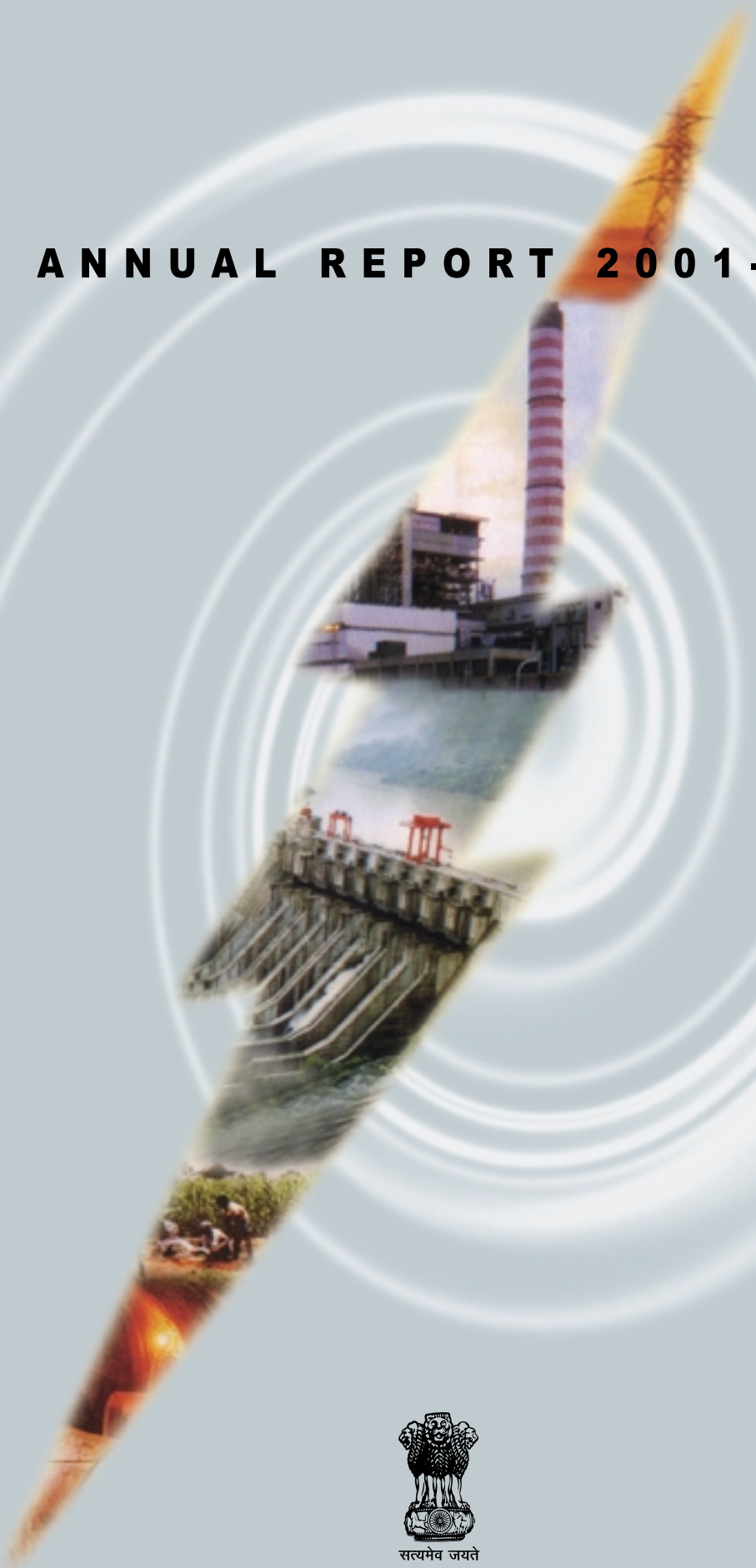
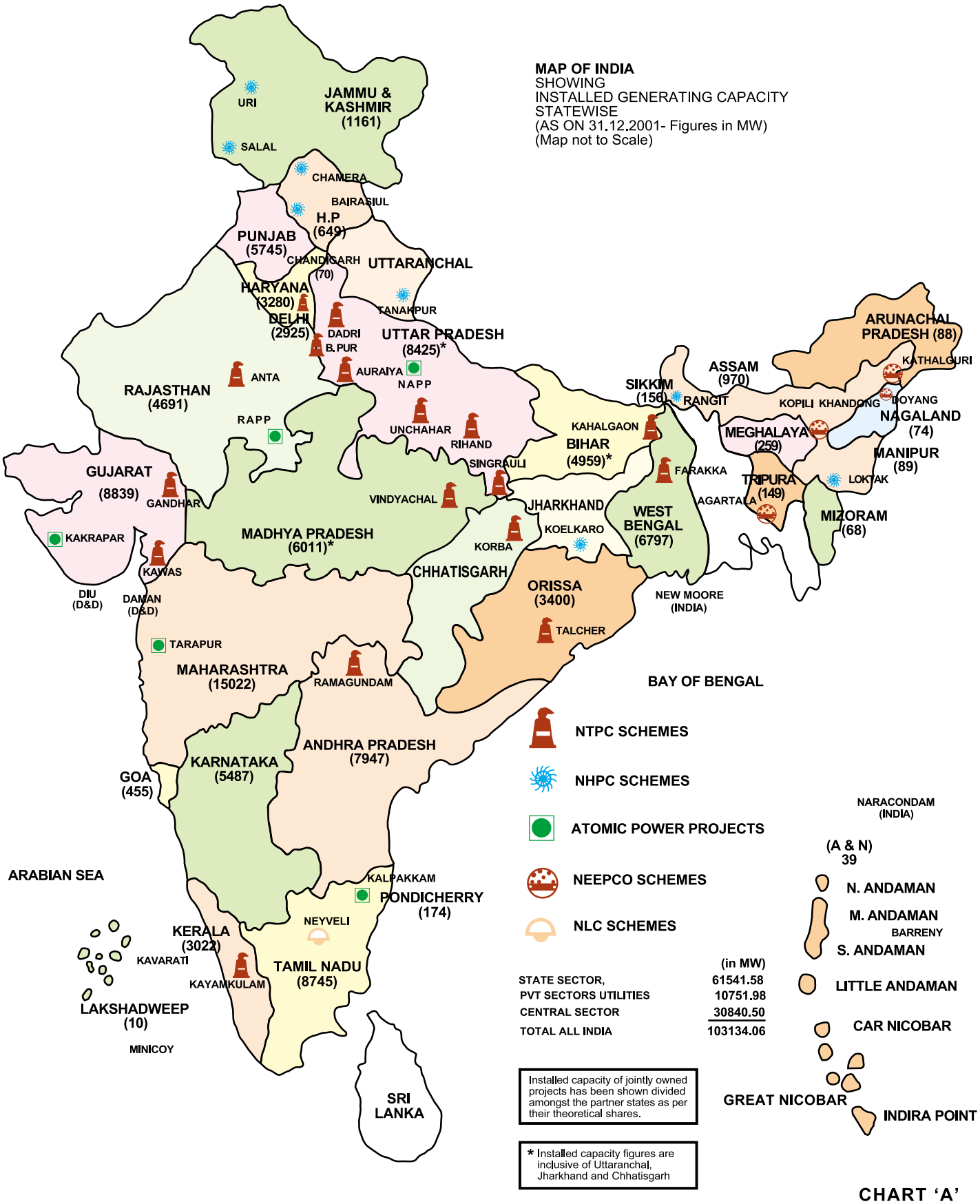
# ANNUAL REPORT 2001-02



सत्यमेव जयते

**MINISTRY OF POWER**
**GOVERNMENT OF INDIA**


MAP OF INDIA
SHOWING
INSTALLED GENERATING CAPACITY
STATEWISE
(AS ON 31.12.2001- Figures in MW)
(Map not to Scale)
JAMMU & KASHMIR (1161)
URI
SALAL
CHAMERA
BAIRASIUL
H.P (649)
PUNJAB (5745)
CHANDIGARH (70)
UTTARANCHAL
HARYANA (3280)
DELHI (2925)
TANAKPUR
DADRI
B.PUR
UTTAR PRADESH (8425)*
ANTA
AURAIYA
NAPP
RAJASTHAN (4691)
RAPP
UNCHAHAR
RIHAND
SINGRAULI
VINDYACHAL
GUJARAT (8839)
GANDHAR
KAKRAPAR
KAWAS
DIU (D&D)
DAMAN (D&D)
MADHYA PRADESH (6011)*
KORBA
CHHATISGARH
TARAPUR
MAHARASHTRA (15022)
RAMAGUNDAM
GOA (455)
KARNATAKA (5487)
ANDHRA PRADESH (7947)
ARABIAN SEA
KALPAKKAM
PONDICHERRY (174)
NEYVELI
KERALA (3022)
KAVARATI
KAYAMKULAM
TAMIL NADU (8745)
LAKSHADWEEP (10)
MINICOY
SRI LANKA
KAHALGAON
BIHAR (4959)*
JHARKHAND
KOELKARO
ORISSA (3400)
TALCHER
FARAKKA
WEST BENGAL (6797)
NEW MOORE (INDIA)
BAY OF BENGAL
SIKKIM (156)
RANGIT
ASSAM (970)
ARUNACHAL PRADESH (88)
KATHALGURI
KOPILI
KHANDONG
DOYANG
NAGALAND (74)
MEGHALAYA (259)
MANIPUR (89)
TRIPURA (149)
LOKTAK
AGARTALA
MIZORAM (68)
NTPC SCHEMES
NHPC SCHEMES
ATOMIC POWER PROJECTS
NEEPCO SCHEMES
NLC SCHEMES
(in MW)
STATE SECTOR, 61541.58
PVT SECTORS UTILITIES 10751.98
CENTRAL SECTOR 30840.50
TOTAL ALL INDIA 103134.06
Installed capacity of jointly owned projects has been shown divided amongst the partner states as per their theoretical shares.
* Installed capacity figures are inclusive of Uttaranchal, Jharkhand and Chhatisgarh
NARACONDAM (INDIA)
(A & N) 39
N. ANDAMAN
M. ANDAMAN
BARRENY
S. ANDAMAN
LITTLE ANDAMAN
CAR NICOBAR
GREAT NICOBAR
INDIRA POINT
CHART 'A'

# ANNUAL REPORT

## 2001-02


# Ministry of Power

## Government of India

*Singrauli Super Thermal Power Station*

# CONTENTS

# MINISTRY OF POWER

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

Electricity is a concurrent subject at Entry 38 in List III of the Seventh Schedule of the Constitution of India. The Ministry of Power is primarily responsible for the development of electrical energy in the country. The Ministry is concerned with perspective planning, policy formulation, processing of projects for investment decision, monitoring of the implementation of power projects, training and manpower development and the administration and enactment of legislation in regard to thermal, hydro power generation, transmission and distribution.

The Ministry of Power is responsible for the administration of the Indian Electricity Act, 1910 and Electricity (Supply) Act, 1948, Electricity Regulatory Commission Act, 1998, Electricity Laws (Amendment) Act, 1998 (No.22 of 1998) Energy Conservation Act, 2001 and to undertake such amendments to these Acts, as may be necessary from time to time, in conformity with the Government's policy objectives.

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

1.General Policy in the Electric Power Sector and issues relating to energy policy. (Details of short, medium and long-term policies in term policies in terms of formulation, acceptance, implementation and review of such policies, cutting across sectors, fuels, regions and cross country flows).

2.All matters relating to hydroelectric power (except small/mini/micro hydel projects of and below 25 MW capacity) and thermal power and transmission system network.

3.Research, development and technical-assistance relating to hydroelectric and thermal power and transmission system network.

4.Administration of the Indian Electricity Act, 1910 (9 of 1910) and Electricity (Supply) Act, 1948 (54 of 1948), Electricity Regulatory Commissions Act 1998 and Electricity Laws (Amendment) Act, 1998 (No.22 of 1998) and Energy Conservation Act, 2001.

5.All matters relating to Central Electricity Authority, Central Electricity Board and Central Electricity Regulatory Commission.

6.Rural Electrification, power schemes in Union Territories and issues relating to power supply in the States and Union Territories.

7.Matters relating to the following Undertakings/ Organisations etc.:

(a) The Damodar Valley Corporation.
(b) The Bhakra Beas Management Board (except matters relating to irrigation).
(c) National Thermal Power Corporation Limited.
(d) National Hydro-electric Power Corporation Limited.
(e) Rural Electrification Corporation Limited.
(f) North Eastern Electric Power Corporation Limited.
(g) Power Grid Corporation of India Limited.
(h) Power Finance Corporation Limited.
(i) Tehri Hydro Development Corporation.
(j) Nathpa Jhakri Power Corporation.
(k) Central Power Research Institute.
(l) National Power Training Institute.
(m) Energy Management Centre.
(n) Power Trading Corporation.

8. Other Public Sector Enterprises concerned with the subject included under this Ministry except such projects as are specifically allotted to any other Ministry or Department.

9. All matter concerning Energy Conservation and Energy Efficiency pertaining to the Power Sector.

## 1.2 ORGANISATIONS UNDER MINISTRY OF POWER

In all technical and economic maters, Ministry of Power is assisted by the Central Electricity Authority (CEA) constituted under the Electricity (Supply) Act, 1948.

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

The construction and operation of generation and transmission projects in the Central Sector are entrusted to Central Sector Power Corporations, viz. The National Thermal Power Corporation (NTPC), the National Hydro Electric Power Corporation (NHPC), the North Eastern Electric Power Corporation and the Power Grid Corporation of India Limited (PGCIL). The Power Grid is responsible for all the existing and future transmission projects in the Central Sector and also for the formation of the National Power Grid. Two Joint Venture Power Corporations namely, Nathpa Jhakri Power Corporation (NJPC) and Tehri Hydro Development Corporation (THDC) are responsible for the execution of the Nathpa Jhakri Power Project in Himachal Pradesh and projects of the Tehri Hydro Power Complex in Uttaranchal respectively. Two statutory bodies i.e., the Damodar Valley Corporation (DVC) and the Bhakra Beas Management Board (BBMB) are also under the administrative control of the Ministry of Power. Programmes of rural electrification are provided financial assistance by the Rural Electrification Corporation (REC) under the Ministry of Power. The Power Finance Corporation (PFC) provides term-finance to projects in the power sector.

Further, the autonomous bodies (societies) i.e. Central Power Research Institute (CPRI), the National Power Training Institute (NPTI) and the Energy Management Centre (EMC) are also under the administrative control of the Ministry of Power. A Power Trading Corporation (PTC) has also been set up in April, 1999 to catalyse development of mega power projects and to promote exchange of power with neighbouring countries.

## 1.3 ORGANISATIONAL SET-UP

Shri Suresh P. Prabhu has been the Minister of Power since the 1st October, 2000. Smt. Jayawanti Mehta has been the Minister of State of Power with effect from the 14th October, 1999. Shri A.K. Basu has been the Secretary of the Ministry of Power since 1.6.2000. He is assisted by a Special Secretary, an Additional Secretary and five Joint Secretaries, including the Financial Adviser.

The Additional Secretary looks after the work relating to Operation Monitoring (OM), Thermal, Energy Conservation, establishment matters of Central Electricity Authority, including that of the Central Power Engineering (Group A) Services. The allocation of work among the five Joint Secretaries in the Ministry of Power is as under:

(i) Hydel, Coordination, Press and Publicity.

(ii) Administration, Thermal and Distribution, including APDP and IT.

(iii) Reforms & Restructuring, Vigilance & Security, Power Finance Corporation (PFC) and Rural Electrification Corporation (REC), Policy, Planning and External Assistance, Official Language.

(iv) Accounts & Finance, Resource Planning, Monitoring of Financial performance of SEBs, and follow up action on the recommendation of Montek Singh Ahluwalia Committee & N.K. Singh Committee.

(v) Investment Promotion Cell, Transmission, Powergrid Corporation of India Ltd. (PGCIL), Power Trading Corporation (PTC), Training & Research and Operation Monitoring.

There is a Principal Accounts Office headed by the Controller of Accounts who in turn reports to the Financial Adviser in the Ministry of Power. Matters relating to reservations for SC/ST, Physically Handicapped and OBC are dealt by the respective Liaison Officers. Matters relating to recreation activities are dealt by Power Sport Control Board. The total staff strength of the Ministry is 313. There are 46 women employees in the Ministry of Power (Sectt.)

# POWER SECTOR-HIGHLIGHTS AND MAIN ACHIEVEMENTS

## 2.1 Power generation :-

The over all generation in the country has increased from 301 Billion Units (BUs) during 1992-93 to 499.5 BUs during 2000-2001 (Chart B). The over all generation (Thermal+Nuclear + Hydro) in public utilities in the country for the last five years are as under :-

| Year | Generation (BUs) |
|---|---|
| 1996-97 | 394.8 |
| 1997-98 | 420.6 |
| 1998-99 | 448.4 |
| 1999-2000 | 480.7 |
| 2000-01 | 499.5 |
| 2001-02 (April-Dec) | 381.1 |
| 2001-02 | 539.5# |

# Target for the whole year.

## 2.2 INSTALLED CAPACITY

The all India Installed Capacity of electric power generating stations under utilities was 101630.08 MW as on 31.3.2001 consisting of 25141.78 MW hydro, 72358.67 MW thermal, 2860 MW nuclear and 1269.63 MW wind which has increased to 103134.06 MW (Statement-I) as on 31.12.2001 consisting of 25574.03 MW hydro, 73273.97 MW thermal, 2860 MW nuclear and 1426.06 MW wind (Chart-C).

## 2.3 CAPACITY ADDITION PROGRAMME-2000-2001

A capacity addition programme of 4000.30 MW consisting of 1297.00 MW Hydro, 2263.30 MW Thermal and 440.0 MW Nuclear was envisaged for the year 2000-2001. Against this, a capacity addition of 3775.66 MW consisting of 1215 MW Hydro 2120.66 MW Thermal and 440 MW Nuclear was added during the year.

### 2.3.1 Capacity Addition Programme during 2001-2002 and Achievement (April-2001 to December, 2001)

A programme of commissioning of 3228.50 MW thermal generating capacity was envisaged during the year 2001-2002. The details of 942.30 MW Thermal capacity already commissioned during the year 2001-2002 (till 31.12.2001) are given in Statement II. The details of 2942.3 MW Thermal capacity likely to be commissioned during the balance period of 2001-2002 are given in Statement III (Jan.2002-March2002).

A programme of commissioning of 1536.2 MW hydro capacity was envisaged at the beginning of the year 2001-2002. The details of 432.25 MW hydro capacity already rolled/ commissioned during 2001-2002 till 31.12.2001 are given in Statement IV. The details of 666.0 MW hydro capacity likely to be commissioned during the remaining period of 2001-2002 are given in Statement V.

### 2.3.2 Capacity addition (last five years)

In the last five years including 2001-02 (April, 2001-December, 2001), the following new capacities have been added.

| Year | Centre | State* | Total* |
|---|---|---|---|
| 1996-97 | 823.50 | 800.90 | 1624.40 |
| 1997-98 | 333.0 | 2893.50 | 3226.50 |
| 1998-99 | 991.60 | 3250.40 | 4242.00 |
| 1999-2000 | 1615.40 | 2892.10 | 4507.50 |
| 2000-01 | 659.00 | 3116.66 | 3775.66 |
| 2001-02(Upto December, 2001) | — | 1374.55 | 1374.55 |

*includes private sector projects.

## 2.4 NINTH PLAN CAPACITY ADDITION PROGRAMME

The Planning Commission had fixed a target of 40245.2 MW for capacity addition during Ninth Plan. The breakup was as under:

| | Central Sector | Private Sector | State Sector | Total |
|---|---|---|---|---|
| Thermal | 7574 | 17038.5 | 4933.0 | 29545.5 |
| Hydro | 3455 | 550.0 | 5814.7 | 9819.7 |
| Nuclear | 880 | 0.0 | 0.0 | 880.0 |
| Total | 11909 | 17588.5 | 10747.7 | 40245.2 |

In the Mid term review carried out in July 1999, the Planning Commission in consultation with the Ministry of Power, assessed that a capacity addition of only 28097.2 MW comprising 8399.2 MW hydro, 18818.0 MW thermal and 880.0 MW nuclear was feasible.

The Working Group on Power for 10th Plan has reviewed the capacity addition programme for 9th Plan and has estimated a feasible capacity addition programme of 19,213 MW consisting of 4590.2 MW hydro 13742.8 MW thermal and 880.0 MW nuclear.

### 2.4.1 TENTH PLAN CAPACITY ADDITION PROGRAMME

Planning Commission constituted Working Group on Power for formulation of the Tenth Plan (2002-07) under the chairmanship of Secretary (Power), Ministry of Power and Member (Planning), Central Electricity Authority as Member Secretary with Members from various organisations.

Working Group on Power has assessed the feasible capacity addition programme of 46,939 MW in the 10th Plan. This comprises of 17,311 MW hydro, 28,328 MW thermal and 1,300 MW nuclear. Region and type-wise capacity benefits is given below:

| REGION | HYDRO | THERMAL | NUCLEAR | TOTAL |
|---|---|---|---|---|
| NORHTERN | 7975 | 6279 | - | 14254 |
| WESTERN | 3810 | 8420 | 1080 | 13310 |
| SOUTHERN | 2174 | 5707 | 220 | 8101 |
| EASTERN | 2031 | 7205 | - | 9236 |
| NORTH EASTERN | 1321 | 717 | - | 2038 |
| ALL INDIA | 17311 | 28328 | 1300 | 46939 |

The sector-wise break-up is as follows:

| SECTOR | HYDRO | THERMAL | NUCLEAR | TOTAL |
|---|---|---|---|---|
| CENTRAL | 10815 | 12290 | 1300 | 24405 |
| STATE | 4904 | 7129 | - | 12033 |
| PRIVATE | 1592 | 8909 | - | 10501 |
| TOTAL | 17311 | 28328 | 1300 | 46939 |

The overall fund requirement for 10th Plan would be of the order of Rs.3,52,000 crores for generating capacity addition. This includes advance action for 11th Plan generation schemes.

### National Perspective Needed for Thermal Power Development

Till the year 1947 a mere 854 MW thermal capacity was installed. Shortly after independence, the Electricity (Supply) Act, 1948 was enacted, which paved the way for creation of State Electricity Boards (SEBs). The SEBs were assigned the sole responsibility of generation, transmission and distribution of electricity within the State. In mid seventies it was realized that with the uneven distribution of coal and hydel resources within the country, power development only by SEBs as spatial units would not only create large inter-state imbalances but also they would not be in position to meet the increasing power demand. Government of India then decided to create generating companies in the Central Sector to supplement the efforts of States. Consequently, public sector undertakings in central sector were created to set up thermal stations alongwith Associated Transmission System.

With rapid installation of large size thermal stations, the share of thermal energy has been gradually increasing.

Based on the 16th Electric Power Survey (EPS) Report it has also been estimated that to ensure 'Power on Demand', additional generation capacity of over 1,00,000 MW needs to be added by 2012. This amounts to nearly doubling the capacity installed in the last half century in the coming decade. The experts have estimated that ideal energy mix for optimal utilization of the installed capacity in India is 60 per cent thermal and 40 per cent hydro. The present thermal:hydro ratio in the country is about 75:25.

The 16th EPS Report has forecasted the peak demand of 1,15,705 MW at the end of the 10th Plan. To meet the demand, as per the Working Group Report a need based capacity addition of 56,836 MW would be required during the 10th Plan period. This capacity requirement is based on the assumptions that R&M and Life Extension Programme of old units would be effectively implemented. As against need based capacity addition requirement of 56,836 MW, the Working Group has reported that capacity addition of 46,939 MW (excluding non-conventional energy sources) is feasible during 10th Plan. Out of the feasible 46,939 MW, the capacity addition of 28,328 MW (60%) has been envisaged in thermal sector during the 10th Plan.

The most crucial factor in perspective planning for highly capital intensive power sector is the resource mobilization capability of the sector. It is estimated that for building 1,00,000 MW of additional power capacity and associated transmission and distribution infrastructure, nearly Rs.8,00,000 crore of investments would be needed in the next decade.

The Working Group has identified that 12,290 MW thermal capacity addition is feasible in Central Sector during 10th Plan. Out of this, 9,160 MW capacity addition has been allocated to NTPC, which constitute about 74% of thermal capacity addition in Central Sector. The feasible thermal capacity addition targets during 10th Plan as assessed by Working Group for other Central Sector generating companies comprises of 1920 MW by Damodar Valley Corporation (DVC), 710 MW by Neveylli Lignite Corporation (NLC) and 585 MW by North Eastern Electric Power Corporation (NEEPCO).

The second important factor in planning for thermal power development is the choice of fuel so as to provide power at affordable tariff to the consumers and also ensure overall energy security of the country on a long-term basis. India has abundant coal reserves, which are expected to last nearly 200 years at the present consumption rates. However, the proven oil/gas reserves in India are not much to be excited about and as such not much fresh capacity addition based on domestic petroleum fuels is feasible in the near future. The price volatility of imported petroleum fuels and security concerns also do not make these fuels as preferred option for large capacity addition.

The fact that coal is the most preferred fuel by generating companies is also corroborated by the fact that out of feasible thermal capacity addition target of 28,328 MW in the 10th Plan, 22377 MW is identified with coal / lignite as a fuel. The gas/LNG/Liquid Fuel based stations constitute balance 5,951 MW. However, in case of availability of LNG/Piped Gas at competitive price in the long run it may emerge as preferred fuel in the 11th Plan.

The third important factor in planning for thermal power development is the choice of location of sites for setting thermal stations. The coal resources in India are largely concentrated in the Eastern Region while the maximum power shortages exist in Northern and Southern Regions of the country. It has been assessed that transmission of Power is economical as compared to transportation of high ash Indian coal over long distance. Further there are bottlenecks in Rail transportation of large quantities of coal. It is therefore, imperative to set up a fuel large size coal based stations on mine mouth and transmit power to load centers.

The economics also justifies setting up of few coastal stations based on imported coal/ blended coal as a fuel. The use of imported coal will also help in reducing the projected gap between domestic coal demand and its production till 11th Plan. The Working Group has identified three coastal stations with benefits of 2000 MW capacity during 10th Plan based on imported coal/blended coal. As far as use of

imported ship transported LNG/Liquid Fuel is concerned, setting up of such stations on the coast is also a preferred option. In case the gas can be imported through pipeline locating few stations along the pipeline would also make optimal choice.

The fourth issue in perspective planning for thermal power development is the optimal utilization of the installed capacity. In this regard renovation & modernization (R&M) of 68 thermal units with capacity of 17,310 MW to accrue benefit of 4250 MU/Year (equivalent to 650 MW) at an estimated cost of Rs.1,903 crores is envisaged during the 10th Plan. Further under Life Extension Programmes 107 units with capacity of 11,022 MW at an estimated coast of Rs.7497 crores have been planned during the 10th Plan. As such, augmentation of thermal power generation capacity forms a major component of the National Perspective Plan of adding more than 1,00,000 MW capacity in the coming decade.

