0.00	ERR	0.00
CENTRAL SECTOR	0.00	0.0	3750.00	88.9	470.00	11.1	4220.00
TOTAL (SR)	8320.59	48.3	8441.50	49.0	470.00	2.7	17232.09
BIHAR	153.30	9.9	1399.43	90.1	0.00	0.0	1552.73
ORISSA	1221.92	72.2	470.00	27.8	0.00	0.0	1691.92
WEST BENGAL	46.91	1.5	3092.47	98.5	0.00	0.0	3139.38
DVC	144.00	7.1	1887.50	92.9	0.00	0.0	2031.50
SIKKIM	26.59	90.8	2.70	9.2	0.00	0.0	29.29
CENTRAL SECTOR	0.00	0.0	840.00	100.0	0.00	0.0	840.00
TOTAL (ER)	1592.72	17.2	7692.10	82.8	0.00	0.0	9284.82
ASSAM	2.00	0.4	55.19	99.6	0.00	0.0	557.19
MANIPUR	2.60	21.6	9.41	78.4	0.00	0.0	12.01
MEGHALAYA	186.71	96.4	7.05	3.6	0.00	0.0	193.76
NAGALAND	2.50	40.8	3.62	59.2	0.00	0.0	6.12
TRIPURA	16.01	29.3	38.64	70.7	0.00	0.0	54.65
ARUNACHAL PRADESH	19.26	68.2	8.99	31.8	0.00	0.0	28.25
MIZORAM	2.37	9.2	23.35	90.8	0.00	0.0	25.72
CENTRAL SECTOR	255.01	100.0	0.00	0.0	0.00	0.0	255.01
TOTAL (NER)	486.46	42.9	646.25	57.1	0.00	0.0	1132.71
A & N ISLANDS	0.00	0.0	27.69	100.0	0.00	0.0	27.69
LAKSHADWEEP	0.00	0.0	5.08	100.0	0.00	0.0	5.08
ALL INDIA	19367.78	27.8	48214.92	69.3	2035.00	2.9	69617.70
STATE SECTOR	18047.77	37.3	30362.92	62.7	0.00	0.0	48410.69
PVT. SECTOR	276.00	9.7	2571.50	90.3	0.00	0.0	2847.50
CENTRAL SECTOR	1044.01	5.7	15280.50	83.2	2035.00	11.1	18359.51

* Anticipated



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

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