## Massive Capacity Addition Planned for Hydro Sector

The Power demand projections made in the 16th Electric Power Survey would require a need based capacity addition of over 100,000 MW during X and XI Plans. The hydropower development would need further boost in order to bridge the gap between demand and supply. Also in order to improve the thermal-hydro ratio, the Government of India has accorded high priority for accelerating hydro power development in the country. A vision paper has been prepared on development of hydroelectric potential in India by 2025-26. The vision paper envisions harnessing of entire balance hydro power potential of India by 2025-26. During the forthcoming X and XI Plans, the vision paper envisages a hydro capacity addition of over 30,000 MW. The likely requirement of funds for this capacity addition over decade would be of the order of 1300 billion rupees.

In terms of hydropower potential, India ranks fifth in the world at 600 billion kilowatt hours of energy annually, equivalent to a name plate capacity of 1,50,000 MW approximately, out of which only 17% has so far been developed.

Hydropower is a renewable, economic, non-polluting and environmentally benign source of energy. Hydropower stations have inherent ability for instantaneous starting, stopping, load variation etc. and help in improving reliability of power system. In the Indian context, unsatisfactory system conditions prevail especially in the Eastern and Western regions having predominance of thermal power. The off peak surplus power and inability of thermal stations to back down are reflected in the form of impermissible high frequencies and injurious low frequencies.

To correct such a situation, the ideal hydro thermal mix should be in the ratio of 40 : 60. At present hydro share is below 25%, which would become approximately 27% if 31,700 MW of hydropower is added by 2012. The greater emphasis on hydropower development for grid stability and system reliability is therefore an inevitable fall out and the Government is determined to ensure maximisation of hydro development and extend full support towards this end.

The total installed capacity of power is 1,03,134 MW, out of which 25,574 MW is that of hydro power. A look at the hydropower development in various regions of the country indicates that maximum hydropower potential harnessed is in the Southern Region but that also stands at a level of 53.86% only. The most under-developed regions are Northern and North Eastern where only 15.22% and 1.22% of hydro-potential have so far been developed. The state of Arunachal Pradesh has a hydro power potential of 50300 MW out of which only 10.50 MW are in operation, 405 MW under construction, leaving a sizeable chunk still to be developed. The other States with large untapped hydro potential are Uttranchal (11,145 MW), Himachal Pradesh (13,071 MW) and J&K (12,282 MW).

The Policy on hydro power development envisages benefits to investors by appropriately adjusting the normative levels for incentives, simplification of procedures and further reassurances of return on investments. The Ministry of Power has substantially increased

its budgetary allocation for the hydro power sector in the last few years. Priority has been given to the completion of languishing State hydro power projects. The Central Electricity Authority has completed a preliminary ranking study for 400 remaining potential hydro power sites having an installed capacity of over 1,07,000 MW. The ranking study has been done basin-wise for the six major river basin systems in India and the projects have been classified into categories A, B and C to enable prioritised development of potentially sound projects. The use of satellite imageries has been made for one of the basins through a national remote sensing agency. A 3-stage clearance procedure has been introduced for Central Sector hydro electric projects to reduce the time and cost overruns in the implementation of the projects. Necessary infrastructure is being developed along with survey and investigation to ensure that project development can take off in right earnest immediately after investment approval. A dialogue has also been initiated with all States where hydro electric power projects are located so as to accelerate the process of allocation of hydro potential sites for development. The financial institutions and the private developers have shown a great confidence in hydro power projects in the past year.

## 2.5 PLANT LOAD FACTOR (PLF)

The actual all India PLF of Thermal\utilities during April, 2001 to December, 2001 was 68.4 % against the target of 68.2%.

The PLF figures from the period 1995-96 onwards and April, 2001 – December, 2001 are as follows :

(Figures in %)

| Year | Centre | State | Overall |
|---|---|---|---|
| 1995-96 | 71.0 | 58.1 | 63.0 |
| 1996-97 | 71.1 | 60.3 | 64.4 |
| 1997-98 | 70.4 | 60.9 | 64.7 |
| 1998-99 | 71.1 | 60.1 | 64.6 |
| 1999-2000 | 73.8 | 63.7 | 67.3 |
| 2000-2001 | 74.3 | 65.6 | 69.0 |
| 2001-02 (April - Dec., 2001) | 72.7 | 65.1 | 68.4 |

A target of 69.9% has been fixed for the year 2001-02

## 2.6 TRANSMISSION & DISTRIBUTION LOSSES

The transmission and distribution losses in the country had come down from 21.8% in 1992-93 to 21.13% in 1994-95. However, there has been an increase in losses thereafter. The losses in 1998-99 are 26.45%. The transmission and distribution losses in the country, year-wise, since 1992-93 are given below:

| Year | T&D Loss(%) |
|---|---|
| 1992-93 | 21.80 |
| 1993-94 | 21.41 |
| 1994-95 | 21.13 |
| 1995-96 | 22.27 |
| 1996-97 | 24.53 |
| 1997-98 | 24.79 |
| 1998-99 | 26.45 |

### 2.6.1 Incentive Payment for Reduction of T&D Losses

Under the incentive scheme for reduction of T&D losses, for the year 1997-98, proposals were received from Gujarat Electricity Board, Transmission Corporation of A.P. Ltd., Electricity Deptt. of Pondicherry and BSES. The proposals were examined for consideration of award by a Committee for deciding the awards in a meeting held on 5th October, 2001. The Ankleshwar Industrial Division of GEB and Pondicherry Region of Electricity Department of Pondicherry qualified for award of shields, Surat Industrial (GEB), Vapi Industrial (GEB), Ankleshwar Industrial (GEB) and Baroda (GEB) qualified for cash awards.

## 2.7 POWER SUPPLY POSITION

The power supply position during the last five years and during the current year (April 2001 to December'2001) has been as under:

**Energy (in MU)**

| Year | Requirement | Availability | Shortage | Shortage |
|---|---|---|---|---|
| 1996-97 | 413490 | 365900 | 47590 | 11.5 % |
| 1997-98 | 424505 | 390330 | 34175 | 8.1 % |
| 1998-99 | 446584 | 420235 | 26349 | 5.9 % |
| 1999-2000 | 480430 | 450594 | 29836 | 6.2 % |
| 2000-2001 | 507216 | 467400 | 39816 | 7.8 % |
| 2001-2002 (April'2001 – December'2001) | 388591 | 360140 | 28451 | 7.3 % |

**PEAK DEMAND & PEAK MET (in MW)**

| Year | Peak Demand | Peak Met | Shortage | Shortage |
|---|---|---|---|---|
| 1996-97 | 63853 | 52376 | 11477 | 18 % |
| 1997-98 | 65435 | 58042 | 7393 | 11.3 % |
| 1998-99 | 67905 | 58445 | 9460 | 13.9 % |
| 1999-2000 | 72669 | 63691 | 8978 | 12.4 % |
| 2000-2001 | 78037 | 67880 | 10157 | 13 % |
| 2001-2002 (April'2001 – December'2001) | 77956 | 68209 | 9747 | 12.5 % |

## 2.8 INCENTIVE PAYMENT FOR BETTER PERFORMANCE OF THERMAL POWER STATIONS IN THE COUNTRY

The best designs, manufacturing practices and adoption of modern technology in the generation of power, transmission systems are not adequate by themselves for achieving optimum results. Men behind the machine play a key role. Therefore, proper training, motivation and due recognition of their efforts is very important to ensure the best performance of the systems. Keeping in view, the Ministry of Power have formulated incentive schemes for awarding Shields, Medals and Cash Incentives to be distributed among the personnel of power utilities for achieving improvement in the performance of Thermal Power Stations also.

### REWARD SHCEME FOR MERITORIOUS PRODUCTIVITY BY THERMAL POWER STATIONS IN THE COUNTRY

The incentive scheme for Meritorious Performance of Thermal Power Stations in the country was introduced in the year 1983-84 for rewarding the Operation & Maintenance personnel for outstanding performance of Thermal Power Stations in Public Sector in the country.

### (i) Highlights of the Scheme

- To improve the performance level over the previous years;
- To encourage Annual / Capital Maintenance;
- To encourage early stabilization of newly commissioned thermal generating units.

### (ii) Modified Scheme for Meritorious Awards

The scheme for Meritorious Awards was subsequently modified in the year 1992-93 to give recognition to those thermal power stations which achieve improvement in the performance during the peak load period only compared to previous years so as to avoid pumping of unwanted generation of power into the grid during the off-peak period and avoid wastage of energy / natural resources to that extent. Any utility thermal power station in the public sector shall be entitled to be considered for the reward under this scheme if it has actual derated installed capacity of at least 100 MW with minimum unit size of 20 MW and above as on 1st April of the year of Awards. Thermal Power Stations eligible for the Award are also given Shields, if the performance level is 6000 kWh/kW/Year and more during the year of Awards.

### (iii) Other Incentives

In addition to the above, the General Manager / Head / Chief Engineer of the Thermal Power Station are awarded 5 Gold, 5 Silver and 6 Bronze Medals for achieving the performance level of more than 7500 kWh/kW/year; 7100 to 7500 kWh/kW/year; 6600 to 7099 kWh/kW/year respectively during the year 1998-99 based on the performance of their respective thermal power stations as per the proviso of the Incentive Schemes.

## REWARD SCHEME FOR ECONOMIC AND EFFICIENT OPERATION OF THERMAL POWER STATIONS IN THE COUNTRY

A new concept for awarding thermal power stations in the country for achieving economic and efficient performance has been introduced from the year 1992. Under this scheme, thermal power stations which achieve more than a specified improvement in their Secondary Fuel Oil Consumption (SFOC) and Auxiliary Power Consumption (APC) as compared to that of the previous year are rewarded by Ministry of Power, Government of India.

For the purpose of selection of thermal power stations for the incentive awards under Secondary Fuel Oil Consumption (SFOC), the coal and lignite based thermal power stations are classified into four groups on the basis of SFOC of previous year. SFOC is worked out in milli-litre/kWh for the Calendar year and awards are decided based on achieving minimum level of improvement over the previous year in SFOC for awards as per the scales of awards prescribed for different groups of such thermal power stations in the country. Similar procedure is adopted for deciding the incentive awards for reduction in Auxiliary Power Consumption (APC) for coal and lignite based thermal power stations in the country.

Under this scheme, cash awards totaling to Rs.225 lakhs were distributed to 44 eligible thermal power stations in the country comprising of Rs.177.19 lakhs to 34 eligible thermal power stations under Specific Secondary Fuel Oil (SFOC) and Rs.47.81 lakhs to 10 eligible thermal power stations under Auxiliary Power Consumption (APC) as incentives for their performance during the Calendar Year 1998.

## 2.9 Chief Minister's Conference

Conference of Chief Ministers/Power Ministers held on 3rd March, 2001 at New Delhi took note of the challenges confronting the Power Sector. It was agreed in the Conference that there is an urgent need to depoliticise power sector reforms and speed up their implementation. The important resolutions adopted in the Conference are as follows:

i) Completing electrification of all villages.

   (a) Rural electrification may be completed by the end of the 10th Plan i.e. by year 2007.

   (b) Full coverage of all households may be targeted for the end of 11th plan i.e. by year 2012.

ii) Distribution reforms to be carried out by making energy audit effective, development of effective Management Information System, effective

programme for identifying and eliminating power thefts in the next 2 years, full metering of all consumers.

iii) Commercial viability has to be achieved in distribution in 2-3 years through any or all of the following:

(a) Creating Profit centers with full accountability

(b) Handling over of local distribution to Panchayats/ Local Bodies/ Franchisees/ Users Associations, whatever necessary

(c) Pirvatisation of distribution.

iv) Current operations in distribution would need to reach break even in two years and achieve positive returns thereafter.

v) SERCs to be made functional and tariff orders to be issued.

vi) Subsidies to be given only to the extent of State Government's capacity to pay the subsidies explicitly through budget provisions.

vii) Special efforts to be made to increase the PLF of existing plants through renovation and modernization.

## 2.10 Scheme for one-time settlement of SEB dues

The Conference of the Chief Ministers/Power Ministers held in March,2001 noted that the large amount of dues owed by the State Electricity Boards to the Central Power Sector Undertakings (CPSUs) was a major impediment to power sector reforms and resolved that an Expert Group would be set up to recommend a one time settlement of power sector past dues to the CPSUs and the dues of the CPSUs to State Power Utilities. The Expert Group was set up under the Chairmanship of Shri Montek Singh Ahluwalia the then Member (Energy), Planning Commission. The Group submitted its report in May, 2001 and proposed a scheme of settlement of outstanding dues linked to a mechanism that would ensure payment of current dues in the future. The recommendations of the Group, inter-alia, included securitisation of the outstanding dues through bonds issued by the respective State Governments. These bonds would be tax free bonds and would have tenure of 15 years. The Group also proposed 50% waiver of the surcharge on outstanding as an incentive for the States to take up the scheme of securitisation. In addition, during the first 4 years from the commencement of the scheme bi-annual cash incentives would be paid by the CPSUs equal to 2 per cent of the value of bonds. This would be linked to the States complying with the provisions of the scheme and reforms to be undertaken by the concerned State Government. The Empowered Group of Chief Ministers in its meeting held on 6th July, 2001 accepted the recommendations of the Expert Group with minor modifications. These modifications included increase in waiver of surcharge from 50 to 60% and incentives for a period of 4 years @ 4% of the face value of the bonds for achievement of performance and milestones by the SEBs shall be increased from 6 per cent in the first year and 5 per cent in the second year. The scheme has since been circulated to the states for implementation.

## 2.11 Status on Reforms & Restructuring in Power Sector

Central Electricity Regulatory Commission formed under the provisions of Electricity Regulatory Commissions Act, 1998 has been made fully functional. The Commission has passed orders on Availability Based Tariff and has also brought out terms and conditions for determination of tariff. Eighteen States namely, Orissa, Haryana, Andhra Pradesh, Uttar Pradesh, Karnataka, West Bengal, Tamil Nadu, Punjab, Delhi, Gujarat, Madhya Pradesh, Arunachal Pradesh, Maharashtra, Rajasthan, Himachal Pradesh, Assam, Chhatisgarh and Kerala have either constituted or notified the constitution of SERC. SERCs of Orissa, Andhra Pradesh, Uttar Pradesh, Maharashtra, Gujarat, Haryana, Karnataka, Rajasthan, Delhi, Madhya Pradesh and Himachal Pradesh have issued tariff orders.

## 2.12 State Reforms Acts:

Orissa, Haryana, Andhra Pradesh, Uttar Pradesh, Karnataka, Rajasthan, Madhya Pradesh and Delhi have enacted their State Electricity Reforms Acts which provide, inter alia, for unbundling/ corporatisation of SEBs, setting up of SERCs, etc.

The SEBs of Orissa, Haryana, Andhra Pradesh, Karnataka, Uttar Pradesh and Rajasthan have been unbundled/ corporatised.

## 2.13 Memorandum of Understanding (MOU) with States:

In order to bring in focused approach to addressing the problems specific to States, the Government of India has been encouraging States to sign MOUs. So far, twenty States viz., Andhra Pradesh, Assam, Bihar, Madhya Pradesh, Chhattisgarh, Gujarat, Goa, Haryana, Himachal Pradesh, Jharkhand, Karnataka, Kerala, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttaranchal, Uttar Pradesh and West Bengal have signed Memorandum of Understanding (MOU). The MOUs affirm joint commitment of the two parties to undertake reforms. In reciprocation of the commitment made by States to undertake reforms in a time bound manner, the Government of India has been extending support and assistance to the State Governments on the following:

i) Provision of additional power through:-
   a. Allocation of additional power from Central Generating Stations
   b. Development of new generating capacity through CPSUs
   c. Support for enhancement of generating capacity in the State sector

ii) Provision of necessary inter-State transmission lines and commitment to have PGCIL take up some identified intra-State lines.

iii) Provisions of additional financing by PFC in relaxation of standard requirements.

## 2.14 Accelerated Power Development Programme (APDP)

The Government of India has initiated from 2000-01 a new Plan Scheme namely Accelerated Power Development Programme (APDP) to provide financial assistance to the States for undertaking Renovation & Modernization Programmes of Thermal and Hydro power stations and also for strengthening and improvement of Sub-transmission and Distribution network. Under this scheme, a focused investment programme has been initiated in 63 identified distribution circles that would be developed as Centre of Excellence in the first phase of the APDP programme. An amount of Rs.978 crores was provided to SEBs/ EDs during 2000-01. A provision of Rs. 1500 crores has been made in the budget for release to States during 2001-02 under APDP and proposals are under consideration for sanction of funds.

## 2.15 Electricity Bill, 2001

The Electricity Bill 2001 has been introduced in Parliament in August, 2001. The Bill seeks to replace the three existing Acts, viz., the Indian Electricity Act, 1910, the Electricity (Supply) Act, 1948 and the Electricity Regulatory Commissions Act, 1998. The main features of the Bill are as follows:

i) The Central Government to prepare a National Electricity Policy in consultation with State Governments.

ii) Thrust to complete the rural electrification and provide for management of rural distribution by Panchayats, Cooperative Societies, non-Government orgnisations, franchisees etc.

iii) Generation being delicensed and captive generation being freely

permitted. Hydro projects would, however, need approval of the state government and clearance from the Central Electricity Authority.

iv) Transmission Utility at the Central as well as State level, to be a Government company – with responsibility for planned and coordinated development of transmission network. Provision for private transmission licensees.

v) Open access in transmission from the outset with provision for surcharge for taking care of current level of cross subsidy with the surcharge being gradually phased out.

vi) Distribution licensees would be free to undertake generation and generating companies would be free to take up distribution licensees.

vii) The State Electricity Regulatory Commission is a mandatory requirement.

viii) Provision for licence free generation and distribution in the rural areas.

ix) The SERCs may permit open access in distribution in phased with surcharge for current level of cross subsidy to be gradually phased out alongwith cross subsidies and obligation to supply.

x) Provision for payment of subsidy through budget.

xi) For rural and remote areas stand alone systems for generation and distribution would be permitted.

xii) Trading is being recognized a distinct activity with the safeguard of the Regulatory Commissions being authorized to fix ceilings on trading margins, if necessary.

xiii) The State Governments have flexibility to unbundle the SEBs or continue with them as distribution licensees and State Transmission Utility.

xiv) The Bill does not prescribe any model of reform, instead provides flexibility to the State Government to choose the model suiting to their conditions.

xv) Metering of all electricity supplied made mandatory.

xvi) An Appellate Tribunal to hear appeals against the decision of the CERC and SERCs.

Provisions relating to theft of electricity made more stringent.

## 2.16 Awareness Campaign Launched by Ministry of Power

The Ministry has set an objective of providing 'Power for All by 2012' and has launched a "Mission 2012 – Power for All" in this direction. A comprehensive Blueprint for Power Sector Development has been prepared outlining the problems and suggesting integrated solution and strategies for achieving the objective of Power for All.

In order to focus public attention on the need to shed the 'business-as-usual' approach and undertake speedy reforms in the power sector, enlisting public participation, the Ministry of Power launched a countrywide "Awareness Campaign" and during the period from 15th October, 2001 to 31st December, 2001 more than 2000 public interaction/road shows were conducted by the senior Officers from the Ministry of Power, Central Electricity Authority and the Central Public Sector Undertakings in every district of the country for sharing with the citizens the plans that have been made for transformation of the power sector. Efforts are being made to cover the wide spectrum of Stake-holders.

In addition, five international conference-cum-business meets have been scheduled on the themes of (i) Transmission, Energy Management & Convergence, (ii) Distribution,

(iii) Non-fossil Fuel Generation, (iv) Fossil Fuel Generation and (v) Optimizing Existing capacity (R&M) between August, 2001 and March, 2002 to optimize investment in power sector.

## 2.17 State Electricity Boards- Rate of Return

Restoration of the financial health of SEBs and improvement in their operation performance continue to remain a critical issue in the power sector. Under Section 59 of the Electricity Supply Act, 1948, SEBs are required to achieve a rate of return (ROR) of not less than 3 per cent on their fixed assets in service, at the beginning of the year, after providing for interest and depreciation charges less consumers contribution. This provision has become operative from the accounting year 1985. There is a continuing deterioration in the financial performance of SEBs. Managerial and financial inefficiencies in State Sector utilities have adversely affected capacity addition and system improvement. While the SEBs do not have enough resources to finance future programmes they are unable to raise investable funds from alterative source due to their poor financial and commercial performance. Also the inability of SEBs to pay their dues, in full, to Central Power Utilities adversely affected the finances and investment plans of CPUs.

In 1995-96, 14 SEBs out of 17 SEBs (including Orissa) and during 1996-97, 1997-98 and 1998-99 out of 16 SEBs (excluding OSEB & DVB) 13,14 & 9 SEBs respectively had the positive ROR (without subsidy), where as in 1999-2000, 7 SEBs had positive ROR (without subsidy).

## 2.18 The Central Electricity Board (CEB)

A statutory body as per Section 36-A of the Indian Electricity Act, 1910, is empowered (under Section 37 of the said Act) to make rules to regulate generation, transmission, supply and use of electrical energy and generally to carry out the purposes and objects of the said Act. The Board is comprised of members representing State Government, Electricity Boards, Central Government Organisations concerning the electricity and also members from the Federation of Electricity Undertakings of India and BIS. The activities of the Board are managed through a Secretariat provided by Central Electricity Authority (CEA) with one of its Chief Engineers functioning as Secretary of the Board. Chairman, CEA has been nominated by the Central Government as the Chairman of the Board. The Indian Electricity Rules 1956, have been framed by the CEB. The Board meets at least once in year to consider amendments/additions to the IE rules. The 9 amendments as proposed in 34$^{th}$ & 35$^{th}$ meeting of CEB are promulgated as amended Rules and sent to MOP for laying in each house of Parliament. The previous publication of draft Notification of amendments as proposed in the 36$^{th}$ meeting of CEB, after Gazette Notification, is made in News papers for wide publicity for inviting comments from public. The 37$^{th}$ meeting of CEB examined 16 agenda items for amendments and proposed 3 amendments. The draft amendments as proposed in 37$^{th}$ meeting are got vetted from the legislative Department of Ministry of Law, and were forwarded to the official Language Commission for drafting the Hindi version. The 38$^{th}$ meeting of CEB was also held on 27$^{th}$ & 28$^{th}$ December, 2001 at Chennai to consider 23 agenda items and 3 Agenda items relating to revised syllabus for O&M personnel working in Thermal & Hydro Power Plants and associated sub-stations and for O&M personnel working in Transmission & Distribution.

# TRANSMISSION

Transmission projects continue to be accorded a high priority for evacuating power from the generating stations to the load centres. The transmission works construction programme for the year 2001-02 in the country and the progress achieved during the year 2001-02 (upto Nov'2001) in the construction of transmission lines and substations for (220 kV and above) is summarized below: -

| | Programme 2001-02 (ckm) | April'01-November'01 | | % achievement relates to programme during | |
|---|---|---|---|---|---|
| | | Programme (ckm) | Achievement (ckm) | 2001-02 | Apr'01-Nov'01 |
| 800 kV lines | 224 | 160 | 46 | 20.54 | 28.75 |
| +/- 500 kV HVDC lines | 680 | 355 | 463 | 68.09 | 130.42 |
| 400 kV lines | 1780 | 1144 | 1027 | 57.70 | 89.77 |
| 220 kV lines | 4240 | 2644 | 2512 | 59.25 | 95.01 |
| 400 kV substations | 6355 | 1260 | 1130 | 17.78 | 89.68 |
| 220 kV substations | 5410 | 1975 | 3055 | 56.47 | 154.68 |

The bar-charts representing programme/achievement during the year 2001-02 (upto November, 2001) are at Chart E.

## 1. CENTRAL SECTOR TRANSMISSION

Central sector transmission works completed during the year 2001-02 (upto Nov'2001) are listed in the following table :-

| Sl No | Name of transmission work | Voltage (kV) | Type | Executing Agency | Length/Capacity (ckm) / (MVA) |
|---|---|---|---|---|---|
| 1 | Nathpa Jhakri-Nalagarh | 400 | D/C | Powergrid | 290 |
| 2 | Sasaram-Biharshariff | 400 | D/C | Powergrid | 388 |
| 3 | Singrauli-Kanpur LILO line I & II at Allahabad | 400 | D/C | Powergrid | 4 |
| 4 | Sasaram-Allahabad | 400 | D/C | Powergrid | 435 |
| 5 | Parulia-Durgapur | 220 | D/C | DVC | 36 |

## 2. INTER-STATE – CENTRALLY SPONSORED SCHEMES

At the time of fourth five year plan several inter-state and inter-regional transmission lines were planned to facilitate the integrated operation of the state systems within the region. Loan assistance equivalent to the full cost of the scheme is extended to the state governments under the centrally sponsored programme for construction of such inter-state lines.

Upto the end of the financial year 2001-02 (AS ON 30.11.2001), a cumulative sum of Rs. 36906.67 lakhs were released to the states. Transmission lines sanctioned under this programme, stringing of over 7000 ckm of 66 kV and above transmission lines have been completed.

## 3. INTER-REGIONAL LINKS UNDER OPERATION :

There are three HVDC back-to-back inter-regional links, already under operation in addition to a few AC inter-regional links. Cumulative inter-regional power transfer capacity of Central Sector transmission projects has increased from 1200 MW in 1996-97 to about 4700 MW in 2001 ( till November, 2001).

A strong National Grid has been envisaged to evacuate the power from major generating resources including hydro projects in North-East Region and large sized Thermal Power Plants in Bihar, Orissa and Madhya Pradesh. The scheme for National Grid would involve development of high capacity transmission corridor in chicken-neck area (falling between Nepal & Bangladesh) and establishment of a ring of 765 kV lines interconnecting Eastern-Western and Northern region. Cumulative inter-regional transmission capacity of the proposed National Grid would increase to about 30,000 MW by the end of 11th plan. Details of inter-regional links existing/planned to be established till XIth plan are given at **Statement**.

## 4. INTEGRATED GRID OPERATION

The Regional Power Grids in the Northern, Western, Southern, Eastern & North-Eastern Regions of the country were established for optimum utilization of the unevenly distributed power resources in the country by facilitating inter-regional and intra-regional power exchanges to the extent feasible, depending upon day to day power availability and load conditions.

The total inter-regional transfer of energy during the period April, 2001 to November, 2001 has been about 7892 MU as against 6305 MU during the corresponding period last year, registering an increase of about 25 %. Further, Eastern region which is perpetually surplus in power, exported 6072 MU energy to neighbouring regions during April, 2001 to November, 2001 as against 4590 MU during the corresponding period last year, registering an increase of about 32 %. All the constituent systems in the Northern, Western, Southern, Eastern and North-Eastern Regions have been operating in integrated manner. North-Eastern Regional Power System operated in synchronism with Eastern Regional power system. All efforts were made to maximize intra and inter-regional power exchanges to the extent possible. Andhra Pradesh, Tamil Nadu, Karnataka, Kerala and Pondicherry in Southern region, Madhya Pradesh & Gujarat in Western Region, Uttar Pradesh, Chandigarh, Haryana, Jammu & Kashmir and Rajasthan in Northern region and Assam in North-Eastern Region received considerable assistance (upto 1300 MW) from NTPC stations and own generation of Orissa and West Bengal in Eastern Region. Southern Region has also exported its surplus power to Western Region. Karnataka has entered into bilateral agreement with Power Trading Corporation (PTC) to purchase 100 MW power of Chhattisgarh of Western Region. PTC has also entered into bilateral agreement with Goa to purchase 100 MW of surplus power and sell it to Gujarat and Karnataka.

## 5. LONG TERM INTER-REGIONAL LINKS

Keeping in view the envisaged generation addition programme, it is expected that by the end of XI th plan:

- Eastern and North-Eastern Region shall be the major source of power for the country.
- The major recipient of surplus power shall be Northern Region, Western Region and Southern Region.

The total inter-regional capacity by this time frame would be about 30000 MW.

Utmost priority has been given for transfer of surplus power from Eastern region to other power deficit regions. A number of steps has been taken including implementation of inter-regional links.

## ADDITIONAL INTER-REGIONAL LINKS IN NEXT 5 YEARS.

| | | | |
|---|---|---|---|
| **HVDC Links:** | | | |
| (i) | Sasaram HVDC B-T-B link | East & North | 500 MW |
| (ii) | Gazuwaka 2nd HVDC B-T-B module(500MW) | East & South | 500 MW |
| (iii) | Talcher-Kolar HVDC Bipole | East & South | 2000 MW |
| **AC Links:** | | | |
| (1) | Rourkela (ER) – Raipur (WR) 400kV D/C | East & West | 1000 MW |
| (2) | Muzaffarpur (ER) –Gorakhpur(NR) 400kV Quad D/C with Series compensation | East & North | 2000 MW |
| (3) | (i)N.K. Pura (ER)-Sipat (WR) 765kV S/C * | East & West | 2200 MW |
| | (ii)Bakula (ER)-Sultanpur(NR) 765kV 2XS/C * | East & North | 4000 MW |

(* under planning stage for transfer of power from Barh, N. Karanpura & Kahalgaon Extn. projects)

With the above additional inter-connections along with the existing links, the total inter-regional power exchange capability would be increased to about 14000 MW. However the quantum of power exchange would largely depend upon the establishment of envisaged power / transmission projects.

### 6. NATIONAL HIGH VOLTAGE DIRECT CURRENT (NHVDC) PROJECT

The first stage of HVDC project between Lower Sileru (AP) and Barsoor (MP) was commissioned in October, 1989 with total indigenous know-how. The second stage of uprating the link to 200 MW at 200 kV has also been completed in November, 2000. Successful power flow was achieved between Lower Sileru & Barsoor at full rated voltage of 200 kV/DC in August, 2000.

### 7. FLEXIBLE AC TRANSMISSION SYSTEM (FACTS)

Flexible AC Transmission System (FACTS) Technology is an energy technology intended to improve the dynamic performance of the Power Transmission System and achieve regulated power flow across AC transmission network. The project envisages installation of Fixed Series Capacitor (FSC) and Thyristor Controlled Series Compensation (TCSC) on the 400 kV Kanpur - Ballabhgarh line of PowerGrid at Ballabhgarh end. Phase-I covers the installation of fixed series capacitor (35%) and Phase-II covers the Thyristor Controlled Series Compensation (TCSC) with the enhancement of compensation under dynamic part by another 12% along with necessary controllers as R&D project. The project has been undertaken by BHEL. Phase-1 is being financed by PowerGrid and Phase-II will have financial support of BHEL and Ministry of Information Technology.

### 8. GAS INSULATED SUBSTATION (GIS):

In transmission and distribution network, most of the substations in operation are Conventional Air Insulated Substations (AIS). Due to

limitations in space, negative environmental impact, long outage time (due to extensive maintenance) and high maintenance cost of AIS, Gas Insulated Substations (GIS) have become popular in the field of High Voltage (HV) & Extra High Voltage (EHV) systems, where space and environment are the major constraints. The minimum space requirement (about 1/10$^{th}$ of conventional substation), high operational reliability, increased safety, easy installation even in difficult site conditions, independent of altitude effect, high security for personnel,flexibility in layout, minimum maintenance (only 25-30% of that of AIS), short delivery & erection time, and environmental friendliness etc. are distinct advantages offered over conventional substations. In developed countries like USA, Japan, Canada, and Europe Gas Insulated Substations are already in operation for the last two decades. In India, about 20-25 numbers of GIS installations are in satisfactory operation under different site conditions at various voltage levels (36kV, 72.5kV, 123kV/145kV, 245kV, and 420kV). In India, due to high investment cost, the application of GIS is mostly limited to metropolitan cities, hilly/mountainous areas, and coastal areas where space, unfavourable environment and difficulty in putting conventional substations are major constraints. M/s BHEL have already indigenously developed gas insulated switchgear for application upto 33 kV level and the development work for 145 kV gas insulated switchgear is in progress. Commercial development by indigenous manufacturers would reduce the overall cost and the foreign exchange requirement. In the process, wide application of GIS technology can be undertaken in urban areas in a cost effective manner. If an indigenous player like BHEL comes up with GIS technology for 145kV and above voltage level, competition will bring down cost.

## 9. SHUNT CAPACITORS

REBs carried out system studies to assess the requirement of shunt capacitors in the state systems to improve the voltage profile. 3666 MVAR shunt capacitors were installed in the country during the year 2000-2001 against the requirement of 15980 MVAR. The total installed capacity of shunt capacitors at the end of 2000-2001 in the country was 39261 MVAR.

The total estimated requirement of shunt capacitors during 2001-02 is 14949 MVAR out of which 1722 MVAR have been installed by the end of October 2000. The progress has been rather slow. Capacitor installation programme is being monitored regularly and States advised to expedite the installation programme.

## 10. Cooperation on exchange of power with neighbouring countries

### Nepal

India and Nepal have already signed an agreement for exchange of power. Presently, a number of interconnections exist at 132 KV level, 33 KV level and also at 11 KV level between India and Nepal. The level of power exchange between India and Nepal is around 50 MW and this may go up to 150 MW in future.

### Bhutan

India and Bhutan already have Terms of Cooperation for exchange of power. Bulk power generated from Chukha HEP (4x84 MW) implemented with Indian technical and financial assistance is exported to India through 220 KV Chukha-Birpara transmission lines. 132 KV Bongaigaon-Geylegphut S/C line also exists to supply power to Bhutan. About 84% of energy generated from Chukha HEP is exported to India and the balance is consumed within Bhutan. A number of hydro projects are being considered for development and export of power to India.

### Bangladesh

At present, there is no power exchange agreement with Bangladesh though some initial

exchange of ideas had taken place and some specific lines had been identified through which exchange of power between the two countries could take place. Though there has not been any progress on this issue, the matter is still under consideration.

## 11. PRIVATE SECTOR PARTICIPATION IN TRANSMISSION

Initiative has been taken for encouragement of private sector participation in transmission and two routes have been identified viz. Independent Power Transmission Company (IPTC) and Joint Venture (JV). In JV route, private investor would enjoy a comfort of at least 26% equity sharing by POWERGRID in the project and of receiving tariff on cost plus basis whereas under IPTC route, 100% project equity shall be owned by the private investor and tariff shall be decided through International Competitive Bidding process with the approval of CERC in both the cases. One Pilot Project each on JV and IPTC routes has been taken upto attract private sector participation.

The project taken up through JV route is the transmission system associated with Tala Hydro Electric Power Project, at an estimated cost of Rs. 1200 crores. This would be the first project under Joint Venture for the transmission sector in the country.

The Project taken up through IPTC route is the 400 kV D/C line from Bina to Dehgam, via Nagda, estimated to cost Rs. 450 crores.

A basket of projects to be built on IPTC route for Private Sector Participation in transmission has been identified. About Rs.21,000 crore will be required to be invested by the Private Sector in Xth & XIth Plan, out of the total estimated requirement of Rs.76,000 crores in Central Sector transmission. It is also envisaged to lay down clear and transparent guidelines with the approval of CERC for making private investment viable, and in line with National priorities.

## 12. MAXIMISATION OF EXPORT OF POWER FROM EASTERN REGION TO NEIGHBOURING REGIONS AND AUGMENTATION OF TRANSMISSION SYSTEM

Eastern Region has been surplus of power on sustained basis and all out efforts have been made by Ministry of Power, Central Electricity Authority and EREB to maximize export of surplus power to the neighboring regions. Entire unallocated power from NTPC stations in the Eastern Region has been allocated to the needy states in the neighbouring Southern, Western, and Northern and North-Eastern Regions. In addition, GRIDCO (Orissa) has also been exporting power to Andhra Pradesh under a bilateral agreement w.e.f. October 1999. The present position in regard to export of power to the neighbouring regions based on the above allocations and bilateral agreements is as under:

| | Export to | Peak MW |
|---|---|---|
| i) | Southern Region | 450 - 475 |
| ii) | Western Region | 360 - 370 |
| iii) | Northern Region | 200 - 260 |
| iv) | North-Eastern Region | 100 - 150 |

An utmost priority has been given for transfer of surplus power from Eastern region to other power deficit regions. A number of steps has been taken including implementation of inter-regional links. As a result of above, export of power from Eastern region has increased from mere 230 MW in 1997 to about 1300 MW in 2001 and energy exchange has also increased to the tune of 7233 MU. On all India basis, the energy exchange between different regions has increased from 3600 MU in 1997-98 to about 9874 MU in 2000-2001.

The extent of power transfer from surplus Eastern Region to other regions, problems encountered and efforts made in maximizing transfer of power are as follows :

### Eastern Region to Southern Region

Power flow on Jeypore-Gazuwaka 500 MW HVDC back to back link has been restricted upto 475 MW due to overloading of transmission system in Orissa particularly during the non-monsoon months when adequate support from the hydro stations of Balimela, Indrawati and Upper Kolab in Southern Orissa is not available and also due to transmission constraints in Andhra Pradesh system. The following transmission facilities need to be completed expeditiously to achieve sustained export of 500 MW to Southern Region.

#### Andhra Pradesh

i) Nidadavolu-Bhimadolu 220 kV D/C

ii) Lower Sileru-Bommur 220 kV D/C

#### Orissa

i) Talcher-Meramundali 400 kV D/C
Meramundali-Jeypore 400 kV S/C

ii) 220 kV Indravati-Theruvali 2xD/C line (GRIDCO)

Andhra Pradesh in Southern Region draws power to the tune of 150 -160 MW from Orissa in radial mode over 220 kV S/C Upper Sileru-Balimela line

### Eastern Region to Western Region

Arrangements have been devised to maximize power transfer from Eastern Region to Western region. In order to achieve this Ib Thermal Power Station has been separated from Eastern Regional grid and synchronized with western Regional Grid. With this arrangement power export to the tune of 370 MW from Eastern Region to Western Region has been possible on 220 kV D/C Korba-Budhipadar line. An attempt was made to supply 100 MW additional power to Western Region through 220 kV Budhipadar-Korba 3rd circuit by radialising loads of Raigarh in Chattisgarh. The power transfer from Eastern Region in radial mode started from 4th August, 2001 but was discontinued w.e.f. 14.8.2001 due to sub-normal voltage and frequency profile of Eastern Region supply. Efforts are being made to resume this supply.

### Eastern Region to Northern Region

The arrangements for transfer of power from Eastern Region to Northern Region over Biharshariff – Sarnath – Allahabad 400 kV D/C line was operationalised on radial mode w.e.f 12.6.2001 by terminating the line at UPPCL's 400 kV sub-station at Sarnath pending completion of HVDC station at Sasaram. This has made possible the transfer of about 250 – 300 MW power from Eastern Region to Northern Region.

## 13. FORMATION OF NATIONAL GRID:

The National Powergrid would basically comprise of transmission system associated with the central generating projects, and inter-regional lines.

As on today, the transmission system associated with Singrauli-Rihand generation complex in the Northern Region, Korba-Vindhyachal generation complex in the Western Region, Farakka-Kahalgaon in the Eastern Region, Ramagundam-Neyveli projects in the Southern and Kathalguri-Ranganadi transmission system in the North-Eastern Region along with the HVDC inter-regional connections at Vindhyachal and Chandrapur and Gazuwaka are existing and HVDC link at Sasaram is in advanced stage of completion.

HVDC line from Talcher-II in Eastern Region dedicated for benefits of Southern Region connecting Kolar in Southern Region is under construction. As a part of Hirma Mega Power Project, bulk transmission from Eastern Region to Northern Region and Western Region have been planned. Further, as part of Barh, Kahalgaon Extn. and North Karanpura projects, generation from which is likely to be earmarked for beneficiaries in Northern and Western Regions, a 765kV transmission system is being

planned. Gazuwaka second module HVDC back-to-back (500MW) link has already been approved for transfer of surplus power from Eastern region. In addition, a bulk power transmission has been planned to match with commissioning of Tala project of Bhutan to facilitate transfer of surplus power from Eastern and North-Eastern Regions to the Northern Region. This would also take care of evacuation of generation in the Teesta complex.

The above transmission system, as indicated, would basically form the National Powergrid which is envisaged to be completed by end of 11th Plan.

Of the total transmission system that would make the National Powergrid, some of the inter-regional transmission system along with the back-up regional transmission system have been planned and / or, in the various stages of planning keeping in view the optimisation of the transmission corridors. These lines are likely to carry less power initially and their full utilisation is anticipated over longer time. These links would primarily comprise the **Power Highways** and will have the margins to facilitate transfer of surplus power across the Regions and also provide open access for wheeling of power to generators transcending State and Regional boundaries.

*A view of Transmission Tower*

The following components of the transmission network are identified/planned that would comprise of the **Power Highways** under Phase-I.

(i) Hirma-Jaipur HVDC, ± 500kV, 2500 MW

(ii) Pooling point Bakula (ER)-Sultanpur 765kV 2xS/C line

(iii) Sultanpur-Unnao 765kV2xS/C line

(iv) Unnao-Moradabad 765kV 2x S/C line

(v) Moradabad-Meerut 765kV 2x S/C line

(vi) Meerut-Moga 765kV 2x S/C line

(vii) Moga-Bhiwadi 765kV S/C line

(viii) Unnao-Agra 765kV S/C line

(ix) Agra-Bhiwadi 765kV S/C line

(x) Agra-Malanpur 765kV S/C line

(xi) Malanpur-Bina 765kV S/C line

(xii) Bina-Seoni 765kV S/C line

(xiii) Sipat-Seoni 765kV 2xS/C line

(xiv) Sipat-N.Karanpura 765kV S/C line

(xv) N. Karanpura-Pooling Point Bakula (ER) 765kV S/C line

(xvi) Siliguri-Purnea 400kV Quad D/C line

(xvii) Purnea-Muzaffarpur 400kV Quad 2xD/C line

(xviii) Muzaffarpur-Gorakhpur 400kV Quad 2xD/C line

(xix) Gorakhpur-Lucknow 400kV D/C line

(xx) Lucknow-Unnao 400kV D/C line

Of the above transmission lines, the HVDC line from Hirma to Jaipur at Sl. No. (i) above, would basically deliver the share of Northern Region constituents from the Hirma project. Similarly, lines at Sl. Nos. (xii & xiii) would be a part of Sipat evacuation system and those at Sl. Nos. (ii, iii, iv,v & xv) would form part of Barh, Kahalgaon Extn. and North Karanpura projects and the investment on these would be recovered from the beneficiaries of generation projects. As regards the other lines, some are proposed to be constructed to match with the commissioning of Tala generation and some as part of the National Grid.

Under Phase-II of Development further inter-connection of the Eastern and Western Region to Southern Region through strong AC lines is contemplated which would be identified after firming up of the generation projects during the 11$^{th}$ Plan Period.

# RURAL ELECTRIFICATION PROGRAMME

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

(a) Production oriented activities like minor irrigation, rural industries etc.;

(b) Electrification of villages.

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

According to the earlier definition: "A village is classified as electrified if electricity is being used within its revenue area for any purpose what-so-ever."

This definition of village electrification was reviewed in consultation with the State Governments and State Electricity Boards and the following new definition was adopted:

**"A village will be deemed to be electrified if electricity is used in the inhabited locality within the revenue boundary of the village for any purpose whatsoever."**

During the year 2001-2002, 255 inhabited villages were electrified and 151289 irrigation pumpsets/tubewells energised as on 31.12.2001. Cumulatively 508326 villages have been electrified and 12974769 electric irrigation pumpsets have been energised as on 31.12.2001.

As regards the electrification of tribal villages, out of a total of 107471 tribal villages in the country, 81403 (Provisional) villages constituting 75.72% have been electrified as on 31.12.2001. Similarly, 309225 (Provisional) Harijan Basties have been electrified as on the same date.

## PRADHAN MANTRI GRAMOYADA YOJANA(PMGY)

The finance minister in his speech while presenting the budget for 2001-02 has announced the launch of a package of incentive to improve the power distribution system in rural areas. The Govt. have decided to include Rural Electrification as an additional component under PMGY launched in the Annual Plan 2000 - 01 to achieve human development at the village level. The six component of PMGY now are: Primary Health, Primary Education, Rural Drinking Water, Rural Shelter, Nutrition and Rural Electrification. As against a minimum earmarking of 15 per cent of the ACA for each component of PMGY during 2000 – 01, it has been decided to earmark 10 per cent of the ACA for the components of PMGY except for the nutrition component for which a minimum earmarking of 15 per cent of the ACA would be continued. While the states and UTs are required to allocate 65 per cent of their total ACA mandatorily for six components, the allocation of the remaining 35 per cent of the ACA would be decided by the States and UTs themselves based on their own priorities States/ UTs must intimate their sectoral allocation of ACA to the Planning Commission.

The funds for Village electrification would now be available as Additional Central Assistance with 90% grant and 10%loan for the special category States, and 30% grant and 70% loan for the other States.

On the basis of proposal submitted by the various states, 1st instalment under the PMGY scheme has been approved.

| Sl.No. | State | Amount approved (Rs. in lakh) |
|---|---|---|
| 1 | Nagaland | 226.30 |
| 2 | Chandigarh | 27.50 |
| 3 | Sikkim | 15.74 |
| 4 | Tamil Nadu | 586.8 |
| 5 | Karnataka | 420.50 |
| 6 | Bihar | 1843.42 |
| 7 | Pondicherry | 26.70 |
| 8 | Chhattisgarh | 425.85 |
| 9 | Uttar Pradesh | 4708.5 |
| 10 | Uttaranchal | 70.35 |
| 11 | West Bengal | 1410.0 |
| 12 | Daman & Diu Admn. | 6.00 |
| 13 | Assam | 3005.5 |
| 14 | Mizoram | 299.0 |
| 15 | Manipur | 300.0 |
| 16 | Arunachal Pradesh | 382.0 |
| 17 | Meghalaya | 300.0 |
| 18 | Rajasthan | 540.0 |
| 19 | Jammu & Kashmir | 961.0 |
| 20 | Punjab | 744.125 |
| 21 | Kerala | 594.50 |
| 22 | D & NH | 7.40 |
| 23 | Madhya Pradesh | 730.31 |
| 24 | Tripura | 70.35 |
| 25 | Andhra Pradesh | 852.50 |

*Proposal from other States are awaited.*

# ENERGY CONSERVATION

Conservation and efficient use of energy is one of the major thrust areas keeping in view the need to bridge the gap between the demand and availability of various forms of commercial energy. Measures to conserve energy are being devised and implemented both on the supply side and the end-use (demand) side. These include awareness and training programmes, energy audits, demonstration-cum-pilot projects and policy studies.

## 2. ENERGY CONSERVATION ACT, 2001

2.1 The Government has enacted the Energy Conservation Act, 2001 (52 of 2001) to meet the legal requirement needed to enforce energy efficiency and its conservation measures in the country. The Energy Conservation Act, 2001 provides for -

(i) The establishment of the Bureau of Energy Efficiency (BEE) by merger of existing EMC.

(ii) Declaring user or class of users of energy as a Designated Consumer.

(iii) Laying down minimum energy consumption standards and labeling for identified appliances/equipments and norms for industrial processes for energy intensive industries.

(iv) Formulation of energy consumption codes.

(v) Establishment of Energy Conservation Fund both at the Central and State Levels.

(vi) Penalties and adjudication. No penalties would be effective during the 1st five years as the initial period of 5 years would be promotional and creating infrastructure for the implementation of the Energy Conservation Act, 2001.

(vii) The BEE would facilitate the evolution of a self-regulatory system and organizations that will regulate on their own because saving energy also makes good commercial sense.

2.2 The steps are under way to operationalise the BEE. The Act also provides a strategic framework for the formulation and development of energy conservation policies; it attempts a balance between regulatory enforcements and voluntary participation and between market driven methods and governmental mandates.

2.3 In the year 2001-02, a budget allocation of Rs. 9.60 crores was provided for promoting Energy Conservation activities and Rs. 28.00 lakhs for grants-in-aid to Energy Management Centre (EMC) at BE stage which has been revised to Rs. 1.92 crores and Rs. 38.00 lakhs respectively at RE stage.

## 3. SUPPLY SIDE ENERGY CONSERVATION

### 3.1 Transmission & Distribution

A number of Pilot Projects/Demonstration Projects have been taken up for load management and energy conservation through reduction of T&D losses in the system. The schemes under implementation during the year 2000-2001 include:-

- Two pilot projects for energy audit study, one in the distribution network of West Bengal State Electricity Board (WBSEB) sanctioned in 1994-95 with the Ministry of Power's contribution of Rs. 181.03 lakhs and the other in the distribution network of Kerala State Electricity Board (KSEB) sanctioned in 1994-95 with the Ministry of Power's contribution of Rs. 114.62 lakhs, are under implementation by WBSEB and KSEB respectively through REC. Both the projects are likely to be completed during the current financial year i.e. 2001-02.
- A pilot project for installation of 2414 LT Switched Capacitors, sanctioned in 1993-94 with the Ministry of Power's contribution of Rs. 199.32 lakhs, is under implementation in Andhra Pradesh, Haryana, Punjab and Tamil Nadu, through REC and is likely to be completed shortly.

- A pilot project on installation of 3000 Amorphous Core Transformers in the distribution networks of various State Electricity Boards, sanctioned in 1993-94 with the Ministry of Power's contribution of Rs. 300.00 lakhs, is under implementation through REC and is likely to be completed shortly.

- Three pilot projects on Remote Controlled Load Mangement in the distribution networks of RSEB (sanctioned in 1996-97 with the Ministry of Power's contribution of Rs. 297.50 lakhs (revised to Rs. 252.00 lakhs in March, 2000), PSEB (sanctioned in 1995-96 with the Ministry of Power's contribution of Rs. 443.88 lakhs) and HVPNL (sanctioned in 1997-98 with the Ministry of Power's contribution of Rs. 237.22 lakhs) are under implementation through REC. The project of RSEB has been completed successfully during 2001-02 while out of the remaining two projects, the HVPNL project is likely to be completed during the current financial year and the PSEB project, during the next financial year i.e. 2002-03.

- An Energy Conservation-cum-System Improvement Project, involving installation of Amorphous Core Transformers and LT Capacitors in the distribution network serviced by the Cooperative Electricity Supply Society, Sirsilla (Andhra Pradesh), sanctioned in 1995-96 with the Ministry of Power's contribution of Rs. 508.00 lakhs, is under implementation through REC Ltd. The project is planned to be completed within a period of 6 years from the date of sanction i.e.upto March, 2002.

- Two pilot projects, one for introduction of 500 Electronic Meters with the Time of the Day (TOD) facility, sanctioned in 1996-97 with the Ministry of Power's contribution of Rs. 88.00 lakhs, and the other for Energy Conservation and Demand Side Management by installing energy efficient lighting in WBSEB's HQs at Calcutta, sanctioned in 1998-99 with the Ministry of Power's contribution of Rs. 5.55 lakhs, are under implementation through West Bengal State Electricity Board (WBSEB) and are likely to be completed shortly.

### 3.2 Demand Side Energy Conservation

**Industrial Sector**

- A project for developing a complete package for energy conservation in Small Scale Industries in Karnataka, sanctioned in 1998-99 with the Ministry of Power's contribution of Rs. 15.25 lakhs has been successfully completed by Technical Consultancy Services Organisation of Karnataka (TECSOK), Bangalore during the current financial year i.e. 2001-02.

## 4. INDO-GERMAN ENERGY EFFICIENCY PROJECT

The project was designed to set up an advisory centre for rational use of energy technologies and provide services on energy efficiency to the target group in the state of Karnataka. The project, which started in June,1996 was completed in all respects in October, 2000.

The following are the highlights of the project:

* 29 comprehensive energy audits were completed;
* follow up of the implementation of energy audit was completed in 15 units. Over 70% of the recommendations/suggestions of the reports have been implemented in industrial units;
* 5 practical energy audit training were completed;
* 4 in-company training were completed;
* success stories in case of 16 projects implemented were disseminated in the form of flag brochures;
* 16 industry specific energy audit manuals were prepared and disseminated;
* equipment specific/utility-wise manuals were prepared for 15 equipment and disseminated;
* video film on energy management - impact on profit was prepared;

* energy information service is being now marketed on a commercial basis. Already 40 members are availing the services ;

* implementation of demonstration projects on retrofitting energy conservation measures which are not widespread such as cooling towers energy saver, compressor energy server, energy efficient motors, VSD for HVAC, VSD for process control, soft starter etc. were implemented and performance monitored and results disseminated to the target group for 11 products.

The Phase-II of the Indo-German Energy Efficiency and Environmental Project is implemented from Delhi with a view to provide impetus to the implementation of Energy Conservation Act - 2001. This collaboration would particularly address towards smoother implementation of Energy Conservation Act and creating tools for developing delivery mechanism for energy efficiency. Phase-II would focus on the following 4 activities to start with:

1. energy performance contracting and developing a mechanism for sustainable implementation of energy efficiency projects;

2. development of minimum energy efficiency standards and norms for energy intensive equipment in industry and appliances;

3. certification course and accreditation of energy managers;

4. reduction of T&D loss and power consumption in rural areas.

The other areas under the Indo-German Energy Efficiency and Environmental Project are as under :

* Assessing the need and market for power plant operators to enhance plant efficiency and availability.

* Defining Clean Development Mechanism in the power sector and developing shelf of project.

* Minimum Energy Performance standards for one or two appliance and introduction of comparative labelling of two appliances.

* Improvement in efficiency of Municipal/ Metro Water Pumping Supply and Distribution systems.

* Energy efficiency in major Govt. buildings, hospitals and institutions.

## 5. ENERGY CONSERVATION AWARDS, 2001

Ministry of Power has launched a scheme to give national recognition through awards to industrial units that have made special efforts to reduce energy consumption while maintaining production. The scheme is aimed at creating an environment that would spur industries to achieve excellence in end-use efficiency. The awards were first announced in 1991. The response from the industries to this scheme has been encouraging. For the Award 2001, 157 industrial units from the various sub-sectors of industry participated. These units have been able to collectively avoid generation of 485 million Kwh of electrical energy in 2000-2001, which is equivalent to the energy generated from a 90 MW thermal power station at a PLF of 60%. In other terms, these units with their efforts have collectively avoided the installation of power generating capacity equivalent to a 90 MW thermal power station in 2000-2001.

# RENOVATION & MODERNISATION

## 6.1 RENOVATION AND MODERNISATION OF THERMAL POWER STATIONS

### Introduction

In order to improve the performance of existing Thermal Power Stations, a Renovation and Modernisation (R&M) Programme called Phase-I Programme was launched by the Government of India all over the country in September, 1984 for completion during the Seventh Plan Period. This programme was successfully completed and intended benefits were achieved.

### R&M (Phase-II) Programme

In view of the encouraging results achieved from the implementation of Phase-I R&M programme during 7th Plan, Phase-II Programme for R&M of Thermal Power Stations was taken up in the year 1990-91 by the Government of India for implementation during the 8th Plan. Under this programme, 44 Nos. of Thermal Power Stations covering 198 nos. of Thermal Units aggregating to a total capacity of 20,869 MW were taken up. The total estimated cost of the programme was Rs. 2383 crores and an additional generation of 7864 MU/year was anticipated after the completion of the programme.

However, about 50% works could be completed by the end of 8th plan i.e. March 1997. After partial completion of these works, an additional generation of 5000 Mu/year was achieved. Also life extension works on 4 Units (300 MW) were completed.

### 9th Plan Programme

The CEA reviewed the progress of Phase-II R&M Programme and the balance activities still required to be carried out were included in the 9th Plan Programme along with the sub-sequently identified additional activities. During the 9th Plan Programme 150 Units (21696 MW) at 36 Power Stations were taken up for R&M and another 28 units for Life Extension at an estimated cost of Rs. 3513 crores.

Out of 28 Units, the Life Extension works on 18 Units (1245 MW) have been completed and the works on 10 Units (665 MW) are under progress.

### Accelerated Power Development Programme (APDP) For Thermal Power Stations

In order to supplement the efforts of SEBs/ Utilities in R&M and to give fillip to power sector reforms, the Govt. of India have sanctioned a scheme called Accelerated Power Development Programme (APDP) under which funds in the form of grant and loan are being provided for R&M of Power Stations and upgradation of sub-transmission and distribution systems including metering. During the year 2000-01, an amount of Rs. 1000 crores was sanctioned as additional Central Plan assistance for R&M and strengthening of sub transmission and distribution system. An amount of Rs. 237.86 crores was sanctioned for R&M of thermal power stations during the year 2000-01 with 50% portion as grant and balance 50% as loan. During the year 2001-02 an amount of Rs. 1500 crores is proposed to be provided under APDP.

## 6.2 RENOVATION AND MODERNISATION OF HYDROELECTRIC POWER PROJECTS

### R&M Phase - I

Based on the recommendations of the National Committee and subsequent reviews, a programme for renovation, modernization and uprating of Hydro Power Stations was formulated by Central Electricity Authority in which 55 schemes were identified with an aggregate capacity of 9653 MW. The total estimated cost of these schemes is Rs.1493 crs. and expected benefit is 2531 MW/7181 MU. Out of 55 schemes, work on 27 schemes having an aggregate capacity of 6511 MW at an estimated cost of Rs.548 crs. and an expected benefit of 1498 MW/3586 MU have been completed till 31.3.2001.

During 2001-02, it was programmed to complete the following Hydro RM&U schemes identified by National Committee (Phase-I):-

| Sl. No. | Name of the scheme | Inst. Cap. MW | Est. Cost (Rs./Crs.) | Expected Benefit | |
|---|---|---|---|---|---|
| | | | | MW | MU |
| 1. | Lower Sileru | 4x115 | 13.35 | 24 | - |
| 2. | Srisailam | 7x110 | 16.32 | - | - |
| 3. | Mahatma Gandhi | 4x12+4x18 | 33.90 | 120 | 370 |
| 4. | Hirakund-I (Sw.yard Equpt.) | - | 9.85 | - | - |
| 5. | Pykara | 3x6.65+2x11+2x14 | 17.06 | 69.95 | 274.62 |

Out of above 5 schemes, two schemes namely Lower Sileru (4x115 MW) and Srisailam (7x110 MW) have been completed in Oct., 2001. As regards RM&U of Mahatma Gandhi HEP (4x12+4x18 MW), units 1&2 have been uprated from 12 MW to 14 MW each and units 7&8 have been uprated from 18 MW to 22 MW each. Work on remaining units is on advanced stage and likely to be completed by Feb., 2002. As regards Pykara HEP (3x6.65+2x11+2x14 MW), R&M works are likely to be completed by March, 2002. Work on Hirakund-I (Switchyard Equipment) is likely to slip to the next financial year; only 35% of work has been completed till Oct., 2001.

At present, there are 17 ongoing (Phase-I) schemes with an aggregate installed capacity of 1163 MW where R&M works at an estimated cost of Rs.792 Crs. with an expected benefit of 702 MW/2194 MU are under different stages of implementation. It is expected that out of these 17 schemes, 2 schemes would be completed during the Ninth Plan. Five Schemes consisting of Khatima, Obra, Ramganga, Pathri have been declared closed due to funds constraints and Nizamsagar has been declared closed due to no major problem in its operation. RM&U work on four schemes viz. Machkund, Subernrekha, Kyrdemkulai and Hirakund (Units 5&6) are yet to be undertaken.

### R&M Phase-II

As per the hydro policy declared in 1998, renovation, modernization of Hydro Power plants have been accorded priority. Accordingly, 67 hydro RM&U schemes having an aggregate capacity of 10318 MW have been identified to be undertaken under Phase-II programme till the end of 10$^{th}$ Plan. At present there are 20 ongoing schemes. 14 schemes have been tied up with PFC/APDP and three schemes of Kerala are tied up with EDC, Canada. Remaining three schemes are being revised and are yet to be tied up. Work on 3 schemes viz. Ganguwal, Bairasuil and Salal has been completed till 31.3.2001.

During 2001-02, the following schemes under Phase-II were scheduled for completion:-

| Sl. No. | Name of the scheme | Inst. Cap. MW | Est. Cost (Rs./Crs.) | Expected Benefit | |
|---|---|---|---|---|---|
| | | | | MW | MU |
| 1. | Kotla (U-2) | 24.2 | 25 | 27.2 | 244.5 |
| 2. | Sharavathy | 10x103.5 | 5.22 | - | - |
| 3. | Nagjhari (U-1&3) | 2x135 | 26.12 | 30 | - |
| 4. | Bhadra | 2x12+1x7.2+1x6+1x2 | 4.10 | 2 | 6 |
| 5. | Supa | 2x50 | 2.64 | - | - |

Contd...

| | | | | | |
|---|---|---|---|---|---|
| 6. | Munirabad | 2x9+10.30 | 3.60 | - | - |
| 7. | Panniar | 2x15 | 62 | 30 | 148 |
| 8. | Pallivasal | 3x5+3x7.5 | 94 | 37.5 | 284 |
| 9. | Sengulam | 4x12 | 114 | 48 | 184 |
| 10. | Tillari | 1x60 | 4.5 | 8.2 | - |
| 11. | Bhira Tail Race | 2x40 | 1.8 | - | - |
| 12. | Shanan | 4x15+1x50 | 11.35 | - | - |

Out of above 12 schemes, RM&U of one scheme namely Kotla (U-2) has already been completed. RM&U works on the following three schemes are on advanced stage and likely to be completed by March, 2002:-

- Nagjhari (U 1&3) (2x135 MW)
- Munirabad (2x9+10.30 MW)
- Shanan (4x15+1x50 MW)

75% of RM&U work on Panniar, Pallivasal and Sengulam has already been completed. 50% of Units of these schemes i.e. 6 nos. would be recommissioned after completion of RM&U works shortly. The Commissioning of remaining units may be slipped by 3 to 6 months. R&M work on remaining 5 schemes i.e. Sharavathy, Bhadra, Supa, Tillari & Bhira Tail Race would also slip to the next financial year i.e. 2002-03.

## National Perspective Plan for RM&U and Life Extension of Hydro Power Stations:

Based on the proposal from various SEBs/ Utilities, a National Perspective Plan for Hydro R&M schemes incorporating schemes to be implemented in the next 12 to 15 years i.e. upto 2011-12 has been formulated.

As per the National Perspective Plan, 36 schemes (23 Nos. Phase-I and 13 Nos. Phase-II) are targeted to be completed during Ninth Plan. Another 68 schemes (14 Nos. Phase-I and 54 Nos. Phase-II) are earmarked for completion during 10$^{th}$ Plan and balance 13 schemes (Phase-II) to be completed during 11$^{th}$ Plan. Total installed capacity of 117 schemes is 19370.55 MW and these schemes after RM&U work would yield benefits of 7751 MW/ 10748 MUs at an estimated cost of Rs.4660 Crs. As on 31.10.2001, 20 schemes (Phase-I 16 Nos., Phase-II 4 Nos.) have been completed during the Ninth Plan. It is expected that 5 more schemes would be completed by the end of Ninth Plan.

## Accelerated Power Development Programme (APDP)

The Government has approved a new scheme on Accelerated Power Development Programme (APDP) The scheme will continue till the end of 11$^{th}$ Plan i.e. 2012. In case of special category states (J&K, Uttaranchal, Himachal Pradesh, Constituent States of North Eastern Region including Sikkim) the entire cost of the project will be met under APDP in the form of 90% grant and 10% loan. In case of non special states, 50% of the project cost will be met from APDP out of which half will be in the form of grant and half as loan. The remaining 50% cost of the project can be met by the utility from their internal sources or loans from PFC/REC/FIS/Supplies credit. R&M/Life extension projects costing less than Rs.100 Crores will be financed under APDP.

17 proposals for RM&U/Life extension of Hydro units have been received so for during 2001-02 for consideration of APDP funding. Out of 17 proposals, 2 schemes were recommended for APDP funding. Appraisal on another 2 schemes are under process & recommendations may be sent shortly. Remaining 13 proposals are under revision by various SEBs/ Utilities based on CEA's comments.

# CENTRAL ELECTRICITY AUTHORITY

## 1. ORGANISATION OF CEA

The Central Electricity Authority (CEA) is a statutory organization constituted under Section 3(1) of the Electricity (Supply) Act, 1948. It was established as a part-time body in 1951 and made a full-time body in 1975. It is an attached office of Ministry of Power, Government of India.

In all technical, financial and economic matters, the Ministry of Power is assisted by the CEA. CEA is responsible for technical co-ordination and supervision of programmes and is also entrusted with a number of statutory functions. CEA is headed by a Chairman, who is also Ex-officio Secretary to the Government of India and has six full-time Members, who are of the rank of Ex-officio Additional Secretaries to the Government of India. These are – Member (Thermal), Member(Hydro), Member (Economics & Commercial), Member(Power System), Member(Planning) and Member (Grid &Operation). CEA has five part-time Members, Member (Legal) being one of them.

## 2. FUNCTION OF CEA

The Authority is generally to exercise such functions and perform such duties and act in such a manner as the Central Government may prescribe under the Rules framed under Section 4B(1) of the Electricity (Supply) Act, 1948 or by issue of written directions in matters of policy involving public interest under Section 4A(1) of the said Act. Under Section 3(1) of the Act, the CEA is particularly charged with the following functions:

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

ii To act as arbitrators in matters arising between the State Government or the Board and a licensee or other person as provided in the Act.

iii To collect and record the data concerning generation, distribution and utilization of power and carry out studies relating to cost, efficiency, losses, benefits and such similar matters.

iv To make public from time to time information secured under the Act and to provide for the publication of reports and investigations.

v To advise any State Government, Board, Generating Company or any other agency engaged in generation or supply of electricity on such matters as will enable such Government, Board, Generating Company or Agency to operate and maintain the power system under the ownership or control in an improved manner and where necessary in coordination with any other agency owning or having the control of another power system.

vi To promote and assist in the timely completion of schemes sanctioned under Chapter V of the Act.

vii To make arrangements for advancing the skill of persons in the generation and supply of electricity.

viii To carry out or make arrangements for any investigation for the purpose of generating or transmitting electricity.

ix To promote research in matters affecting the generation, transmission and supply of electricity.

x To advise the Central Government on any other matter on which its advice is sought or make recommendations to that Government on any matter if, in the opinion of the Authority the recommendation would help in improving the generation, distribution and utilization of electricity; and

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

Under the provision of Electricity (Supply) Act,

1948, the Central Government has further added few more functions to the Central Electricity Authority. These are :

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

Apart from the above functions provided under the Electricity (Supply) Act, 1948, CEA also undertakes design and engineering of power projects with a view to develop in-house technical know-how and also to assist the State Electricity Boards, Generating Companies & State authorities requiring such assistance under Section 3(1) (v) of the Electricity (Supply) Act, 1948. Introduction, the Secretariat for Central Electricity Board (CEB) and safety inspection of centrally owned / controlled electrical installation as per Indian Electricity Rules 1956 is also vested with CEA.

## 3. SUB-ORDINATE OFFICES

Following are the sub-ordinate offices of the CEA:-

1. Northern Regional Electricity Board, New Delhi.
2. Western Regional Electricity Board, Mumbai.
3. Eastern Regional Electricity Board, Calcutta.
4. Southern Regional Electricity Board, Bangalore.
5. North-Eastern Regional Electricity Board, Shillong.
6. Power System Training Institute, Bangalore.
7. Hot Line Training Centre, Bangalore.
8. Regional Power Survey Organisation, New Delhi.
9. Regional Power Survey Organisation, Bangalore.
10. Regional Power Survey Organisation, Mumbai.
11. Regional Power Survey Organisation, Calcutta.
12. Regional Inspectorial Organisation, Chennai.
13. Regional Inspectorial Organisation, Goa.
14. Regional Inspectorial Organisation, New Delhi.
15. Regional Inspectorial Organisation, Shillong.

## 4. TECHNO-ECONOMIC APPRAISAL OF POWER SCHEME

**During the year 2001-2002 (upto 30.11.2001), CEA accorded Techno-Economic Clearance to 8 new power schemes comprising 5 generation projects aggregating to 3726.617 MW, 3 transmission (including 1 appraised scheme) schemes involving 3075 Ckt. Kms transmission length.**

**During the year 2001-02 (upto 30.11.2001), CEA's consultation under Section 44 of E(S)Act, 1948 was issued to 11 Captive power plants aggregating to 780 MW to the various State Electricity Boards.**

## 5. MONITORING OF THERMAL POWER PROJECTS

In order to keep a close watch for timely completion of sanctioned and on-going thermal power projects in the Central, State and Private Sector, implementation of the projects is closely monitored by the Thermal Monitoring Division by making site visits/various correspondences with Suppliers, Contractors and different Executing Agencies. In Thermal Project Monitoring Division of CEA project-wise bottlenecks are identified, remedial measures

are suggested and the concerned project authorities are advised to undertake requisite steps/actions to overcome the constraints. Joint Coordination Meetings are held twice a year and review meetings conducted periodically which provide useful link between project authorities and main suppliers of equipment to ensure coordinated efforts for timely completion of thermal projects under execution.

## 6. LOAD DESPATCH & TELECOMMUNICATION

### A. • Establishment of Load Despatch and Telecommunication facilities for Power Sector:

In 1990s Government of India has decided to modernize the existing Regional & State Load Despatch Centers and Communication facilities in the country to prevent grid disturbances and failures.

The Central Electricity Authority (CEA) had prepared a Master Telecom Plan in consultation with M/S Merz and Mecllenan, UK to meet the telecommunication requirement of the power sector. Dovetailing this Master Telecom plan with Supervisory Control and Data Acquisition System for Power Sector, CEA conceived the Unified Load Despatch and Communication (ULDC) scheme for all the five Regions to Operate, Monitor and Control the Regional Power System in a unified, well-coordinated and integrated manner. The availability of real time system data is essential to ensure optimality in system operation and also to minimise system brownouts and blackouts.

The ULDC Scheme for Southern (1993), Northern (1993), North Eastern (1994), Eastern (1997) and Western (1998) Regions have been techno economically appraised and cleared by Government of India at a total estimated cost of Rs. 1814 crores. The Unified Load Despatch and Communication Schemes would ensure modernisation of Energy Management System with the installation of state-of-art system to improve further the performance of integrated operation of regional power grid in the country. The facilities being created under the Unified Scheme would cater to the Load Despatch and Telecommunication requirements of Power Sector up to the year 2010.

CEA is paying a special attention to North-Eastern constituents States and also for Sikkim in Eastern Region. The ULDC Scheme for North-Eastern Region is being given a special attention to remove all constraints including funding arrangement to provide a help to the North-Eastern States. These Load Despatch and Telecom Schemes are in the various stages of implementation. The Scheme-wise details covering the sanctioned, revised cost and anticipated date of completion are as under:

| Name of the ULDC scheme for the Region | Date of Govt. approval | Sanctioned Cost by Govt. (In crores) | Revised Estimated cost (under processing) (In crores) | Completion Schedule |
|---|---|---|---|---|
| Northern | March 1995 | 479.51 | 658.92 | January 2002 |
| Southern | February 1995 | 621.57 | 683.80 | January 2002 |
| Western | February 2001 | 254.82 | | February 2005 |
| Eastern | September 1998 | 290.01 | | December 2004 |
| North-Eastern | August 1999 | 167.93 | 267.35 | May 2003 |

**Appraisal and Monitoring:**

1) During the current year technical appraisal in respect of Load Despatch and Telecommunication aspects for various transmission, distribution and communication schemes have been carried out. Some of the important schemes are as under:

**a) Transmission System:**

Sipat STPS Stage-I, Hirma Mega Power Project, Tala HEP etc.

**b) Load Despatch & Communication and Distribution Automation:**

Central Load Despatch Center **for Sikkim**, Indira Sager of MPEB, State Load Despatch Center and Communication System for CSEB, Communication System of GRIDCO Orissa etc.

2) To achieve timely completion and minimise time & cost over-runs of the Unified Load Despatch and Communication (ULDC) schemes, CEA is closely monitoring all the five ULDC Schemes.

- **Micro-wave and Power Line Carrier Communication (PLCC) Coordination:**

Coordinated with WPC/DOT agencies to achieve timely clearance of frequency spectrum to PLCC system of new power transmission lines and the VHF/UHF/microwave systems of power utilites.

- **Consultancy and technical support**

1) Necessary technical input had been provided to National / International Standardisation bodies (like BIS, CIGRE) to ensure supply of quality Load Despatch & Telecommunication (LD&T) equipment for Power Sector.

2) Technical support/consultancy on LD&T aspects was provided to power utilities including Narmada Control Authority, Nathpa Jhakri power projects, Tala projects of Bhutan and Chhatisgarh State Electricity Board.

- **Follow up of IT Task Force Recommendation:**

1) National Task Force on Information Technology and Software Development, constituted by the Government of India, inter alia, recommended leasing of spare telecommunication channels by SEBs and POWERGRID to the telecommunication users. Power Utilities were asked to make use the facilities offered in the recommendation for possible revenue earning through formulation of new telecommunication schemes and reviewing the existing telecommunication facilities.

2) Based on the above lines, a scheme called 'Establishment of Backbone Telecom Network' for developing a wide-band telecom network in the country is being taken up for implementation by POWERGRID. The estimated cost of the scheme is Rs. 1100 crores using the Right of Way (ROW) and Power Transmission Line infrastructure.

3) Other power utilities like Rajasthan Vidyut Prasaran Nigam (RVPN), Haryana Vidyut Prasaran Nigam (HVPN), Tamil Nadu State Electricity Board (TNEB), Karnataka Power Transmission Corporation Limited (KPTCL), West Bengal State Electricity Board (WBSEB) etc. have evolved plans to diversify into telecom business.

CEA is also trying to make different power utilities to join and come in collaboration to put up a full fledged telecommunication service.

## B. POWER AND TELECOMMUNICATION COORDINATION COMMITTEE (PTCC)

1. During the year 2001-02 (Up to November 2001), 53 new cases were received for PTCC clearance. This Division has sent

Induced Voltage (IV) comments for 46 cases to BSNL and Railway for issuing PTCC route approval; these include 1235 circuit Kms. of 400 kV lines and 2820 circuit Kms. of 220 kV lines. The anticipated target for the remaining period of year up to March 2002, 25 cases are likely to be received and comments for 20 cases will be sent to BSNL for issue of route approval. This includes 550 circuit Kms. of 400 kV and 1200 circuit Kms. of 220 kV power lines.

2. During the year, Technical assistance to MSEB, Rajasthan Rajya Vidyut Prasaran Nigam and APTRANSCO was rendered for their state level PTCC cases.

3. Studies were carried out in coordination with the concerned agencies in respect of finalization of norms for PTCC clearance of HVDC power lines and 800/765 kV EHV transmission lines.

4. A Sub-Committee with the Director, PTCC, Power Communication Engineering Division, CEA as a Convener, set up for study and suggest interim guidelines for laying of power cables greater than 33kV in proximity with telecom cables had finalized guidelines and issued for guidance to State Electricity Boards/Power Utilities, BSNL in laying underground power cables in proximity with telecommunication cables.

5. A number of pending/outstanding cases were resolved and the constitution of re-organization of Central PTCC and State Level PTCC, in the wake of reforms in power and telecom sectors was finalized by the Central PTCC and notification issued to SEBs, BSNL, Railways, Defence etc. and also Chief Engineer, Power Communication Engineering Division (formerly LD&T) CEA has been appointed by the Ministry of Power as an Arbitrator from Power Sector to resolve all disputed cases of PTCC including electrocution accident cases.

## 7. UT DIRECTORATE

### • Power Development Schemes

– UT Directorate is responsible for power development in UTs viz Chandigarh, Dadra and Nagar Haveli, Daman & Diu, Pondicherry, Andaman & Nicobar Islands and Lakshadweep Islands. It renders assistance to the UTs in project formulation, preparation of specification/ procurement of equipments pertaining to power generation, transmission and distribution schemes.

Functions of UT Directorate include - Clearance of Gener ation and T&D Schemes of UTs whose cost do not come under the purview of techno-economic clearance of CEA.

– Assistance in formulation of/participation in Annual Plan Discussions for UTs/

– Preparation of Master Plan for Power Development in UTs.

– Tendering and procurement of power equipment as required by DGS&D, Advisory Committee for acceptance of tenders, etc.

– UT Administration on specific organisational and staff matters and when referred to.

– Assistance to Ministry in dealing with audit observations of UTs.

### IMPORTANT WORKS COMPLETED DURING THE YEAR 2001-02:

### UT of Andaman & Nicobar Islands:

- A technical team of CEA visited Port Blair to finalise the scope of works relating to implementation of 33 kv transmission line from Bambooflat PH.
- Technical clearance accorded to the scheme for augmentation of DG capacity at Chowra Island by 2x160 KVA.
- SFC clearance to the scheme for conversion of existing overhead T&D system to U/G cabling system due to extension of Port Blair Airport.
- Award of work to M/s R&C, Nagpur for erection of 3 Nos. bays and additional works for drawing power from 20 MW Bambooflat PH.

### UT of Lakshadweep:

1. Technical clearance to the scheme for

augmentation of DG capacity and Distribution system at Bitra Island.

2. A technical team of CEA visited Lakshadweep Islands to review the progress of power development works.

### UT of Dadra & Nagar Haveli & UT Of Daman and Diu:

1. Technical clearance to the scheme for hot line stringing of II circuit of 66 KV, Kharadpada – Masat line.
2. Preparation of Master Plans for the UT of D&NH and UT of Daman & Diu for meeting the future load growth and improving the quality and reliability upto the end of 11th Plan period (2012) which is under progress.
3. Evaluation of proposal and award of works to scheme for augmentation of 66/11 kV Kharadpada s/s & Khadoi s/s.
4. Power sanction for fixation of stock limit for Electricity Department of DNH for the year 2002-03.
5. Technical clearance for augmentation of 66/11kV Dadra s/s from 30 MVA to 60 MVA.
6. Technical clearance for normal development works for the period 2002-04.

### UTs of Chandigarh & Pondicherry:

Technical clearance to the scheme for establishment of 66/11kV, 2x20 MVA s/s at Sector 56 and Sector 47, Chandigarh.

Power sanction for fixation of stock balance limit of Electricity Department of Pondicherry for the years 2000-2001 and 2001-2002.

### ARUNACHAL PRADESH

Director (UT) and Dy. Director (UT) visited Arunachal Pradesh for site inspection & reviewing the progress of ongoing power distribution schemes funded under central pool of non-lapsable funding. The progress of implementation of rural electrification of villages funded under the PM's special package for NE region was also reviewed.

## 8. RESEARCH AND DEVELOPMENT DIVISION

Under the provision of Section 3(1)(ix) of Electricity (Supply) Act, 1948 Central Electricity Authority will function and perform such duties so as to promote research in matters affecting the generation, transmission and supply of electricity.

## 9. Ranking Study of Balance Hydro Potential By CEA

The Government of India is according high priority for hydro power development. Hydro power is a prefered source of generation as it is clean power and is inflation free, not being dependant on fossil fuel prices. Besides having the advantage of meeting peaking power needs, it also enhances energy security. A number of steps have been taken to encourage hydro power development in the country. The country needs to enhance the share of Hydro Power to correct the hydro thermal imbalance to stablize its Power System while meeting the growing energy needs of the people. With the objective of expediting hydro development in a systematic manner, Central Electricity Authority undertook a ranking study of the balance Hydro Potential sites for all the basins in the country. This excercise would help in identifying the projects, which could be taken up first in order of their priority so that Hydro Power Development is taken in an appropriate sequence.

The ranking of hydro sites has been carried out based on weightage criteria for various aspects involved in the development of hydro schemes such as R & R aspects, inter-state/international issues, height of dam, length of water conductor system, accessibility to site, type and potential of the scheme, status of scheme etc. Considering these aspects, the schemes have been graded in A,B and C categories in order of their priority for development.

Based on the Ranking Study, about 400 schemes with an aggregate installed capacity of about 1,07,000 MW have been prioritised in

all the six River Systems of the country. 98 schemes with probable installed capacity of 15,640 MW fall under "A" Category, 247 schemes with probable installed capacity of 69,850 MW under "B" category and 54 schemes with probable installed capacity of 21,420 MW under "C" category.

## 10. IMPORTANT TASKS HANDLED DURING 2001-2002 (Upto November 2001)

### CEA Chairs at IIT, Delhi

An MOU was signed on 12th October, 1999 between CEA and the IIT Delhi for creation of two CEA Chair Professorships one each at the Centre of Energy Studies and the Electrical Engineering Department of IIT, Delhi to fulfill following objectives concerning Power Sector:

- To take part in the academic programs of IIT Delhi as full time professors/faculty in the Centre for Energy Studies and Electrical Engineering Department and coordinate HRD programs in the frontier areas of Power Management.
- To develop R&D programs relevant to the needs of CEA and in areas defined in the MOU (subject to need based revision).
- To initiate and develop HRD programs relevant to the needs of CEA and to coordinate courses for any batch of students from CEA.

Endowment money of Rs. 60 lakhs has been fully paid by CEA. One Chair Professor in the Electrical Engineering Dept., IIT Delhi is already functioning. The 2nd Chair Professor in the Centre of Energy Studies, IIT Delhi has also been selected; however, confirmation from IIT Delhi is awaited.

Under the programme a number of CEA officers are pursuing M.Tech. and Ph.D. courses at IIT Delhi which will give long term benefits to the Power Sector.

# CENTRAL ELECTRICITY REGULATORY COMMISSION

The Central Electricity Regulatory Commission (CERC), an independent statutory body with quasi-judicial power, was constituted on 25th July, 1998 under the Electricity Regulatory Commission Act, 1998. The Commission consists of a Chairperson and four other Members including the Chairman, CEA as the ex-officio member.

The functions of the Commission are:-

(a) To regulate the tariff of generating companies owned or controlled by the Central Government;

(b) To regulate inter-state transmission including tariff of the transmission entities;

(c) To promote competition, efficiency and economy in the sector;

(d) To regulate inter-state bulk sale of Power;

(e) To aid and advise the Central Government in formulation of tariff policy and to frame guidelines relating to electricity tariff;

(f) To associate with the environmental regulatory agencies towards developing policies and procedures for environmental regulations for the power sector;

(g) To arbitrate or adjudicate in matters relating to tariff.

CERC drafted the regulations relating to CERC (Filing of Annual Report by Thermal Generating Companies) 2000, CERC (Filing of Annual Report by Transmission Utility) 1999, CERC (Medical Facilities) Regulations, 2000 and CERC (Terms and Conditions of Tariff) Regulations, 2001, Notification regarding revised terms and conditions for determination of tariff, CERC (Procedure, Terms & Conditions for grant of transmission License and other related matters) Regulations, 2001, CERC (Terms & Conditions of Tariff) (First Amendment) Regulations, 2001 and Notification regarding extension of billing of charges upto 31.12.2001.

The Commission also opened its web site (www.cercind.org) and maintained it by posting all its programmes and orders from time to time.

The number of petitions carried forward from last year (1999-2000) was 40 and the number of petitions received during the year 2000-2001 was 127. Out of 167 petitions, 29 petitions, were disposed of finally. The average time taken for disposal of petitions is five to seven months.

From 1st April, 2001 to 31st December, 2001, 65 petitions were received and thus totalling to 203 (138 carry forward from last year). Fifty one petitions were disposed of finally during the period. It is anticipated that another 50 petitions will be disposed off by the end of 31st March, 2002.

# PRIVATE PARTICIPATION IN THE POWER SECTOR

## 1. PRIVATE POWER POLICY

Since independence, development of the electricity sector has primarily been the responsibility of the Government, with a relatively small contribution from private enterprises, in the form of licensees like Bombay Suburban Electricity Supply Company(BSES), Tata Electric Company(TEC),Calcutta Electric Supply Company(CESC) and Ahmedabad Electric Company(AEC), etc. Considering the large requirement of funds for the sector, it was not possible to mobilise adequate financial resources by Government alone, given the highly capital intensive nature of the sector and the large incremental capacity addition requirements. At present, the country faces an energy shortage of about 7.3% and peaking shortage of around 12.5%.

In order to mobilise additional resources for the sector to help bridge the gap in demand and supply, the Government formulated a policy in 1991 with the objective to encourage greater investment by private enterprises in the electricity sector. The Electricity (Supply) Act, 1948 was amended in 1991 to provide a legal framework for facilitating the investments. Although the policy announced in 1991 covers generation and distribution, there has been more progress in the area of generation in so far as private sector is concerned.

The package of incentives in the policy which complements the amended provisions in the legislation comprehensively cover the legal, administrative and financial environment to make private investments in the sector attractive. A two-part tariff system for power projects to be put up by the Independent Power Promoters, covering the fixed costs and variable energy cost in electricity pricing, has been formulated and tariff notification issued in March 1992, which has been amended from time to time keeping in view the changing needs of the sector. This, inter-alia, provides for a 16% Return on Equity at 68.5% PLF for thermal plants (coal/lignite/gas) and 90% availability for hydro electric plants. To encourage efficiency in plant operation, an incentive scheme based on capacity utilisation has also been formulated. The norms for tariff based bidding in respect of thermal power projects have been incorporated in the tariff notification vide an amendment dated 23.5.1997.

## 2. RESPONSE FROM THE PRIVATE SECTOR

**Private power projects being monitored by Central Government**: The response to GOI's energy policy has been encouraging. Since 1991, both domestic and foreign developers have evinced keen interest in the Indian power sector. Out of a total of 58 private sector power projects given techno-economic clearance by Central Electricity Authority (CEA), 55 projects envisaging a total capacity of around 28,500 MW are presently in the pipeline at different stages of implementation. Three of the projects are no longer being pursued by the respective State Governments for development through the Private Sector. In addition, there are several projects which are being set up by the private sector with the approval of the State Governments themselves and do not require the techno-economic clearance of CEA. After announcement of the private power policy in 1991, a total capacity of around 6500 MW has already been commissioned and another 4500 MW are presently under construction.

## 3. MAJOR POLICY INITIATIVES TAKEN TO STREAMLINE THE PROCESS OF PROJECT DEVELOPMENT

### 3.1 Competitive bidding for Awarding Projects:

The initial batch of projects were awarded generally on the basis of negotiations between the SEB and a single developer. The SEBs and State Governments had been advised to introduce a more competitive element in the process of selection of developers and award

of projects, and consider awarding new projects only on the basis of competitive bidding. In January 1995, it was decided that no new private power project proposal would be considered by CEA, if the project is not awarded through competitive bidding. A cut off date 18.2.1995 was prescribed and only those MOUs, which were signed before this date are valid. Projects after this date have to be awarded only after following the competitive bidding route. Detailed guidelines have also been issued to the State Governments for adopting competitive bidding. A notification for competitively bid projects was issued in May, 1997 defining the manner in which tariff would be determined for such projects. However, certain categories of projects, where the ICB route may not be feasible, have been exempted from this route.

### 3.2 Exemptions from ICB route:

#### 3.2.1 *Expansion projects*

It has been recognised that in order to have the benefit of the already existing infrastructure facilities, which result in reduced project costs, it would be preferable for the same project developer to be allowed to undertake the expansion project rather than to undergo the bidding process. The states have accordingly been advised in January, 1997 to encourage such expansion plans by IPPs.

#### 3.2.2 *Joint venture projects between SEB/ PSU and private company*

Competitive bidding shall not be necessary for selection of the private company partner in joint venture projects where the SEB/Public Sector Undertaking holds majority shares (51%) of the joint venture company.

#### 3.2.3 *Generating stations exclusively for captive use*

Competitive bidding would not be required for setting up generating stations by IPP exclusively for the captive use of an industry or a group of industries without involving any sale of Power to State Grid.

#### 3.2.4 *Power projects based on heavy bottom residue and set up by existing refineries*

Power projects based on heavy bottom residue being set up by existing refineries have also been exempted from ICB route subject to the condition that the project would be required to go in for ICB for procurement of equipment and price of fuel would be fixed by an independent body like the Bureau of Industrial Costs and Prices.

**Bidding for EPC contracts**:

The States/SEBs had been advised in June, 1996 to impress upon the promoters that for the projects that have not finalized their EPC contracts, it would be necessary to follow the ICB route in the selection of their EPC contractors. In the case of IPPs who inform that their EPC contracts have been finalised, the SEB should satisfy itself that they have actually done so and in cases where it is not finalised, the SEB should ensure that the bidding route adopted is transparent and proper.

## 4. GUIDELINES FOR PRIVATE SECTOR PARTICIPATION IN RENOVATION AND MODERNIZATION

The policy details out various options like Lease, Rehabilitate, Operate and Transfer(LROT), sale of plant and joint venture between SEBs and private companies for promoting R&M programmes. While deciding on the available options, the policy emphasizes on adherence to competitive bidding route. R&M schemes costing up to Rs. 500 crores are not required to be submitted to the CEA for techno economic appraisal.

### 4.1 Captive/Co-generation Plants:

As an alternative to meet the rapidly increasing industrial demand for power, Ministry of Power has suggested encouragement to captive/co-generation plants by industries. The policy suggests, inter-alia, sale of excess power to the grid as per mutually agreed rates, access to transmission grid of the State on payment of

wheeling charges, third party access for direct sale of power etc. A resolution for promotion of co-generation had been issued on November 6, 1996. The resolution details the definition of co-generation, mode of fixation of tariff and mode of deciding co-generation status for the power plants.

**4.2 Setting up of Mega Power Projects:** To facilitate setting up of large sized thermal power plants in the country and in order to derive the economies of scale, the Ministry of Power issued guidelines for setting up of mega power projects on10th November, 1995. Power projects having a capacity of 1000 MW or above and supplying power to more than one State were defined as a Mega project. After considering the experience of this policy, the policy was revised in November, 1998. Under the revised policy, specific Inter-state and Inter-regional mega power projects have been identified for being developed both in the public as well as private sector. The Standing Independent Group (SIG) which had been constituted by the Government of India, to establish parameters for negotiation of large power generation projects was made the apex body to initially oversee implementation of the mega private power projects . Under the revised policy, the principles of competitive bidding would be adhered to as far as possible, while obtaining tariff offers. The Hirma mega project in Orissa being developed by CEPA, which was being developed on the MOU route even prior to announcement of the mega power policy, is the only mega project being developed on the MOU route. A Power Trading Company (PTC) has been established to purchase power from the private sector mega projects and sell it to the beneficiary States. Security to the PTC would be provided by means of a Letter of Credit and recourse to the State's share of Central Plan Allocations and other devolutions. A pre-condition would be that the beneficiary States should have constituted their Regulatory Commissions with full powers to fix tariffs as envisaged in the Central Act and also commit to privatise distribution in cities having population of more than one million.

The import of capital equipment has been made free of customs duty for these projects. In order to ensure that domestic bidders are not adversely affected, price preference of 15% is being given for the projects under public sector, while deemed export benefits as per the EXIM policy is being given to domestic bidders for projects both under public and private sector. The domestic bidders would be allowed to quote in US Dollars or any other foreign currency of their choice. In addition, the income-tax holiday regime would be continued with the provision that the tax holiday period of 10 years can be claimed by a promoter in any block of 10 years, within the first 15 years. The State Governments have been requested to exempt supplies made to mega power plants from sales tax and local levies.

It is visualised that the country would be adding 15,000-20,000 MW of capacity through this policy at the most competitive tariffs payable by State Electricity Boards and consequently by consumers.

**4.3 Enhancing the CEA limit**: Section 29 of the Electricity (Supply) Act, 1948, empowers the Central Government to lay down the ceilings for capital expenditure on various schemes for the power sector, exceeding which the concurrence of CEA would be required. The ceiling limits have been revised from time to time, thus delegating powers to the State Governments to give such concurrence. The various capital expenditure limits beyond which CEA's concurrence is required are presently prescribed in the notification issued by MOP on 2.6.1999 as amended so far, which are mentioned below:-

(i) In relation to a scheme for thermal generating station prepared by a Generating Company selected through a process of competitive bidding by the competent Government or Governments and conforming to the factors notified vide number S.O. 251(E), dated the 30th March, 1992 as amended vide number S.O. 410(E), dated the 23rd May, 1997, rupees five thousand crores;

(ii) In relation to a scheme for other thermal generating station prepared by a Generating Company selected through a process of competitive bidding by the competent Government or Governments, rupees one thousand crores;

(iii) In relation to a scheme prepared by a Generating Company, not wholly or partly owned by the Central Government or any State Government, for supply of power to more than one State, and approved in accordance with a scheme proposed by any committee or body authorised by the Central Government in this regard, rupees twenty thousand crores;

(iv) In relation to a scheme for hydro-electric generating station prepared by a Generating Company selected through a process of competitive bidding by the competent Government or Governments, rupees one thousand crores;

(v) In relation to a scheme for renovation and modernisation of existing power generating station, rupees five hundred crores; and

(vi) In relation to a scheme for generating station prepared by a generating company, where the power generated is primarily for captive consumption for an industry or a group of industries and sale of power, if any, to the Board, does not exceed 50% of the total installed capacity of the power station, rupees three thousand crores;

(vii) In relation to all other schemes, rupees two hundred and fifty crores.

All hydro-electric schemes utilising water of inter-state rivers are to be submitted to the CEA for its concurrence.

## 5. POLICY ON AUTOMATIC APPROVAL FOR FOREIGN DIRECT INVESTMENT

It has been decided to allow automatic approval (RBI route) for 100% foreign equity without any upper ceiling. The categories which would qualify for such automatic approval are :

(i) Hydro-electric power plants

(ii) Coal/lignite based thermal power plants

(iii) Oil/gas based thermal power plants

## 6. NEW NORMS FOR ENVIRONMENTAL CLEARANCE

The following delegations have been made to the state governments in the matter of environment clearance to power projects:-

(i) All co-generation plants and captive power plants upto 250 MW.

(ii) Coal based plants upto 500 MW using fluidized bed technology subject to sensitive area restrictions.

(iii) Power stations upto 250 MW on conventional technology.

(iv) Gas/Naphtha based station upto 500 MW.

A new procedure for getting environmental clearance for pithead thermal project has also been laid down.

## 7. RELAXATION OF 40 % CAP FOR DEBT EXPOSURE BY IFIS

The policy announced in 1991 envisaged that, an amount not exceeding 40% of the total outlay for private sector units may come from Indian public financial institutions (IPFIs). This ceiling has since been removed, but with a stipulation that considering the need of maximising financing from external sources and prudential norms exercised by IPFIs, allowing a higher domestic debt component for projects which are developed based on indigenously sourced plant and equipment, would be more desirable.

It has also been decided that there would be no objection for Foreign Term Loan being replaced by Rupee Term Loan as long as the hard cost does not change and the new financial arrangements are acceptable to the concerned SEB/State Government, project developers and the lenders. Whenever such a change is desired in the financial package, project

developers may approach CEA, for formal approval.

Of the eight designated counter guarantee projects, counter guarantee of the Government of India has been extended to Jegurupadu Combined Cycle Gas Turbine (216 MW)of M/s. GVK Industries Limited and Dabhol Combined Cycle Gas Turbine (Phase-I) (740 MW) of M/s. Dabhol Power Company. M/s. Spectrum Power Generation Limited withdrew their request for counter guarantee for their 208 MW Godavari Combined Cycle Gas Turbine in Andhra Pradesh. In the case of the other 5 projects, on 16.5.1998, the Government approved extension of counter-guarantee in the case of the Visakhapatnam Thermal Power Project (1040 MW) of M/s Hinduja National Power Company Limited (HNPCL) in Andhra Pradesh, Bhadravati Thermal Power Project (1082 MW) of M/s Central India Power Company (CIPCO) in Maharashtra and the 250 MW single unit lignite based Neyveli Thermal Power Project of M/s ST-CMS Electric Company in Tamil Nadu, through a revised procedure. Government of India counter guarantee to these projects has been issued in August, 1999. The promoters of the Neyveli Thermal Power Project have achieved financial closure and have commenced construction activities. In the case of the Visakhapatnam TPP and the Bhadravati TPP, the counter guarantees issued has since expired as the project promoters were unable to achieve financial closure.

The Ib Valley project was re-negotiated by the Government of Orissa before construction could commence and, therefore, techno-economic clearance was issued afresh to this project on 26.2.1999. Issue of Counter Guarantee of Government of India was approved in the case of this project and the Mangalore Thermal Power Project of M/s. Cogentrix Energy Inc., on 22.12.1999. Counter guarantee to these two projects can be issued only after the stipulated conditions are fulfilled.

## 8. REASONS FOR TARDY PROGRESS BY PRIVATE POWER SECTOR

**8.1** The major impediments to the speedy development of private sector power projects include the following:

i. The foremost problem due to which many projects have been unable to achieve financial closure inspite of progressing well on other fronts, remains the poor financial health of the State Electricity Boards (SEBs), who do not have the financial capability to support more than a few projects in terms of regular reimbursement of bills, opening of letters of credit and escrow accounts.

ii. A bankable escrow cover has been sought by almost all the IFIs financing IPPs. The states do not have sufficient escrow space to accommodate all the IPPs. Difficulties have been witnessed in identifying the quantum of escrow capacity available with the states. In several cases, the escrowable capacity identified by the state governments has not been accepted by the financial institutions. The inability of the state governments to accommodate all the IPPs for allocation of escrow cover has also led to litigation by some of the IPPs.

iii. The delay in non-finalisation of various contracts such as Power Purchase Agreement, Fuel Supply Agreement and Fuel Transportation Agreement etc. acceptable to all the concerned parties.

iv. Court cases in the form of Public Interest Petitions etc.

**8.2** Government has initiated the process of reforms and restructuring of the power sector. It is expected that with the reforms and restructuring of the power sector, the confidence of investors/IPPs in power sector will improve and the need for security for their investments would not be necessary. Eighteen States have already constituted Regulatory Commissions or are in the process of doing so. The Central Electricity Regulatory Commission at the centre has also become operational. The Regulatory Commissions will look into all aspects of tariff fixation. Subsidies to any specific group of consumers would have to be met by the States

by debit to their respective budget. This is expected to gradually help the SEBs in improving their financial health.

**8.3** A few states have signed Memoranda of Agreements(MOA) with Ministry of Power, committing for reforms which include restructuring of SEBs, constitution of State Electricity Regulatory Commissions, energy audit, 100% metering, billing and collection of bills, reduction in T&D losses etc. Recently, MOA has also been signed between Government of Andhra Pradesh / APTransco and PFC, FIs lead by IDBI to finance the private power projects on achievement of certain reform milestones.

## 9. CRISIS RESOLUTION GROUP

**9.1** The Crisis Resolution Group (CRG), under the chairmanship of the Minister of Power, was constituted on January 1, 1999 with the approval of the Prime Minister. The initial term of the Group was up to March 31, 2000. The Group first met on January 12, 1999 and has met on eleven more occasions since then. The Prime Minister has approved the extension of the tenure of the CRG up to March 31, 2002.

**9.2** The CRG has succeeded in removing the last mile problems of several projects, enabling them to achieve financial closure and start construction activities.

# COOPERATION WITH NEIGHBOURING COUNTRIES IN HYDRO POWER

Development of water resources of the common rivers of India, neighbouring countries of Nepal, Bhutan and Myanmar for mutual benefits has been under consideration with these countries. There is regular exchange of electric power between India and the neighbouring countries for the supply of surplus power and meeting power requirements in the border areas.

India has been assisting Nepal in the development of its hydro power potential and four HE schemes viz. Pokhra, Trisuli, Western Gandak and Devighat have been implemented with financial and technical assistance from Govt. of India. Three major water resources projects in Nepal viz. Karnali, Pancheshwar and Saptakoshi are presently under discussions at various levels as mutual benefits projects. Feasibility report of Karnali multi-purpose project (10800 MW) was prepared in 1989. Key parameters of this projects are to be finalised after mutual discussions. Investigations are being carried out in respect of Pancheshwar MPP by the two countries in their respective territories. A Joint Project Office (JPO) was established in Kathmandu in Dec., 1999 to carry out additional investigations and studies are required to be carried out for finalisation of Detailed Project Report (DPR). The investigations are under progress for the preparation of joint DPR which is likely to be prepared by June,2002. Development of this project was covered under integrated Mahakali River Treaty signed between HMG, Nepal and India in Feb., 1996 and subsequently ratified. India had offered financial and technical assistance for investigation of Saptakosi (3300 MW) Multi-purpose Project. Preliminary cost estimates for taking up detailed survey and investigations leading to preparation of DPR have been prepared and discussed by the Joint Team of Experts (JTE). Inception Report for carrying out investigation and preparation of DPR for Saptakosi High Dam and Sunkosi Multipurpose Project has been agreed to by the JTE. Joint technical expert groups have been constituted for each of the above projects for joint guidance for carrying out investigations and preparation of detailed project reports (DPRs). A team comprising officers from CEA, CWC and NHPC visited Nepal in Feb.2001 for identification and implementation of small/ medium size power projects in Nepal. Further, a joint committee on water resources headed by respective Water Resources Secretaries has been constituted to act as an umbrella committee of all technical and expert level committees.

In Bhutan, Chukha HE Project (336 MW) implemented with Indian financial and technical assistance and operating in an excellent manner is a shining example of cooperation between the two countries for mutual benefits; surplus power from the project is being imported by India. The Kurichu HE Project (60 MW) in Eastern Bhutan is presently under implementation on a turnkey basis with Indian financial and technical assistance and 45 MW capacity has been commissioned. Another project viz. Tala HE Project (1020 MW) has been taken up for implementation and is being executed by Tala Hydro-Electric Project Authority(THPA) comprising of Indian and Bhutanese Officers and Engineers. Consultancy for the project in respect of both electro-mechanical and civil works is being rendered by Central Electricity Authority (CEA), Central Water Commission (CWC) and Water & Power Consultancy Services (WAPCOS). The project is being funded by India through grant and loan and major portion of the power generated will be made available to India. Investigation of Sankosh Multi-purpose Project (4060 MW) have been completed by CWC and DPR prepared by CEA/CWC.

The proposed Manas MPP (2800 MW) was reconnoitred by a Joint Indo-Bhutan team and pre-feasibility report was prepared in Aug., 1982. The investigation of the scheme could not be taken up due to objections to the scheme from environmental angle. Investigation of two Hydro-electric projects namely Wangchu (900 MW) and Bunakha (180 MW) have been completed and DPR prepared. India is also providing technical assistance for rehabilitation of 8 nos. Mini/Micro hydel projects in Bhutan for which CEA is rendering Design and Engineering Consultancy Services. CEA is also rendering consultancy services for Yonglachu HE Project (4x400 KW) in Bhutan.

Two more hydro projects viz. Mangdechhu (360 MW) and Punatsangchhu (870 MW) are under discussion between India and Bhutan.

Tamanthi MPP (1200 MW) proposed to be developed on Chindwin River in Myanmar has been identified as a mutual benefit project between India & Myanmar. A Fact Finding Mission led by Member (Hydro), CEA, visited Myanmar in Feb., 1999 and held discussions relating to setting up of the project and absorption, evacuation of Power to India etc. A technical team comprising Engineers from CEA/ NHPC/CWC/GSI visited project site for inspection in Nov., 1999.

An Indian team visited Myanmar in April/May, 2000 and established two nos. Gauge & Discharge Stations on the Chindwin river at Tazon and Hkamti and studied general geology of project sites.

# BADARPUR THERMAL POWER STATION (BTPS)

## INTRODUCTION

Badarpur Thermal Power Station (BTPS) was established by the Government of India in the year 1967 to ensure power availability for meeting growing demand of power in the Northern Region. The installed capacity of BTPS is720 MW consisting of 3x100 MW and 2x210 MW coal fired units. However, the 3 units of 100 MW each have been derated to 95 MW w.e.f. 11.1.1990 making the present capacity as 705 MW. The station is owned by Government of India and is being managed by NTPC since 1st April'1978 on an agency basis.

BTPS is one of the major sources of power supply to Delhi State and since April, 1987 the entire energy generated at this station is supplied to the Delhi Vidyut Board.

## GENERATION TARGET FOR 2001-02

The generation target for BTPS has been fixed at 5100 MUs at a PLF of 82.58% for the year 2001-02 as against the target of 4500 MUs at a PLF of 72.87% and the actual generation of 5180.458 MUs at a PLF of 83.88% during 2000-2001. The power station has already generated 4046.230 MUs at a PLF of 86.96% till December, 2001.

## HIGHLIGHTS FOR THE PERIOD APRIL – DECEMBER 2001

- Highest ever generation of 4046.230 MUs (at a PLF of 86.96%) during April-December,2001 period since inception. Previous best was 3886.702 MUs at a PLF of 83.53% during April-December, 2000.
- The station achieved best performance level during April-December, 2001 period in respect of Generation, Plant Load Factor, Sp. Oil Consumption, Partial Loading and DM make-up water consumption.
- Station has received ISO-9002 certification valid upto 28th March, 2003.
- Station has received ISO-14001 (for environment) valid upto 26th May, 2004.
- BTPS has been adjudged as the 2nd best amongst all thermal power stations (after Dadri) in the field of environment and has received an Indo German Greentech Environment Excellence Award for the year 2000-01 for the same.
- Station has received water and air consent from DPCC valid for a period of 3 years i.e. upto 24th April and 13th May 2004 respectively.

## RENOVATION & MODERNISATION PHASE-I

BTPS is one of the Thermal Power Stations identified under the centrally sponsored scheme for Renovation and Modernization of thermal utilities. Under the Renovation & Modernization Scheme, Phase-I, various schemes for 3x100 MW of BTPS for Rs.36.97 crores were approved. All of the works under these schemes have already been completed and an expenditure of Rs.36.86 crores has been incurred up to December'2001. With implementation of R&M Phase-I scheme for BTPS, the actual annual average PLF has improved from 45.30% to 65.00% against the envisaged improvement in PLF from 45.30% to 55%. As a result of this, during the financial year 2000-01, the station generated 5180.458 MUs at a PLF of 83.88%, the highest since inception, surpassing previous best of 5020.849 MUs at PLF of 81.08% achieved in 1999-2000.

## RENOVATION & MODERNISATION PHASE-II

Under R&M Scheme Phase-II programme, certain areas were identified for carrying out further modifications. BTPS submitted a proposal for R&M Phase-II for an estimated cost of Rs.187.77 crores (latest revised cost Rs.232.77 crores) for approval covering all units of BTPS. The proposal has been techno-

economically cleared by CEA and approved by PIB in April,1997. The scheme mainly emphasizes on reduction in heat rate and sustaining the present level of generation. The Scheme also covers various measures to ensure best environmental norms in addition to increase in the reliability of the units.

## REPLACEMENT & REPAIR WORKS

Pending sanction/release of R&M Phase-II funds, two more schemes covering certain urgent works of capital nature were identified jointly with CEA for immediate implementation in the BTPS Units. These two schemes (Replacement & Repair works I&II) have been approved for execution during the years 1998-2000 and 2000-02, at an estimated cost of Rs.14.70 crores (SFC-I) and Rs.14.91 crores (SFC-II) respectively. R&R works-I schemes have been mostly completed and an expenditure of Rs.14.60 crores have already been incurred till 31st December, 2001. Under R&R Works-II (SFC-II) schemes, Rs.9.73 crores have already been spent. Encouraged by the advantages of all these schemes in increasing and sustaining performance level and environmental norms, and other scheme of Rs.14.95 crores (SFC-III schemes already cleared by CEA) is under consideration.

## ASH UTILISATION

Ash utilization for 2001-02 has been targeted at 30%. This has already been achieved upto December, 2001 and the utilisation levels are going to increase further by the end of the year 2001-02.

Production of ash bricks is also gaining momentum. BTPS has already achieved a progress of 35.27 lakh bricks till December, 2001. Bricks are being used in-house for civil constructions in a big way. Ash bricks from the station have been supplied in the past to IIT Delhi, US Embassy, CPCB, CPWD and CBRI, Roorkee, for their construction works.

Dry Ash Bagging facility has been commissioned (capacity 80-100 MT/Day) and will give an output of 360 Baggs (40 Kgs. each) per hour after begining its operation.

Another area of ash utilization is for filling up of low-lying areas. For NOIDA-Greater NOIDA Express Highway project, ash is being lifted from the station for use in this project. DDA, MCD and other neighbourhood people are also using ash from the station for land filling.

# POWER DEVELOPMENT ACTIVITIES IN NORTH EASTERN REGION

On 21.1.2000, Hon'ble Prime Minister announced a package for the socio-economic development of the North Eastern Region (NER).

## PROGRESS OF REC IN NORTH EASTERN STATES

For the financial year 2001-02, provision of Rs.69 crore has been made for the seven North Eastern States and Sikkim for intensive electrification and for undertaking System Improvement Programme. Besides, REC also made a provision of Rs.100 crore for electrification of Rural Households. In addition, grant of Rs.9.3 crore has been allocated for release of 97,000 single point light connections to the households of rural poor under Kutir Jyoti Programme. So far, the Corporation has disbursed Rs.1.69 crore under this progaramme.

## ELECTRIFICATION OF TRIBAL VILLAGES UNDER PM'S SOCIO-ECONOMIC PACKAGE FOR DEVELOPMENT OF NORTH EASTERN STATES.

In the meeting of the Prime Minister with the Chief Ministers and Government of the North Eastern States held on 22.1.2000 at Shillong, Hon'ble Prime Minister made the announcement that 165 tribal villages in North Eastern States (Arunachal Pradesh – 60, Assam-20, Manipur-60, Meghalaya-10, Mizoram-3, Nagaland-2 & Tripura-10) are to be electrified under the PM's socio-economic package for the development of the North Eastern States.

Sanction of the Government of India has been conveyed to State Government as grant-in-aid as Central Assistance from the Central Pool of Resources for electrification of tribal villages as detailed below:

(Rs. in crores)

| State | No.of tribal villages | Total fund required | Amount (Ist Instalment) |
|---|---|---|---|
| Arunachal Pradesh | 60 | 8.97 | 4.2 |
| Assam | 20 | 1.35 | 0.68 |
| Meghalaya | 10 | 1.49 | 0.75 |
| Nagaland | 2 | 0.70 | 0.20 |
| Mizoram | 3 | 0.68 | 0.34 |
| Manipur | 60 | 11.29 | 5.64 |
| Tripura | 10 | 1.44 | 0.72 |
| Total | 165 | 25.92 | 12.53 |

Subsequently, number of tribal villages under this scheme were enhanced from 165 to 500 in NE States. State wise break-up of the additional 335 villages as finalised is as under:

| Name of State | Number of villages |
|---|---|
| Arunachal Pradesh | 40 |
| Assam | 85 |
| Manipur | 84 |
| Meghalaya | 95 |
| Mizoram | 4 |
| Nagaland | 2 |
| Tripura | 25 |
| Total | 335 |

NE States have been requested to identify the villages proposed to be taken up and the requirement of funds thereof and submit detailed proposal to CEA.

Special attention is being given to North-Eastern constituents States and also for Sikkim. A Master Telecom Plan in consultation with M/S Merz and Mecllenan, UK, has been prepared to meet the telecommunication requirement of the power sector. A Unified Loan Despatch and Communication (ULDC) scheme has been conceived to operate, monitor and control the regional power system in a unified, well-coordinated and integrated manner. The ULDC scheme would ensure modernization of Energy Management System with the installation of state-of-art system to improve further performance of integrated operation of regional power grid in the country. This scheme for NE region is being given a special attention to remove all constraints including funding arrangement to provide a help to the North Eastern States.

## HYDRO DEVELOPMENT IN NORTH EASTERN REGION AND SIKKIM

### Steps for speedy Development- Hydro Potential

To speed up the development of hydro potential in North Eastern Region and Sikkim, various steps have been taken from time to time. With the concerted efforts of the various Committee which were set up in past, a number of HE schemes in N.E. Region and Sikkim have been accorded TEC. One HE scheme with an installation of 2x40=80 MW, namely Bairabi in Mizoram has been cleared by CEA last year in November, 2000 under State Sector.

At present 38 number of schemes with proposed installed capacity of 27570 MW are under various stages of survey and investigation in the North Eastern Region and Sikkim. Out of which 34 schemes with a proposed installation of 26681 MW are in North Eastern Region.

### Mega Hydro Projects Planned

The Region presents very attractive sites for providing large storage with multi-

purpose aspects of development. Three major projects development viz., Dihang & Subansiri in Arunachal Pradesh and Tipaimukh in Manipur which will provide in power generation and other additional benefits.

**(i) Dihang dam projects- Arunachal Pradesh**

Three schemes in Arunachal Pradesh with total installation of 13450 MW in three power houses are being planned with details as under.

i) Upstream of Yingkiong near Pugging village on river Siang River Upper Siang Dam Project-Upper Dihang (or Siang) Project – 11000 MW.

ii) 15 km upstream of Raying near Roing village on the Siyom river which is tributary of Siyom River (Siyom Dam Project- Middle Dihang or Middle Siang Project) – 700 MW.

iii) Upstream of Pasighat near Routung village (Lower Dihang Dam Project)- 1750 MW.

Survey and Investigataion of above schemes by NHPC are in progress so as to firm up DPR.

**(ii) Subansiri Dam Projects – Arunachal Pradesh**

Three schemes in Arunachal Pradesh with total installation of 6500 MW in three power houses are being planned with details as under.

i) Upstream of Daporijo near Menga village on Subansiri River (Upper Subansiri Dam Project) – 2500 MW

ii) Upstream of Tamen village on Kamla River which is tributary of Subansiri River (Middle Subansiri Dam Project) –2000 MW.

iii) Gerukamukh village near original site on Subansiri River (Lower Subansiri Dam Project) – 2000 MW.

DPR for Lower Subansiri was submitted by NHPC to CEA in June 2001 and the scheme was returned in July 2001 as essential inputs/clearances were not tied up. Survey and Investigation for other sites are in progress so as to firm up the DPR.

**Site clearance for Mega Projec**t: MOEF has issued site clearance (Stage-I) for Dihang and Subansiri during 2000 and 2001. Site clearance (Stage-II) for Lower Subansiri Dam Project issued by MOEF in July 2001.

**(iii) Tipaimukh Dam Project (6x250=1500 MW)- Manipur**

The scheme envisages construction of a dam across the river Barak immediately downstream of the confluence of the Tuivai river with installed capacity of 6x250 MW=1500 MW and energy benefits 3516 Gwh. The project has been entrusted to NEEPCO, and DPR submitted in December, 2000 by updation of cost estimates only.

Scheme is yet to be notified under Section 29(2) of E(S) Act 1948 and authorization under Section 18A of E(S) Act, 1948 to be obtained. Other clearances/essential inputs are yet to be obtained for this project and in view of this DPR was returned in May 2001.

**Design & Engineering:**

During the year 2001-02 (upto Nov. 2001), technical assistance back support for design and engineering of electro-mechanical works of various HE Projects aggregating to Installed Capacity of 5044 MW are being carried out.

**NEEPCO PROJECTS:**

(i) Ranganadi HEP (405 MW), Arunachal Pradesh**:** The execution of the project is in advance stage of implementation and all the three units of 135 MW each are to be commissioned by 2001-02.

(ii) Kopili HEP Stage-II (25 MW): The project was accorded investment approval in July, 1999 at an estimated cost of Rs.76.09 crores. The execution of the project is in progress and the project is likely to be completed by July, 2003.

(iii) Tuirial HEP (60 MW): The project was accorded investment approval at an estimated cost of Rs.368.72 crores in July, 1998 and the project is to be completed in 8 years time i.e. by 2006. The execution of the project is in progress.

**NHPC PROJECTS:**

(i) Loktak Down Stream (90 MW): The project was accorded investment approval on 10.12.1999 at a cost of Rs.578 crores to be executed by NHPC. The project is scheduled to be commissioned in 2008-09.

(ii) Teests-V (510 MW) : The project has been accorded approval on 19th January, 2000 at a cost of Rs.2200 crores, to be executed as a Central Sector Project by the NHPC. The project is scheduled to be commissioned in 2006-07. The work is proceeding as per schedule.

Beside above, the following projects are under various stages of processing to be taken up for execution in the N.E. Region and Sikkim:-

(i) Tripura Gas Based Power Project (500 MW), Tripura.

(ii) Tipaimukh HEP (1500 MW),Manipur.

(iii) Tuivai HEP (210 MW), Mizoram.

(iv) Kameng HEP (600 MW), Arunachal Pradesh.

# VIGILANCE ACTIVITIES

## VIGILANCE ACTIVITIES/DISCIPLINARY CASES IN MINISTRY OF POWER

Disciplinary proceedings against four persons were pending/contemplated at the beginning of year 2001-2002. These are at the different stages of processing. One case was added during the year and the same was decided after imposing penalty to the charged officer. Proposal to initiate disciplinary proceedings against one more official has been approved.

In this changing security environment, necessary arrangements/follow-ups have been taken up with the concerned organizations. A meeting of PSUs under the administrative control of Ministry of Power was held to review the internal security measures.

Vigilance Awareness Week was celebrated in the Ministry and its attached officers/PSUs from 31.10.2001 to 4.11.2001 to give the message of integrity and transparency.

## VIGILANCE ACTIVITIES OF BBMB

The Vigilance Organisation in Bhakra Beas Management Board comprises of a Part-time Chief Vigilance Officer duly appointed by the Central Vigilance Commission for 3 years who is helped by 6 Vigilance Officers (VOs) of the rank of Dy.Chief Engineer/Superintending Engineer at various project stations. ***Vigilance Awareness Week*** was celebrated in Bhakra Beas Management Board from 31.10.2001 to 6.11.2001. During this period a seminar titled "Importance of Creating Awareness about Vigilance" was held on 6.11.2001 at Chandigarh. A presentation was also made by CVO in which a case study on the matter was discussed at length which emphasized on the vincibility of the menace of corruption. A book-let emphasizing the evil effects of corruption and the need and method to be adopted to get rid the society of this evil was also brought out and distributed among the delegates. Also, a pamphlet symbolising the efforts to fight corruption titled "Do's and Don'ts - A commitment to fight corruption" was brought out and distributed among the delegates. In addition to this, Seminars were also held at Project stations of Talwara, Sundernagar & Nangal highlighting the need for preventive vigilance and various guidelines of the Central Vigilance Commission about routing out corruption from the society.

During the year, periodic inspections of corruption prone areas were undertaken. The Board has created a special Cell at the Head quarter to give impetus to the vigilance activities.

## VIGILANCE ACTIVITIES OF NHPC

Emphasis was given on preventive vigilance and procedural improvement. 285 surprise checks were conducted till November 30, 2001. Out of which only 1 case was instituted.

Vigilance department of NHPC creates general awareness amongst the employees through series of workshops / training programs and periodic discussion with **HOD / HOP** at projects, regions and offices. In the period under review, 05 workshops have been organized in different projects for executives, supervisors and workmen.

NHPC has observed the Vigilance Awareness Week from October 31, 2001 to November 6, 2001 in all projects, regional offices as well as Corporate Office of NHPC. At Corporate Office on October 31, 2001 Vigilance Awareness Week was inaugurated by Sh. N. Vittal, Central Vigilance Commissioner. On the occasion, NHPC Vigilance Journal 'Chetna' was also released by Shri N. Vittal, CVC. Banners and posters on the theme of anti-corruption were displayed at prominent locations in Corporate Office as well as in projects, sites & Offices on this occasion.

## VIGILANCE ACTIVITIES OF REC

### A. Progress made during the current year upto November, 2001

Prescribed periodical statistical returns were sent to CVC, CBI, MOP, in time. Instructions received from the Central Vigilance Commission

from time to time were complied with. Surprise inspections and regular inspections were carried out. In addition to the surprise inspections carried out by the Departmental heads, 19 surprise inspections and 6 regular inspections were carried out by the officers of Vigilance Division which included inspection of Project Offices of REC across the country. In addition to the 4 complaints brought forward as on 1.4.2001, 14 complaints were received, of which 12 have been settled so far. In addition to the 6 disciplinary cases pending as on 1.4.2001, 1 case was received upto November, 2001. Of these, 3 have been finalised and the remaining are at various stages of completion.

Emphasis was also laid on the preventive vigilance. Existing Procedure for reimbursement of conveyance expenditure, medical expenses, and submission of Annual Property Returns were reviewed and streamlined.

Vigilance Awareness Week was observed in REC offices countrywide including its Corporate Office at Delhi from 31st October - 6th November, 2001. A Compendium of "Citizens Guide to fight corruption" was released on this occasion.

As per norms, performance of Vigilance Division was reviewed by the Board of Directors, REC, Chief Vigilance Officer, Ministry of Power, and the Central Vigilance Commission in addition to the periodical reviews undertaken by the CMD, REC and CVO, REC.

## B. Anticipated targets to be achieved during the remaining period of the year i.e. upto 31st March, 2002.

1. All the pending complaints (6) will be finalized
2. Efforts would be made to get all the pending disciplinary cases (4) completed.
3. Atleast three more regular inspections would be carried out.

## VIGILANCE ACTIVITIES OF NEEPCO

6(Six) cases / complaints have been received during the period upto November 2001and all the complaints have been handed over to CBI after preliminary verification/ investigation by vigilance.

3(three) cases/ complaints have been taken up for investigation by vigilance. Out of them one incumbent has been removed from service on the basis of the finding of the Inquiry Committee. Two cases are in the verge of issuing of final order.

1(One) case involving Five officers has been forwarded to CBI after sanctioning prosecution by disciplinary authority.

1(One) case involving 3 (Three) officers was forwarded to CVO for advice which has since been received back and is under process to submit to disciplinary authority for necessary action.

2 (Two) officers involving in 1(one) case have been charge sheeted by disciplinary Authority.

Apart from these, 5(five) Cases/ Complaints are under investigation by CBI for which full co-operation and assistance are rendered as and when asked for.

7(Seven) Nos. of Surprise/Routine Inspections/ checks has been conducted in all the projects by Vigilance Department during the period.

The aspect of Preventive Vigilance has been emphasised by issuing effective Guidelines to streamline the Rules and Procedures to plug the loopholes detected during Inspections/ checks and also from time to time.

In NEEPCO vigilance awareness was observed from 31st Oct'2001 to 6th Nov' 2001 as per directives.

## VIGILANCE ACTIVITIES IN DVC

Vigilance Department laid emphasis on quicker disposal of disciplinary cases and due to the sustained efforts a good number of disciplinary cases could come to an end and penalties as decided by the disciplinary authorities were imposed. The Vigilance Department brought out the second issue of the journal "Chetna" in the month of November, 2001 wherein list of

irregularities and penalties has also been included for general information of all employees. The Vigilance Department celebrated the Vigilance Awareness Week in the months of October/November, 2001. Eminent speakers delivered lectures on Ethics & Integrity during the Vigilance Awareness Week at the different plants. Posters and banners on the theme of Anti-corruption were displayed at prominent locations. Debates, Essay Competition, Quiz Competition were also organized to create awareness. Vigilance Department also laid emphasis to create general awareness through Workshops and periodic discussions with the Head of Departments at Projects. Vigilance Workshop was also organized at DVC Towers in the month of July, 2001. Stress has been given to scrutinize the Annual Property Returns of Grade A employees of DVC. Inspections at regular intervals have been strengthened and these are giving substantial results. Complaints are being looked into thoroughly and speedily for appropriate action. Stress has also been given to plug the loopholes in the system in various areas like purchase, contract, execution etc. for long term benefit.

## VIGILANCE ACTIVITIES IN NJPC

### Minor Penalty Cases

All the cases for minor penalty, action have been disposed of imposing appropriate penalties on the officers involved. At present, there is no minor penalty case pending.

### Major Penalty Cases

All the cases for major penalty, action are being dealt as per the laid down procedure and guidelines.

### Vigilance Awareness Week

Vigilance Awareness week was celebrated from 31st October to 6th November 2001. Besides the pledge which was administered at all the Offices of the Corporation as well as the Project, the activities during the week also included a lecture on the Prevention of Corruption Act 1988 by Shri S.K. Sharma, Jt. Secretary and Legal Advisor, CBI; display of banners and posters, an Essay competition on 'Transparency in Management' and a Quiz Programme on vigilance related topics.

## Surprise checks by Project Vigilance

Surprise checks were carried out by the Project Vigilance Officers from time to time and appropriate preventive action taken in consultation with the authorities concerned.

## Computerisation of Vigilance Work

To augment the effectiveness of Vigilance Administration, action was initiated to computerize the property returns in accordance with the CVC's instructions. Software application for the purpose has been developed and would be commissioned soon after trial with test data.

### Action on complaints

A few complaints, mostly anonymous/ pseudonymous, alleging corrupt motives and other irregularities were received. Appropriate action in respect of these complaints is being taken keeping in view the laid down procedure and guidelines.

# WOMEN EMPLOYEES

There are 46 women employees in the Ministry of Power. The representation of women employees at various levels in the Ministry of Power is indicated below:

| Group | Strength | Percentage of overall staff strength |
|---|---|---|
| A | 02 | 0.66% |
| B | 21 | 7.03% |
| C | 21 | 20.19% |
| D | 02 | 0.66% |
| Total (MOP) | 46 | 15.38% |

Employment of women in various grades in the Ministry of Power depends on the nominations received from the recruiting agencies such as the Union Public Service Commission, Staff Selection Commission etc.

## NATIONAL HYDROELECTRIC POWER CORPORATION (NHPC)

**Women Employees**

| Cadre | Total no of Employees | No of Female employees | % Female employees |
|---|---|---|---|
| EXECUTIVE | 2443 | 75 | 5.22 |
| Assistant Officer/AE/Supervisor | 1795 | 121 | 6.74 |
| Workmen | 8687 | 715 | 8.23 |
| **Total (NHPC)** | **12925** | **937** | **7.25** |

## NATIONAL THERMAL POWER CORPORATION (NTPC)

**Women Employees**

| Category of Employees | Total Employees | Female Employees |
|---|---|---|
| Workmen | 13190 | 479 (3.63%) |
| Supervisors | 2443 | 78 (3.19%) |
| Executives | 8262 | 154 (1.86%) |
| Total (NTPC) | 23895 | 711 (2.98%) |

## WOMEN EMPLOYEES IN REC

Employment situation of Women Employees in various post(s)/pay-scales in REC upto 30.11.2001 are as follows:-

| Sl.No. | Post(s) | No. of employees | No. of women employees (on date) | %age of women employees to total number |
|---|---|---|---|---|
| 1. | Executive Director/GM | 4 | - | - |
| 2. | Chief/C.S. | 8 | - | - |
| 3. | Joint Chief(s) | 10 | - | - |
| 4. | Deputy Chief(s) | 51 | 3 | 5.88% |
| 5. | DD/DPE or equivalent | 61 | 7 | 11.48% |
| 6. | AD/APE or equivalent | 106 | 24 | 22.64% |
| 7. | SO/AO | 8 | 2 | 25% |
| 8. | Acctt./Sr. Asstt./Sr. PA/Sr.T. Asstt./Sr. D/man/SCD(Hr. Grd.) or equivalent | 189 | 38 | 20.11% |
| 9. | Asstt.(A/Cs.)/A/cs. Clerk | 37 | 03 | 8.11% |
| 10. | Asstt./UDC/LDC/PA/. Steno Gr. III | 220 | 42 | 19.09% |
| 11. | SCD/L. Asstt./Jr. EDP Analyst | 29 | - | - |
| 12. | DMO/PMO/BMO | 8 | - | - |
| 13. | Electrician/Lift Operator | 5 | - | |
| 14. | Class-IV | 174 | 12 | 6.90% |
| | **Total (REC)** | 910 | 131 | 14.40% |

## WOMEN EMPLOYEES IN DVC

**In all, 1006 women are in employment in DVC. The details are given as under:**

| Sl. No. | Designation | No. of Women Employees | % compared to Male |
|---|---|---|---|
| 1. | Jr.Messenger/Jr. Khalasi/Jr.Safaiwalas etc. | 33 | 6.19 |
| 2. | Messenger/Mazdoor/Safaiwala/Female Attendant | 533 | 16.19 |
| | Sebika/X-ray Helper Daftry/Cook | 4 | 4.9 |
| | Record Supplier | 1 | 0.2 |
| 3. | Jr.Storekeeper/Pharmacist-Dresser | 3 | 2.3 |
| | Asstt. Nurse | 35 | 100 |
| | Asstt.Gr.III/Typist/Asstt. Storekeeper | 82 | 5.05 |
| | Middle School Teacher | 57 | 10.65 |

Contd...

| | | | |
|---|---|---|---|
| | Lab Tech/Jr.Nurse/Asstt. Gr.II/TG Teacher/Jr Steno | 153 | 9.52 |
| | Public Health Nurse Asstt. Gr.I/DA | 4 | 0.73 |
| | Nursing Sister/Steno/Tech.Gr.I | 38 | 3.5 |
| | PG Teacher | 9 | 1.28 |
| | Asstt. PO/Matron/Sr.Acctt./PA | 7 | 3.22 |
| 4. | Asstt.PRO/Hindi Officer/Principal/Head Master HSS | 5 | 1.11 |
| | Asstt. Secy/MO/AO/FO/Asstt. Engineer | 18 | 3.6 |
| | DDP/Sr.MO/DDPH/Specialist Gr.II/AFA | | |
| | Executive Engineer | 17 | 4.12 |
| | SDE/MOIC/Sr.MO(PG) | 4 | 2.03 |
| | Superintending Engineer/MOIC(SG) | 2 | 1.44 |
| | Medical Superintendent | 1 | 2.63 |
| | **Total (DVC)** | **1006** | |

DVC is contributing for the development of a large number of rural women/ girls through its Social Integration Programme. The following may be enumerated, as per sequence mentioned in the letter from National Commission for women.

### Development Programme for Women/Girls in DVC

A number of in-house vocational training such as sewing, wool knitting, typing, leaf-plate making etc. are given through different Training Centres set up by DVC. During training, all in-puts are also provided by DVC.

Besides this, various income generating programmes like cocoon reeling, tasar reeling, food preservation, para-veterinary training, piggary, poultry farming, goatry, mushroom cultivation, lac cultivation, agricultural farming, bird (duck) rearing farm etc. are arranged.

DVC also provides trainees with material assistance to establish their own entrepreneurial activities. Women self help groups are organised with the objective of undertaking small economic activities by the beneficiaries themselves.

### Employment of Women in NJPC

Since its inception in 1989, 76 women have been recruited at various executive/non-executive level in the Corporation. At present, the strength of women is 49 which comprises 9 executives and 40 non-executives. The present strength of women accounts for about 10% of the total work force of the Corporation.

# ACTIVITIES RELATING TO PHYSICALLY HANDICAPPED EMPLOYEES

## MINISTRY OF POWER

Implementation of reservation in respect of Physically Handicapped in Ministry of Power, its attached/subordinate offices, autonomous bodies and Public Sector Enterprises is monitored by Liaison Officer (SC/ST). SC/ST Cell renders necessary assistance in monitoring implementation of reservation for Physically Handicapped. Apart from this, recruitment made in respect of Physically Handicapped in various organizations under the administrative control of Ministry of Power is regularly monitored. Periodical returns, like half yearly returns, annual returns etc. are also sent to Ministry of Social Justice and Empowerment, Department of Personnel & Training and Department of Public Enterprises regularly.

## PHYSICALLY HANDICAPPED EMPLOYEES IN NTPC

| Category of Employees | Total Employees | Physically Handicapped Employees |
|---|---|---|
| Workmen | 13190 | 82 (0.62%) |
| Supervisors | 2443 | 10 (0.41%) |
| Executives | 8262 | 9 (0.11%) |
| **Total (NTPC)** | **23895** | **101 (0.42%)** |

## HANDICAPPED EMPLOYEES IN NHPC

| Cadre | Total no. of Employees | No. of Physically handicapped | %of PH |
|---|---|---|---|
| EXECUTIVE | 2443 | 12 | 0.83 |
| Assistant Officer/AE/Supervisor | 1795 | 36 | 2.01 |
| Workmen | 8687 | 30 | 0.35 |
| **Total (NHPC)** | **12925** | **82** | **0.63** |

## PHYSICALLY HANDICAPPED EMPLOYEES IN REC

Employment situation of Physically Handicapped Employees in various post(s)/pay-scales in REC upto 30.11.2001 are as follows:-

| Sl.No. | Post(s) | No. of employees | No. of Physically Handicapped Employees |
|---|---|---|---|
| 1. | Executive Director/GM | 4 | - |
| 2. | Chief/C.S. | 8 | - |
| 3. | Joint Chief(s) | 10 | - |

Contd...

| | | | |
|---|---|---|---|
| 4. | Deputy Chief(s) | 51 | - |
| 5. | DD/DPE or equivalent | 61 | 1 |
| 6. | AD/APE or equivalent | 106 | 1 |
| 7. | SO/AO | 8 | |
| 8. | Acctt./Sr. Asstt./Sr. PA/Sr.T. Asstt./Sr. D/man/SCD(Hr. Grd.) or equivalent | 189 | 2 |
| 9. | Asstt.(A/Cs.)/A/cs. Clerk | 37 | - |
| 10. | Asstt./UDC/LDC/PA/. Steno Gr. III | 220 | 4 |
| 11. | SCD/L. Asstt./Jr. EDP Analyst | 29 | - |
| 12. | DMO/PMO/BMO | 8 | - |
| 13. | Electrician/Lift Operator | 5 | |
| 14. | Class-IV | 174 | 1 |
| | **Total (REC)** | 910 | 9 |

## PHYSICALLY HANDICAPPED EMPLOYEES IN DVC

27 physically handicapped persons are employed in DVC. Details of these are given as under:

| Sl.No. | Designation | No. | % of Total |
|---|---|---|---|
| 1. | Jr.Messenger/Jr.Khalasi | 3 | 0.5 |
| | Jr. Safaiwala | | |
| 2. | Messenger/Mazdoor/Mali/Khalasi | 19 | 0.48 |
| 3. | Progress & Record Asstt. | 1 | 0.06 |
| | TG Teacher (Music) | 2 | 0.11 |
| 4. | Medical Officer | 1 | 0.24 |
| | Specialist Incharge | 1 | 2.63 |

## EMPLOYMENT OF PHYSICALLY CHALLENGED PERSONS IN NJPC

In order to achieve 3% reservation for Physically Challenged Persons in all groups of posts as required under Section 33 of PWD Act, 1995, posts suitable for persons with disabilities in all the groups have been identified. Due to geographical conditions and the peculiar nature of construction work of the project, recruitment of desired percentage of physically Challenged Persons is yet to he achieved. Recruitment action to achieve the required percentage will be undertaken when the O&M manpower is inducted for the project.

# NATIONAL THERMAL POWER CORPORATION LTD. (NTPC)

**1.0** National Thermal Power Corporation (NTPC) was set up in 1975, as a central sector generating company to plan, promote and develop thermal power in India. The Corporation has rapidly grown to become largest thermal power generating company in India. The total approved investment of the Corporation as on **31.12.2001** stands at **Rs. 50,409.22 crores.**

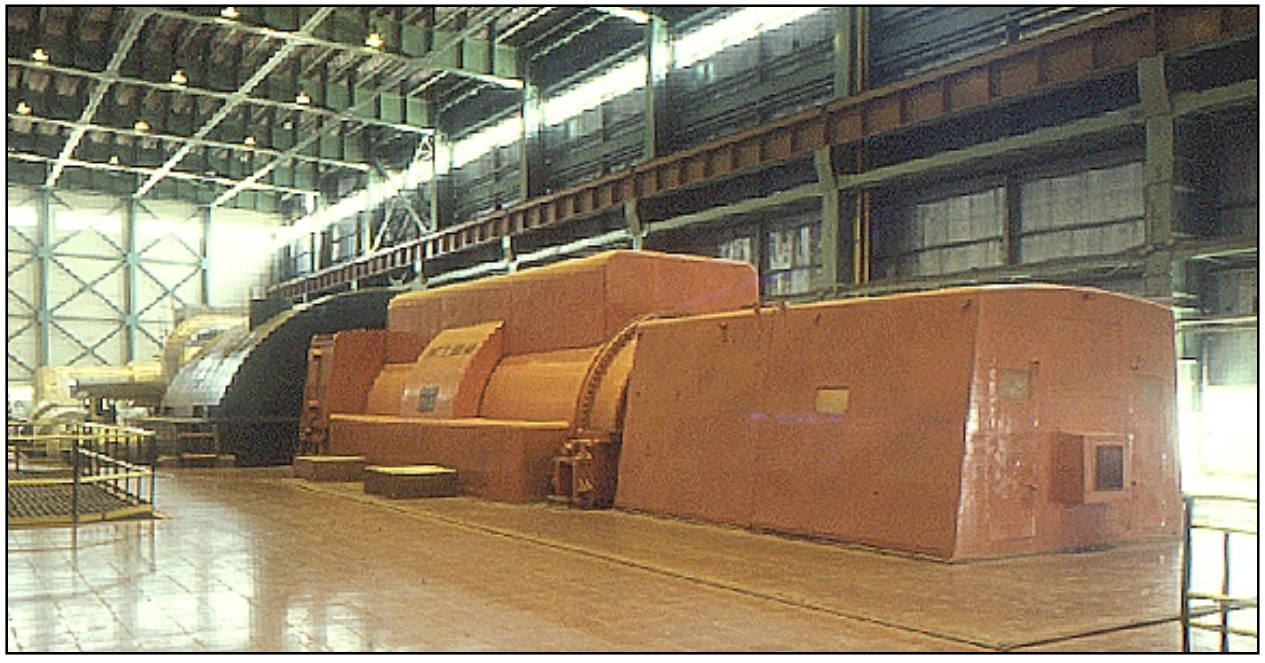
**The approved capacity of NTPC's projects is 24,455 MW. The commissioned capacity of NTPC owned stations as on 31.12.2001 is 19,435 MW.** Presently, NTPC has to its credit 13 coal-based thermal power projects and 7 gas/ liquid fuel-based combined cycle projects.

In addition, NTPC has acquired 240 MW of Captive Power Plants of SAIL through formation of a Joint Venture Company with SAIL.

Besides its own stations, **NTPC also manages the Badarpur Thermal Power Station in Delhi (705 MW) and Balco's Captive Power Station near Korba, Madhya Pradesh (270 MW),** which was also constructed by NTPC.

## 2.0 NTPC PERFORMANCE HIGHLIGHTS: as on 31.12.2001

- During the year 2001-2002, upto 31.12.2001, a record generation of over **99116 Million Units** was achieved, as against the last year's generation of **94853 Million Units** during the same period.
- During the year 2000-2001, seven NTPC coal stations namely Singrauli, Rihand, Unchahar, Dadri (Coal), Ramagundam, Korba & Vindhyachal and NTPC managed Badarpur achieved more than 80% PLF. Singrauli and Dadri (Coal) were ranked first in the country with a PLF of 93.6%.
- NTPC received **Excellent MOU rating for the year 2000-2001, and thus for 14 consecutive years** in a row since the inception of MOU



*Turbine Hall of Farakka Super Thermal Power Project*

system by Government of India.

- As a part of debt management strategy and with the objective of effecting savings in Interest costs, a loan of US $ 120 million was prepaid during September 2001 by taking fresh loan from International market resulting in a saving of Rs.8.42 crores.
- NTPC has paid a dividend of Rs.747 crores for the financial year 2000-01.

## 3.0 GENERATION (as on 31.12.2001)

### 3.1 NTPC Stations

As on 31.12.2001, a total capacity of 19435 MW was under operation at various NTPC stations. This comprises 32 units of 200/ 210 MW at Singrauli, Korba, Ramagundam, Farakka, Vindhyachal, Dadri, Unchahar and Kahalgaon, 16 units of 500 MW at Singrauli, Korba, Ramagundam, Rihand, Farakka, Talcher-Kaniha & Vindhyachal, 6 units of 110 MW at Tanda and Talcher, 4 units of 60 MW at Talcher and 22 Gas Turbines and 10 Steam Turbines at Anta, Auraiya, Kawas, Dadri, Gandhar, Kayamkulam & Faridabad combined cycle power plants.

The generation performance of NTPC Stations has consistently been at high level. **The gross generation from NTPC stations during the year 2001-02 (upto 31.12.2001) has been 99116 MUs as against 94853 MUs generated during the same period last year.**

The PLF of coal based stations excluding the stations of Eastern Region during the period (Year 2001-02 upto 31.12.2001) was 84.3%. However, including Eastern Region the PLF is only 79.1% due to low PLF in the ER because of poor demand and inadequate inter-regional transmission network.

### 3.2 Stations Managed by NTPC

#### 3.2.1 Badarpur Thermal Power Station (BTPS), Delhi (705 MW)

Badarpur Thermal Power Station (BTPS 705 MW) owned by GOI is being managed by NTPC since 1st April, 1978. 100% power from this station is supplied to DVB. During the year 2001-02, upto 31.12.2001, the station has generated 4046.3 MUs at a PLF of 87.0% against 3886.7 MUs at a PLF of 76.1% during the same period last year.

#### 3.2.2 BALCO Captive Power Plant (4x67.5 MW)

Balco Captive Power Plant has generated 1356.5 MUs at a PLF of 76.1% during the year 2001-02, upto 31.12.2001.

## 4.0 ADB LOAN FOR FEROZE GANDHI UNCHAHAR TPS STAGE-II (2x210 MW)

The ADB have approved NTPC as the implementing agency for stage-II of Feroze Gandhi Unchahar Thermal Power Project under loan for US$ 126.68 million consequent to take over of the project by NTPC. The transfer of the loan has been made effective from 14.11.1995. **The loan was closed on 31.03.2001 with the cumulative utilisation of US $ 126.68 million (Rs. 484.38 crores).**

## 5.0 JBIC ASSISTANCE FOR FARIDABAD GPP (400 MW)

Faridabad Combined Cycle Gas Based Power Project (400 MW) is being implemented with financial assistance from JBIC, Japan. JBIC has extended financial assistance of J¥ 23,536 million for the project. As per the revised allocation made by JBIC, J¥ 22,850 million shall be available to NTPC for implementation of the project and the balance would be available for

implementation of ATS by POWERGRID. The implementation of the project took off with investment approval having been conveyed in July'97. **The loan closed on 31.03.2001 with the cummulative utilisation of J¥ 19,503.62 million (Rs.688.92 Crores) in respect of project portion only.**

## 6.0 JBIC ASSISTANCE FOR SIMHADRI TPP (1000 MW)

Simhadri TPP (1000 MW) was posed to JBIC, Japan for funding who have sanctioned a direct JBIC loan of J¥ 19,817 million to NTPC as first tranche loan for Simhadri TPP. The loan was effective from 24.06.97. Investment approval for the project was given in July 1997. During the year 2001-02 (period April 2001 to December 2001) NTPC has utilised J¥ 949.05 million (Rs. 37.73 crores). **The cumulative utilization till 31.12.2001 is J¥ 18,855.04 million (Rs. 728.21 crores).**

II-Tranche JBIC loan of J¥ 12,194 million was sanctioned by the Japanese Government for Simhadri TPP in August 2000. Loan agreement was made effective on 31.05.2001. During the year 2001-02 (for the period April 2001 to December 2001) NTPC has utilised J¥ 11,592.52 million (Rs.451.09 crores).

Further, III-Tranche of JBIC Loan amounting to J¥ 27,473 million has been pledged on 12.12.2001.

## 7.0 DOMESTIC BORROWINGS

NTPC has received funding proposals aggregating over Rs.8000 crores from various Banks and Financial Institutions for participating in the capacity addition programme of NTPC. Beginning from November 1999, NTPC has tied up Rs.6089 crores and utilised Rs.2070 crores upto 31.12.2001.

## 8.0 MEMORANDUM OF UNDERSTANDING (MOU)

NTPC is the first power sector corporation to have signed a Memorandum of Understanding (MOU) with the Govt. of India and **has been rated "Excellent" for every year since inception of MOU system of rating.**

Based on the Memorandum of Understanding (MOU), signed between NTPC and the Ministry of power for the year 2001-02, in respect of major performance parameters, the targets are as follows :

| S. No. | Parameters | Unit | Target 2001-2002 | |
|---|---|---|---|---|
| | | | V.Good | Excellent |
| 1. | Generation | MUs | 119000 | 121000 |
| 2. | Heat Rate | kcal/kWh | 2475 | 2465 |
| 3. | Gross Margin | Rs.Cr. | 4223.27* | 4294.25* |
| 4. | Net Profit to Capital Employed | % | 7.55* | 7.78* |
| 5. | Ash Utilisation | Lakh $m^3$ | 32 | 34 |

* based on ABT (Availability Based Tariff)

## 9.0 OUTSTANDING DUES OF NTPC

The rising level of receivables continue to cause concern to NTPC. The billing for the year 2001-02 (upto 31.12.2001) stood at Rs.15616.47 crores with realisation of Rs.11680.24 crores, i.e. 74.8%. The total cumulative outstanding dues rose to Rs. 21309.11 crores (including surcharge of Rs. 7868.06 crores) as on 31.12.2001. The outstandings in terms of months of average billing works out to 7.7 L/C (Letter of Credit) opened as on 31.12.2001 was Rs.1237.62 crores, which was a mere 75.87% of Last Quarter Average Billing of Rs.1631.27 crores.

However, The Conference of Chief Ministers called by the Hon'ble Prime Minister on 03.03.2001 agreed on the need to evolve a package to help State Governments and state utilities to discharge their outstanding liabilities to the central utilities. Accordingly, the Government of India set up an Expert Group under the chairmanship of Member, Planning Commission to suggest a scheme for one-time settlement of outstanding dues and also steps required to ensure full payment of current dues in future.

The Expert Group has recommended signing of Tripartite Agreements between the State Governments, Government of India and the Reserve Bank of India for deductions out of central devolutions of the state in case of default in payments extending beyond 90 days. All the State Governments have been approached for signing of Tripartite Agreements which is being vigorously pursued at the highest level by constituting high level Task Forces for each of the states. Andhra Pradesh and West Bengal have already signed the Tripartite Agreement.

## 10.0 IMPACT OF CERC ORDERS

CERC, in its Order dated 04.01.2000 on ABT, had fixed target availability of 80% w.e.f. 01.04.2000 and 85% from 01.04.2001 against 70% agreed in the NTF (National Task Force). NTPC had filed Review Petition against this Order of the Commission on which CERC issued its Order on 15.12.2000 fixing the target availability of 80%. Subsequently, vide its Order dated 21.12.2000, CERC also issued tariff norms in which rates of depreciation were reduced from 7.84% to 3.6% and O&M escalation was limited to 6% against prevailing norm of 10%. Implementation of these Orders of CERC will result in reduction in internal resources of NTPC by about Rs. 23,000 crores over the next 11 years and will force NTPC to reduce its 20,000 MW capacity addition programme to only about 8,000 MW in the next 11 years.

## 11.0 GROWTH STRATEGY

Power is the prime mover of the economy and NTPC is a key player in the power sector. **NTPC is making significant contribution for the growth of the economy by generating one-fourth of India's total power generation with one-fifth capacity.** NTPC continued its multipronged strategy for capacity addition to maintain/augment its share in the country's installed generating capacity through green field projects, expansion of its existing plants, acquisition of SEB's plants and forming joint ventures and selective diversification in related areas. **NTPC is planning to become a "40000 MW plus" company by the year 2012.**

## 11.1 Capacity Addition Details

### 11.1.1 IX Plan

In the IX plan, 2200 MW capacity has been commissioned till date. This includes Vindhyachal Unit VII and VIII (1000 MW), Unchahar Unit III and IV (420 MW), Kayamkulam (350 MW) and Faridabad (430 MW). NTPC would add 3140 MW in IX Plan (including 440 MW Tanda TPS takeover from U.P. and one 500 MW unit at Simhadri scheduled to be commissioned in March 2002).

### 11.1.2 Capacity Addition Programme

With a view to achieve a capacity of 40,000 MW by the year 2012, NTPC has formulated an ambitious capacity addition programme as follows :

- Installed Capacity — **19,435 MW**
- On-going Projects (under construction) — **4,500 MW**
- New Projects — **15,970 MW**
  - CEA Cleared — 8,680 MW
  - FR Submitted — 4,340 MW
  - FR under finalization — 2,950 MW

### 11.1.3 Project-wise capacity addition details

**A. ONGOING PROJECTS (4500 MW):**

| Sl. No. | Projects | Capacity (MW) | Commissioning Schedule |
|---|---|---|---|
| 1. | Simhadri | 1000 (2x500) | Unit-I (March 2002)<br>Unit-II (Dec 2002) |
| 2. | Talcher-II | 2000 (4x500) | Unit-I (Nov 2003)<br>Unit-II (Aug 2004)<br>Unit-III (May 2005)<br>Unit-IV (Feb 2006) |
| 3. | Rihand-II | 1000 (2x500) | Unit-I (Aug 2005)<br>Unit-II (May 2006) |
| 4. | Ramagundam-III | 500 (1x500) | Unit-I (Aug 2005) |

**B. Likely starts in next year (6080 MW):**

| Sl. No. | Projects | Capacity (MW) |
|---|---|---|
| 1. | Sipat-I | 1980 (3x660) |
| 2. | Barh | 1980 (3x660) |
| 3. | Kahalgaon-II | 1320 (2x660) |
| 4. | Kol Dam (Hydro)* | 800 (4x200) |

* Infrastructure development work under progress

**C. Feasibility Reports for the following five projects with a total capacity of 4340 MW have been submitted to CEA for techno-economic clearance.**

| Sl.No. | Projects | Capacity (MW) |
|---|---|---|
| 1. | North Karanpura | 1980 |
| 2. | Vindhyachal-III | 1000 |
| 3. | Sipat-II | 660 |
| 4. | Unchahar-III | 210 |
| 5. | Dadri-II | 490 |

**D.** In addition, projects namely, Anta II (650 MW), Auraiya II (650 MW), Kawas II (650 MW) and Gandhar II (650 MW) with a total capacity of 2600 MW are under review and shall be taken up after reasonable firm prices for LNG are known and acceptance of cost of generation based on the same by beneficiary States.

## 11.2 Joint Ventures

### 11.2.1 JV with BSES (UPL)

Utility Powertech Ltd. (UPL), a Joint Venture Company of NTPC & BSES with an equity holding of NTPC-49% & BSES-51%, was incorporated on 23.11.1995 to take up assignments of Construction, Erection and Supervision in power sector and other sectors in India and abroad. UPL has received orders for approximately Rs.125 crores till date. The turnover of the JVC for the year 2000-2001 was approximately Rs.38.00 crores. Profit (Before Tax) for the year 2000-2001 was Rs.2.30 crores.

*A view of Talcher Super Thermal Power Project*

### 11.2.2 JV for Renovation & Modernisation (R&M)

NTPC has formed a Joint Venture Company with M/s. ABB ALSTOM with equal equity contribution of 50% each for taking up Renovation and Modernisation assignments of Power Plants both in India and abroad. The Company was registered with Registrar of Companies (ROC) under the name : "NTPC-ABB ALSTOM POWER PLANT SERVICES PRIVATE LIMITED" (NASL) on 27.09.99 and formally launched on 15.02.2000. The turnover of the JV Company for the year 2000-2001 was Rs.101.03 Lacs. The JV Company has received orders/LOIs for Rs.75.4771 crores till date.

### 11.2.3 JV with SAIL (SPSCL)

SAIL POWER SUPPLY COMPANY LTD. (SPSCL), a Joint Venture Company of NTPC & SAIL with equity holding of 50% each, was incorporated on 07.03.2001 for Operation & Maintenance of Captive Power Plants, 2x60 MW each, at Rourkela and Durgapur, earlier belonging to SAIL.

Turnover of the JV Company for the year 2000-01 is Rs. 11.34 crore.

Another JV is likely to be formed with SAIL for takeover of Bhilai CPP-II of SAIL's Bhilai Steel Plant. Study/ Evaluation for the same is under progress.

### 11.2.4 JV for Power Trading

Power Trading Corporation of India Ltd. (PTC) has been formed with 30% equity contribution from POWERGRID, 15% from NTPC, and 15% from PFC. Balance 40% shall be offered to State Governments, SEBs, other Financial Institutions and Public at large. PTC would purchase power from identified private projects and sell it to the identified State Electricity Boards. The JV company was incorporated on 16.04.1999. Turnover of the JV company for the year 2000-2001 was Rs.11.6265 Crores.

### 11.2.5 JVs for LNG

NTPC had signed MOUs with Gujarat Pipavav Ltd. (GPLNG) and Petronet LNG Ltd. (PLL) for sourcing of LNG for its Gas based Expansion Projects at Kawas, Gandhar, Anta, Auraiya and Kayamkulam. Sourcing of LNG through International Competitive route will entail the cheapest gas compared to pursuing JV route. NTPC is now taking necessary action for sourcing Liquified Natural Gas (LNG) for expansion of its projects at Anta, Auraiya, Kawas, Gandhar and Kayamkulam through ICB procedure.

### 11.2.6 JV with Coal India Ltd. (CIL)

Amarpali and Magadh block in North Karanpura Coalfields of CCL which are linked to Barh STPP and North Karanpura STPP respectively are being contemplated to be developed through JV mode. Equity share holding of such JV is likely to be : CIL/CCL-41%, NTPC-10% and Private Partner/(s)-49%. Selection of third private partner is being done through International Competitive Bidding Process. Preparation of documents with regard to RFQ, RFP is under preparation by CIL/CCL in consultation with NTPC.

### 11.2.7 JV with ONGC

There is likelihood of a JV with ONGC for setting up a Gas based Power Project (360 MW) at Hazira (Gujarat). EIA studies have already been completed.

### 11.2.8 JV with IOC

There is likelihood of a JV with IOC for setting up a residue based Power Project at Chennai. Study/Evaluation for the same is under progress.

### 11.2.9 JV for Distribution

NTPC is planning to enter the Distribution sector by forming a JV company with an International Partner. Necessary action for study/evaluation/ selection of JV partner etc. are under progress.

## 11.3 Related Diversification

### 11.3.1 Hydro Projects

KOL DAM Hydro-Electric Project has been taken over from Himachal Government / HPSEB for implementation by NTPC. The agreement for the same was signed on 26.02.2000. Land acquisition for the project is already initiated. Clearances from MOEF and CEA have been transferred in NTPC's name in May 2000. EDF France has been appointed as Engineering Consultant. Updated DPR for Koldam Hydro-Electric Power Project 800 MW (4x200 MW) have been submitted for revised Techno-Economic Clearance.

Some more sites for Hydro-Electric Power Projects are being explored. These include Maneribhali-II (4x76 MW) and Palamaneri (4x104 MW) in Uttaranchal and Puyankutty (480 MW) and Mahadayi (345 MW) in South. Apart from this, NTPC has submitted proposal for Teesta IV (495 MW) and Teesta VI (360 MW) in Sikkim against Sikkim Government's invitation through Global notification. NTPC has also shown interest for Teesta-III (1200 MW).

## 12.0 SPV (SPECIAL PURPOSE VEHICLE) FOR AFFORESTATION

In order to increase the national forest cover and facilitate quick forest clearances for the forest land proposed to be acquired for future power projects of NTPC and other power utilities under MOP, a SPV for afforestation has been set up. This SPV has been registered as a Society under the Society Registration Act (1860) by the name "National Power Afforestation Society (NPAS)" in August 2001. Finalisation of MOU covering the modalities for operationalising the NPAS between NPAS, MOP and MOEF is in progress.

*Control Room of a Power Station*

# NATIONAL HYDROELECTRIC POWER CORPORATION LTD. (NHPC)

National Hydroelectric Power Corporation (NHPC) was set up in 1975. In its existence of over 25 years, NHPC has become the largest organisation for Hydro Power development in India, with capabilities to undertake all the activities from conceptualisation to commissioning of Hydro Projects. Execution of Geo-thermal & Tidal Power Projects in the country has also been included in the corporate objectives of NHPC.

NHPC is a Schedule "A" Enterprise of the Government of India with an Authorised Share Capital of Rs. 7,000 Crores and an Investment base of over Rs. 10,000 Crores.

NHPC during 2000-2001 has commissioned Kurichu HE Project (3 x15 MW), Bhutan, three and half months ahead of schedule and Kalpong HE Project (3 x 1.75 MW ) Andaman and Nicobar Islands, sixteen months ahead of schedule.

## A. STATUS OF OPERATING POWER STATIONS

Following seven Projects have been commissioned by NHPC in India:

| | | | |
|---|---|---|---|
| 1. | Baira Siul (HP) | - | 180 MW(3x60 MW) |
| 2. | Loktak (Manipur) | - | 105 MW (3x35 MW) |
| 3. | Salal (J&K) | - | 690 MW (6x115 MW) |
| 4. | Chamera-I (HP) | - | 540 MW (3x180 MW) |
| 5 | Tanakpur (UP) | - | 120 MW (3x40 MW) |
| 6. | Uri (J&K) | - | 480 MW (4x120 MW) |
| 7. | Rangit (Sikkim) | - | 60 MW (3x20 MW) |
| | | | **2175 MW** |

During the current financial year (upto Dec.2001), NHPC Power Stations generated 7503.48 MUs against the target of 8228.0 MUs. The generation was less mainly due to less inflow of water. Anticipated energy generation for the balance months of the year 2001-02 is 1141 MUs.

## B. STATUS OF ONGOING PROJECTS (Ending December, 2001)

### ( a) Projects on ownership basis:

### 1. Dulhasti H.E. Project (3x130 MWs) , J&K.

Out of the total length of 10581 m of head race tunnel to be constructed, so far 8871.5m (83.84%) excavation of tunnel 1717m (17.28%) of concrete lining has been achieved till 31st Dec. 2001. Owing to adverse geological conditions and seepage, the tunneling work at the upstream face suffered a setback. Due to cavity formation and roof fall in the tunnel, the Tunnel Boring Machine has suffered extensive damage and had to be abandoned in June 1999. Drilling and blasting method was resorted to for the balance excavation of the tunnel. Concreting of all the Dam blocks along with grouting has been completed. All HEM works activities in Dam and Intake structure have been completed. Silt flushing tunnels, Surge shaft, Pressure shaft, Penstock, Draft Tubes & Tail Race Tunnel works have been completed in all respects. Erection and dry testing of all three units, erection of Generator Transformers have been completed. All civil works of Powerhouse have been completed. 400 kV GIS and oil filled cable have been successfully tested. Overall 31.69% progress of HEM works have been achieved during the year and cumulative progress of 92.27% have been achieved upto 31st Dec. 2001.Total expenditure incurred upto Dec. 2001 is Rs. 3061.96 Crores.

The anticipated target to be achieved for the remaining period of the year i.e. upto 31.3.2002 is to complete, all the civil works except HRT and all hydro mechanical/electro-mechanical works, except wet testing. The project is scheduled to be completed in December 2003.

**2. Dhauliganga H.E. Project, Stage-I (4x70 MWs), Uttaranchal.**

The project had been cleared for the revised cost estimate of Rs. 1578.31 crores including IDC (Aug.'99 P.L.) on 7.7.2000. Major achievements during the year (till Dec.2001) includes completion of diversion tunnel and diversion of river in April 2001, start of major works like HRT excavation from U/S & D/S side (in April/May,2001), Excavation of Desilting basins (in May/June 2001), TRT excavation (Aug., 2001), Cut-off trench embankment (Oct.,2001) and completion of Power House Cavern excavation upto EL 1039 (Nov.,2001) etc. All MOU milestones due upto the period have been achieved, ahead of schedule.

Upto Dec.2001, 100% of Desilting basins I & II (Pilot & slashing), 49.07% (2596m) of HRT excavation 67.5% of Power house cavern excavation and 40.73% (178m) of TRT excavation have been completed. Work of spillway excavation suffered due to slope failure.

During the balance period of the year i.e. from Jan. 2002 to March,2002, major planned works include, start of cut off wall trend and concreting, completion of HRT excavation, intake tunnel excavation and lining, Power House cavern upto EL 1019 (ramp) and 108 m length of TRT excavation etc. Total expenditure upto Dec. 2001 is Rs. 547.59 crores. The project is scheduled to be completed in March 2005.

**3. Chamera H.E. Project, Stage-II (3x100 MWs) , H.P.**

The Project is being executed on Turnkey mode and agreements with the consortium members were signed on 18.7.99. Mobilisation has been completed by M/s Indo Canadian Hydro consortium, the turnkey contractor of this project and major work has been started. Dam excavation is nearly completed and 10820 cu m of Dam concreting has been done upto Dec.2001. TRT excavation has been done during the year. The major achievements during this year are day - lighting of 7831m of HRT on 23.10.2001,(ahead of schedule by more than 7 months), day lighting of 3463m of TRT on 5.12.2001 (ahead of schedule by 11 months). Completion of excavation of all Draft tubes, Pressure shafts, Penstocks, Vertical shafts and of Power house up to turbine pits, Silt flushing tunnels, and Desilting Chambers and concreting of Dam upto EL 1127 mtr. on 19.12.2001. Total expenditure upto Dec. 2001 is Rs. 920.61 crores.

**Anticipated target to be achieved for the remaining period of the year i.e upto 31.03.2002 are as follows:**

1) HRT lining between Inlet Adit and Adit-I = 600 m

2) Foundation concreting of Dam =29580 cum.

3) Erection and commissioning of EOT crane in service Bay.

**The Project is scheduled for commissioning by May, 2004.**

**4. Teesta H.E. Project Stage-V (3x170 MWs), Sikkim**

Teesta H.E. Project located in East Sikkim is a run-of-the-river peaking scheme identified on Teesta River. The installed capacity of the project is 510 MW to generate 2573 MUs of electricity in a 90% dependable year. Developments of infrastructure facilities are in progress. All major milestones including start of HRT works and 50% excavation of heading in Diversion Tunnel have been achieved ahead of schedule. Excavation of all the Adits for Dam, HRT and Power House are in full swing. Adit excavation and Ventilation tunnel in Power House has been completed. The Benching of DT-II is completed except at inlet and outlet ramp portions. E&M and HM works have been awarded .Total expenditure upto Dec. 2001 is Rs. 267.94 Crores,

*Main Access Tunnel to Power House - Teesta HE Project, Stage-V*

**Anticipated targets to be achieved for the remaining period of the year i.e upto 31.03.2002 are as follows:**

| Description | Anticipated targets |
|---|---|
| i) Diversion Tunnel (Benching) | 260 mtr length |
| ii) Excavation (Adit-I ,II,III & IV) | 174 mtr length. |
| iii) Power house | |
| a) Surge shaft open excavation | 21000 cu m |

**The project is scheduled to be completed by February 2007.**

### 5. Loktak Downstream H.E. Project (3x30 MWs), Manipur

Loktak Downstream HE Project with an installation of 3 X 30 MW is located in Tamenglong District of Manipur. The Dam site is connected by 56 Km long fair weather road with Bishenpur town, which is 28 kms south of Imphal. It is a run of the river scheme to utilize the discharges of the Loktak HE Project in operation since March 84. The project on completion will yield benefits of 7 hours of peaking daily and an annual energy generation of 420.25 million units in a 90% dependable year.

The Project was sanctioned in December,1999 for a cost of Rs.578.62 crores including IDC of Rs. 46.95 crores (at Aprtil, 1999 price level). However, no active work has taken place due to the adverse law and order situation and stay order by High Court Guwahati. Necessary arrangement of accommodations for security personnel to be deployed for road construction works/ other project works are yet to be made available by the Govt. of Manipur. Total expenditure upto Dec. 2001 is Rs. 16.21 Crores.

**The project is scheduled to be completed by December 2008**

### 6. Parbati H.E. Project, Stage-II (4x200 MW), H.P.

The Project is located in Kullu district of Himachal Pradesh. This is a run of the river scheme and is expected to generate 3175.92 MUs in a 90% dependable year. The Project envisages construction of a 91Mtr. high Concrete Dam, a 31.25 Km. long 6 m. Dia. Head Race Tunnel and a Surface Power House to accommodate 4 Pelton Turbine Generating Units of 200 MW each.

TEC has been accorded by CEA on 3/1/2001 and environmental clearance by MOEF on 4/6/2001. The physical possession of private land in Manikaran and Garsa valley has been taken over. Case is in process for acquisition of private land in Sainj valley and for construction of roads at Jhuni (Garsa). Construction of residential buildings (Type-II & III) is nearing

completion. In Civil works, Construction of Abutment for Bailley Bridge to Adit-I axis is in progress. The works of approach road at Dam, Power House, Tunnel and Sheela Garh complex etc. are in progress.

Total expenditure upto Dec. 2001 is Rs. 127.78 crores.

**Anticipated targets to be achieved for the remaining period of the year i.e upto 31.03.2002 are as follows:**

| Description | Anticipated targets |
|---|---|
| i) Road Cutting Earth work | 46344 cu m |
| ii) Investigation,Design and Const. of suitable RCC / Steel bridge 7.5 mtrs,20mtrs Span double 70 R loading over Hurla nallah at Jhuni. | 64% |
| iii) Bridge at Suind | 45% |
| iv) Bridge across River Beas. | 6% |

### (b) Projects being executed on deposit/ turnkey basis:

#### (i) Kalpong H.E. Project (3x1.75), A&N Islands

The Project which was undertaken by the Corporation on "Deposit Work" basis has been completed and commissioned in August 2001, sixteen months ahead of schedule.

#### (ii) Kurichu H.E. Project (3x15 MW ), Bhutan

The Corporation has taken up this Project for execution on "Turnkey basis". The Civil work of Construction of Concrete Dam and Power House including Tail Race Channel has been completed. The Electro-mechanical works of Unit-IV are in progress. Unit-IV is to be commissioned in June 2002 against the original schedule of December 2002. Unit-I, II & III have been commissioned in August 2001 in all respect, ahead of schedule targets.

## C. PROJECTS UNDER INVESTIGATION/ STATUS OF NEW PROJECT/SCHEMES (Ending November,2001)

### 1. Siang & Subansiri (19900MW), Arunachal Pradesh

The Corporation has taken up investigation works in Arunachal Pradesh for the following projects –

| | | |
|---|---|---|
| 1. Upper Siang H.E. Project | - | 11000 MW |
| 2. Middle Siang H.E. Project | - | 700 MW |
| 3. Lower Siang H.E. Project | - | 1700 MW |
| 4. Upper Subansiri H.E. Project | - | 2500 MW |
| 5. Middle Subansiri H.E. Project | - | 2000 MW |
| 6. Lower Subansiri H.E. Project | - | 2000 MW |
| **Total** | | **19900 MW** |

*Dulhasti Project - Intake*

The Brahmaputra Board had initially taken up the survey & investigation for these projects. The status of work in respect of these projects/ schemes is as under:-

**Lower Siang H.E. Project:** Additional Survey & Investigation is in progress as per schedule. Total expenditure upto Dec. 2001 is Rs. 4.62 Crores.

**Lower Subansiri H.E. Project**: DPR has been submitted. CEA has recommended the cost estimate for stage-II works for Rs. 33.31 crores. Government approval to this estimate is awaited. Total expenditure upto Dec. 2001 is Rs. 28.17 crores.

**Upper & Middle schemes (Siang & Subansiri) :** Site clearance (Stage-I) has been accorded by MOEF. Survey and Investigation are in progress. EIA studies / preparations of EMPs have already been awarded and are in progress. Total expenditure upto Dec. 2001 is Rs. 47.30 crores.

## 2. J&K Projects (2798 MW)

The following 7 nos. new projects with a total capacity of 2798 MW have been allotted to NHPC in J&K :

| S. No. | Name of the Project | Capacity (MW) | Present Status |
|---|---|---|---|
| 1 | Kishenganga HE Project | 330 | DPR submitted for establishing commercial viability. CEA has not found the project commercially viable. Total expenditure upto Dec. 2001 is Rs. 3.83 crores. |
| 2 | Uri-II HE Project | 280 | Site clearance (Stage-I & II) has been accorded.CEA has established commercial viability of the project. CEA has cleared cost estimate for Stage-II. Approval of this estimate is awaited. Total expenditure upto Dec. 2001 is Rs. 2.84 Crores, |
| 3 | Nimoo Bazgo HE Project | 30 | A team of Officers from CEA,PDD (J&K) visited the alternative site during Nov. 2001 and have submitted their report. |
| 4 | Chutak HE Project | 18 | Site clearance (Stage-I) has been accorded by MOEF. S&I works are in progress. |
| 5 | Bursar H.E. Project | 1020 | Site clearance (Stage-I) has been accorded by MOEF. CEA has established commercial viability of the Project. CEA has cleared cost estimate for stage-II activities for which approval of Government of India is awaited. Total expenditure upto Dec. 2001 is Rs. 0.58 crores. |
| 6 | Pakal Dul H.E. Project | 1000 | Site clearance (Stage-I & II) accorded by MOEF. CEA has established commercial viability of the Project. CEA has cleared cost estimate for stage-II activities for which approval is awaited. Total expenditure upto Dec. 2001 is Rs. 0.74 crores |
| 7 | Sewa-II H.E. Project | 120 | Site clearance (Stage-I & II) have been accorded by MOEF. CEA has cleared cost estimate for stage-II activities for which approval is awaited. Total expenditure upto Dec. 2001 is Rs. 11.07 crores |

**3. Parbati St-I & III H.E. Projects (1270 MW)- H.P.**

**Parbati Stage-I :** Site clearance for stage- I has been rejected by MOEF. The matter is to be reviewed by the committee constituted by MOEF for site clearance of this project. Total expenditure upto Dec. 2001 is Rs. 0.82 crores.

**Parbati stage-III :** Site clearance stage-I has been accorded by MOEF. CEA has established commercial viability. Detailed Survey and Investigation are in progress. Clearance of Cost Estimate for Stage-II activities is awaited. Total expenditure upto Dec. 2001 is Rs. 1.09 crores.

**4. Teesta Low Dam Stage-III (132 MW), West Bengal**

**Teesta Low Dam Stage-IV (168 MW), West Bengal**

**Stage-III** : Site clearance of Stage I & II have accorded by MOEF. The project has not been found commercially viable.

**Stage-IV** : Site clearance of Stage - I has been accorded by MOEF. CEA has established commercial viability of the project. Estimate for stage-II activities has been cleared by CEA and approval for the same is awaited. Total expenditure upto Dec. 2001 on stage –III & IV is Rs. 11.13 crores.

## D. JOINT VENTURE PROJECTS

Two new projects, Indira Sagar (1000 MW) and Omkareshwar (520 MW) in Madhya Pradesh are being executed through joint venture of NHPC and MP State Govt. MOU has been signed between NHPC and Government of West Bengal for executing Purulia Pumped Storage Scheme (900 MW) through joint venture.

## E. PLANS FOR CAPACITY ADDITION

NHPC Plans to add 5310 MW during Xth Plan, 10341 MW during XIth Plan and 13500 MW during XIIth Plan respectively.

## F. SMALL HYDRO PROJECTS

NHPC has agreed for execution of Kambang (3x2 MW) & Sippi Projects (2x2 MW). Contract for the execution of civil works for both the projects has been awarded and construction work has commenced. On completion of both the projects 42.64 MU of energy at 60% load factor will be available annually for the state grid. Further Govt. of Arunachal Pradesh has also requested NHPC for the execution of Halaipani Small HE Project (3x3 MW). Preparation of revised DPR for approval of State Govt. is in progress .

## G. DEVELOPMENT OF GEOTHERMAL POWER

NHPC has been appointed as the nodal agency for the exploitation of Geothermal Energy in the country by Ministry of Non–Conventional Energy Sources (MNES). Since the know – how for construction of Geothermal Power for generation of electric power is not available either with NHPC or else-where in the country, therefore, international Consultant / Contractor viz., M/s Geother Ex. USA has been hired for i) Review and evaluation of existing published data regarding all geothermal fields in the country, ii) Preparation of pre-feasibility report in respect of four most promising sites and iii) Supervision and exploration involving deep drilling and preparation of detailed project report in respect of one most suitable prospect for power report for power generation.

Subsequently, approval for development of Tattapani Geothermal field, Chattisgarh for power generation in two phases has been received form MNES. In Phase-I a pilot power plant of 300KW capacity will be installed and in phase-II feasibility study for Mega Watt size geothermal plant is to be taken up. For pilot power plant MNES have conveyed their approval for grant to the tune of Rs. 4.6 Cr. In principle approval of Govt. of Chattisgarh for installation of pilot geothermal power plant at Tattapani has also been obtained. On the spot examination of the bore holes was conducted by GSI, MPUVN, NHPC & ONGC and it was concluded that existing bore holes cannot be used as production holes. A fresh proposal is being submitted to MNES of 1 MW plant.

## H. COMMERCIAL

Outstanding dues, from various beneficiaries, as on 31.12.2001 is Rs. 2153.32 crores (Including surcharge of Rs. 1157.06 crores). Total payment received during the year (upto 31.12.2001) is Rs. 2002.20 crores.

## I. CONSULTANCY SERVICES

Consultancy Services Division acts as a business window for generating additional business for the Corporation. Consultancy Services in all areas from **''Concept to Commissioning''** for all facets of hydropower development are rendered. Based on its expertise and experience, domestic financial institutions like IFCI Ltd. and ICICI Ltd., funding agencies of major hydroelectric power projects in private sector have engaged NHPC as **''Lender's Engineer''**. During the financial year 2001-2002 Consultancy Services Division has received consultancy assignments amounting to Rs. 786 Lakhs and the payment received stand at Rs. 330 Lakhs (as on 31.12.2001).

### MAJOR ONGOING ASSIGNMENTS (AS ON 30.11.2001) :-

NHPC has been appointed as "Lender's Independent Engineer" by Industrial Finance Corporation of India Ltd. (IFCI) for 400 MW Maheshwar H.E. Project against stiff international competition for a consultancy fee of Rs 163.45 Lakhs.

- NHPC has been appointed as "Lender's Independent Engineer" by ICICI for 300 MW Baspa-II H.E. Project for a consultancy fee of Rs. 164 Lakhs in Himachal Pradesh.
- Development of Software Packages in F&A areas for BBMB Ltd. for a total fee of Rs. 24.33 Lakhs.
- Techno-Commercial Evaluation of the offer received by DVC from M/S. ALSTOM–BHEL Consortium, techno-commercial negotiation, associating in joint inspection and witnessing of major tests for Refurbishment of one Hydel Unit for Maithon H.E. Project of Damodar Valley Corporation (DVC) for a total fee of Rs.157.50 Lakhs.
- Techno-Economic Feasibility Study of Earthen Dam to be constructed downstream of the existing concrete Dhanikari Dam for water supply to Port Blair for Andaman & Nicobar Administration for a total fee of Rs. 42 Lakhs.
- Annual Maintenance Contract for Software Packages in F&A areas for M/s. Nathpa Jhakri Power Corporation Ltd.
- Assistance for Indirasagar & Omkareshwar HE Projects of NHPC Ltd. for a consultancy fee of Rs. 435.65 lakhs.
- Commercial Management for Nathpa Jhakri Hydroelectric Power Project (6X250 MW) of NJPC Ltd. for a consultancy fee of Rs. 34.52 lakhs.
- Contracts Management for Electro-Mechanical Works for Nathpa Jhakri Hydroelectric Power Project (6X250 MW) for a consultancy fee of Rs. 37.81 lakhs.
- Design & Engineering of Electro-Mechanical Works for Nathpa Jhakri Hydroelectric Power Project (6X250 MW) of NJPC Ltd. for a consultancy fee of Rs. 38.40 lakhs.
- Operation & Maintenance Management for Nathpa Jhakri Hydroelectric Power Project (6X250 MW) of NJPC Ltd. for a consultancy fee of Rs. 37.10 lakhs.
- Generating Equipment Review and Erection Review for Nathpa Jhakri Hydroelectric Power Project (6X250 MW) of NJPC Ltd. for a consultancy fee of Rs. 32 lakhs.
- Development of EDP & Communication Infrastructure for Nathpa Jhakri HE Project of NJPC Ltd. for a consultancy fee of Rs. 68 lakhs.
- Feasibility Study for six Mini/Micro Hydroelectric Projects in Andaman & Nicobar Island for A&N Administration for a consultancy fee of Rs. 17.25 lakhs.

- Feasibility Study of Kalpong Downstream HE Project in North Andaman & Nicobar Island for A&N Administration for a consultancy fee of Rs. 25 lakhs.

### Completed Consultancy Assignments during 2001-2002 (as on 31.12.2001) : -

- Design and Preparation of Specifications for tunnels between Udhampur - Katra Section of Northern Railway for a consultancy fee of Rs. 14.70 Lakhs.
- Preparation of Pre-feasibility Report for Tizu Zungki HE Project for Deptt. of Power, Government of Nagaland for a consultancy fee of Rs. 500 lakhs.
- Annual Maintenance Contract for Software packages in F&A area and Y2K OK accounting packages for NJPC Ltd for a consultancy fee of Rs. 1.58 Lakhs.
- Consultancy for evaluation of M/s Alstom offer for Refurbishing of Cranes and Uprating of one unit of Maithon HE Project of Damodar Valley Corporation for a consultancy fee of Rs.7.50 Lakhs.
- Repair and Restoration of Spituk Monastery, Leh for Ladakh Autonomous Hill Development Council, Leh on Deposit Work basis for a consultancy fee of Rs. 178 lakhs.
- Construction Management, Quality Control and other services for Bakreshwar Thermal Power Project for West Bengal Power Development Corporation for a consultancy fee of Rs. 331.13 Lakhs.
- NHPC has been registered as a ''Consultant'' in the area of Hydro Power with World Bank (WB), Asian Development Bank (ADB), African Development Bank (AfDB) and Kuwait Fund for Arab Economic Development (KFAED), Kuwait.
- NHPC has been registered as a ''Consulting Agency'' with Central Water Commission (CWC) and Consultancy Development Centre (CDC).

### MOUs SIGNED BY NHPC

- A MOU has been signed between NHPC and Harza Engineering Company, International L.P., USA for providing consultancy services in the field of hydropower in India and abroad.
- A MOU has been signed between NHPC and M/s Bhakra Beas Management Board, Chandigarh for establishing joint venture for providing consultancy services in the field of hydropower including Renovation, Modernisation and Uprating (RM&U).
- A MOU has been signed between NHPC and M/s Heavy Engineering Corporation, Ranchi for mutual sharing of expertise and resources in development of hydropower project in India and abroad.

### PERFORMANCE AGAINST MEMORANDUM OF UNDERSTANDING

Memorandum of understanding was signed in March 2001 for the year 2001-2002 between NHPC and Ministry of Power setting targets of different performances parameters such as Capacity Index, Generation, Financial parameters of Gross margin and Net profit as percentage of net worth, achievement of project implementation milestones, Implementation of CAT plan, R&D activities, HRD programmes, survey and investigation, IT and communication, Consultancy assignments and Corporate plan etc. NHPC was rated as "Excellent " for the seventh consecutive years.

# RURAL ELECTRIFICATION CORPORATION LTD.(REC)

**Rural Electrification Corporation Ltd. (REC) was set up in 1969 as a wholly owned Govt. of India enterprise with the primary objective of providing financial assistance for rural electrification in the country.** In February 1992, REC was declared as a Public Financial Institution under Section 4-A of the Companies Act 1956. In February 1998, the Corporation was registered as a Non-Banking Financial Company under Section 45-IA of the RBI Act, 1934.

**Recently, the Govt. of India has upgraded the Corporation from Schedule 'B' to Schedule 'A' Enterprise.**

## PERFORMANCE HIGHLIGHTS FOR THE YEAR 2000-2001

**The highlights of performance during the last three years including year 2000-2001 are given below:-**

(Rs. in Crore)

| | 1998-99 | 1999-00 | **2000-01** |
|---|---|---|---|
| 1. Loan Sanctioned | 2879 | 4678 | **6308** |
| 2. Disbursement | 2203 | 3051 | **4109** |
| 3. Recoveries | 2276 | 2716 | **3582** |
| 4. Profit (before tax and depreciation) | 391 | 426 | **453** |
| 5. Dividend on Equity | 50 | 50 | **67** |

**Following were the other notable achievements of the Corporation during the year 2000-01:-**

(a) REC is the first Central Public Sector to successfully securitise its future receivables of next five years from APTRANSCO. The issue was for a significant amount of Rs.206 crore. This was a measure to reduce REC's exposure to APTRANSCO.

(b) REC mobilized funds from the market to the extent of Rs.1611 crore at different times during the year as against mobilization of Rs.981 crore in the previous year.

(c) REC pre-paid Government loan amounting to Rs.211.53 crore. This is primarily to correct the mismatch in tenures between the Corporation's Assets and Liabilities and plan up the future repayments. During the current year 2001-02, another sum of Rs.643 crore has been pre-paid by REC.

(d) REC has been becoming increasingly self-reliant. The Government loans now constitute only about 10% of its resources.

(e) REC's outstanding allround performance has earned it 'Excellent' grading for the 8th year in succession in the annual MOU signed with the Ministry of Power. REC was earlier awarded Certificate of Merit by the Hon'ble Prime Minister for 'Excellence' in the achievement of MOU target for the year 1998-99.

(f) REC is also one among the PSUs

which was granted "Mini Ratna - Category I Status" by DPE based on its consistent performance and profitability.

## CUMULATIVE PERFORMANCE OF REC UPTO 31.3.2001

Cumulatively, upto the end of March 2001, 37335 projects have been sanctioned by REC involving a loan amount of Rs.28589 crore. Against this, a sum of Rs.20021 crore has been disbursed in accordance with phasing of projects and their physical progress. This includes Rs.261.50 crore released as grant to SEBs, State Govts. and State Power Utilities towards provision of 43.80 Lakh single light point connections to the households of rural poor, under Kutir Jyoti Programme.

## PROGRESS OF PERFORMANCE DURING THE YEAR 2001-2002 (UPTO NOVEMBER 2001)

**During the year 2001-2002**, REC has so far sanctioned a Loan assistance of Rs.2839 crore including Short Term Loans to various SEBs and Power Utilities. The sanctions include loan assistance of Rs.1106 crore for System Improvement Projects which also cover installation of capacitors, energy meters, transformers etc. to improve reliability and quality of supply.

The Corporation has disbursed a total sum of Rs.1705 crore upto Novemebr, 2001 including grant of Rs.9.78 crore under Kutir Jyoti Programme.

# NORTH EASTERN ELECTRIC POWER CORPORATION LTD. (NEEPCO)

The North Eastern Electric Power Corporation Ltd. (NEEPCO) was constituted in 1976 under the Company's Act 1956 with the objective of developing the power potential of the North Eastern Region of the country through planned development of power generation projects which in turn would effectively promote the development of the North Eastern Region. Since then NEEPCO has grown into one of the pioneer public sectors with an authorised share capital of Rs. 2500.00Crs.

The main objectives of the North Eastern Electric Power Corporation are to add to the power generating capacity in the North Eastern Region by installing Hydro and Thermal power plants, to ensure optimum utilisation of commissioned generation projects, to generate adequate internal resources ensuring justifiable return on investment, to continue sustained efforts to obtain the receivable from State Electricity Boards/Departments and to undertake long terms feasibility studies for optimum development of Hydro Power resources of the North Eastern Region.

Out of the total installed capacity of 1785.72 MW (Grid) in the North Eastern Region, NEEPCO is contributing a total of 700 MW (Comprising 375MW of Thermal and 325MW of Hydro Power), thus meeting more than 40% of peak demand/energy needs of the region.

## 1. Capacity Addition Programme for the 9th Plan :

Capacity Addition Programme for the 9th Plan of NEEPCO was set at 754 MW (174 MW Thermal and 580 MW Hydro Power ). Upto 2001-2002, the capacity addition of 349 MW (174 MW Thermal and 175 MW Hydro Power ) has been achieved. With the commissioning of Ranganadi H.E. Project (405 MW) in 2001-02, the capacity addition of 754 MW is expected to be fully achieved.

## 2. Projects under operation and maintenance:

The following completed Projects are under Operation and Maintenance:

| Sl No. | Name of the Projects | State | Installed Capacity |
|---|---|---|---|
| 1 | Kopili H.E. Project. | Assam | 150 MW |
| 2 | Kopili H.E. Project 1st Stage Extension. | Assam | 100 MW |
| 3 | Assam Gas Based Combined Cycle Power Station. | Assam | 291 MW |
| 4 | Agartala Gas Turbine Power Station. | Tripura | 84 MW |
| 5 | Doyang H.E. Project. | Nagaland | 75 MW |
| | | **TOTAL** | **700 MW** |

## POWER GENERATION :

During 2001-2002, generation of power upto 30-11-2001 is 628.2972 MU against a target of 817.00 MU by Hydro Power Stations and 1117.1561 MU against a target of 1159.00 MU by Thermal Power Stations. The cumulative generation since inception till Nov. 2001 in respect of Kopili H.E. Project is 9438.6900 MU, 1778.6927 MU by Kopili H.E. Project - Ist Stage Extension, 5399.3157 MU by Kathalguri Gas Turbine Power Station,1380.3272 MU by Agartala Gas Turbine Power Station and 193.3603 MU by Doyang H.E. Project. Project wise anticipated targets to be achieved during the remaining period of the year 2001-2002 i.e. from Dec' 2001 to March' 2002 are given below:

| | |
|---|---|
| I) Kopili H.E. Project | 113 MU |
| II) Kopili H.E. Project - Ist Stage Extension | 97 MU |
| III) Assam Gas Based Power Station. | 530 MU |
| IV) Agartala Gas Turbine Power Station. | 161 MU |
| V) Doyang H.E. Project. | 23 MU |

Total earning (Provisional) in terms of sale of Power during the year upto 30-11-2001 from Kopili H.E. Project is Rs. 31.04Crs., Assam Gas Based Power Station, Kathalguri Station is Rs. 156.85 crs., Agartala Gas Turbine Station is Rs. 69.17 crs. and that of Doyang H.E. Project is Rs.12.95 crs.

## PROJECTS UNDER EXECUTION:

1. **Ranganadi H.E. Project (405 MW) - Arunachal Pradesh :** The project is located in the Lower Subansiri District of Arunachal Pradesh and having 3 units of 135 MW each. The Project is under commissioning. The cost of the Project was Rs. 774.12Crs. (Including IDC) at February' 1993 price level and the same was approved in August 1995. The revised cost estimate is Rs. 1455.45 Crs. (Including IDC) at July'99 price level for which CCEA clearance has already been obtained.The project envisages to generate 1874 MU annually at rated capacity. The Project is expected to be fully commissioned by March 2002.
2. **Tuirial H.E. Project (60 MW) - Mizoram :** The Tuirial H.E. Project in Mizoram is located in the Border of Cachar District of Assam and Aizwal District of Mizoram and comprises of construction of a 77 M high Homogenous Earth fill Dam across the Tuirial river with an installed capacity of 2 x 30 MW, surface Power House on the left bank of the river. The cost of the Project at July'97 price level is Rs. 368.72Crs. (including IDC) and completion cost of the Project is Rs.448.19Crs. at Jan '97 price level. The project has been taken up as a Central Sector Scheme under loan assistance of JBIC, Japan with 85% of the project cost being financed under JBIC loan assistance and balance 15% from Govt. of India's assistance. The infrastructural work for the project are nearing completion. Land acquisition for the project area has already been completed and for submergence area is in progress.1/6th of the total work has been completed. During the year, Letter of Intent for Package - I (Diversion Tunnel) has already been issued to M/S Patel Engg. Ltd., Mumbai and process for awarding of remaining Packages are under progress. The Project is scheduled to be commissioned in 2006 - 07.

*Doyang Hydro Electric Project (75 MW) Nagaland*

3. **Kopili H.E. Project -Stage - II (25 MW) - Assam :** During the construction of the Ist Stage of the Kopili H.E. Project, it was found feasible to set up a second Power House at Khandong with an installed capacity of 1 x 25 MW named as 2nd Stage. The proposed location of the Power House is near the existing Khandong Power House. The scheme consists of a by-pass tunnel of length 325 M. from Khandong by-pass tunnel, one 2.75 M. Dia. Penstock, a surface Power House & a tail race to release water into Umrong Reservoir. The boring of the bye-pass tunnel was completed during Ist Stage works of Khandong System. The HRT had been designed to cater for the additional water requirement for this scheme. The estimated cost is Rs. 76.09Crs.(including IDC) at Sept'98 price level and completion cost of this Project is Rs. 99.35Crs (including IDC). All the 3 (three) packages have already been awarded to the contractors. The Project envisaged to produce additional 301 MU per year. The Project is scheduled to be commissioned in 2003 - 04.

4. **Tuivai H.E. Project (210 MW)- Mizoram :** The proposed Tuivai H.E. Project is located in Aizawl district of Mizoram. The project comprises of construction of a 155 M. Rock-fill Dam across the Tuivai river. The impounded water is proposed to be taken by a 4.95 km. Long HRT of 6 M. dia. to a surface Power House located on the right bank of the river having of 3 (three) units of 70 MW each. The project has been originally investigated by CWC. All statutory clearances including Forest and Environmental clearance from MOEF have been received. TEC for the project has also been accorded. Pre-construction activities like development of infrastructural facilities and detailed survey and investigation works are in progress. The 2nd stage proposals of the 3 stage clearance, for the Hydro Project is under examination.

5. **Kameng H.E. Project (600 MW) - Arunachal Pradesh :** The proposed Kameng H.E. Project is located in the West Kameng district of Arunachal Pradesh. The project comprises of construction of a 96.50 M. high concrete gravity Dam across the river Bichom and diverting water through a 6.70 M. Dia., 8.75 km long Tunnel to Tenga reservoir created by constructing a 60.50 M. high concrete gravity Dam across the Tenga river. Water of both these rivers is proposed to be taken through a 7.0 M. dia, 5.86 km long HRT to Kimi Power House with installed capacity of 4 x 150 MW = 600 MW. The Techno-economic clearance and Forest & Environment clearance of the project has been obtained. 2nd stage clearance for the project has been obtained. Preliminary and infra structural works of the project are in progress. Accommodation for Staff, works for road communication, land acquisition and pre-construction investigations are also in progress. The project is likely to be posed for JBIC funding.

6. **Tipaimukh H.E. Project (1500 MW)- Manipur :** This Project was initially investigated by CWC and then by Brahmaputra Board. It has now been handed over to NEEPCO for execution. MOU with the Govt. of Manipur is yet to be signed. In the meanwhile, NEEPCO has submitted the Revised Detailed Project Report of the Project to the State Government of Manipur for final clearance by the Govt. of Manipur for execution of the Project by NEEPCO. The Governor in Council (Govt. of Manipur) has approved the MOU proposed by NEEPCO with minor changes. NEEPCO is continuing Hydro-meteorological observations after taking over the project from the Brahmaputra Board. Revised work plan considering the present status and assuming that the Project for 2nd stage clearance under 3 stage schemes for the hydro Projects will be put

up after signing of MOU with the concerned State Govts.

## NEW SCHEMES FOR EXECUTION :

The following new schemes have been identified for execution as Central Sector Projects by NEEPCO :

1. **Lower Kopili H.E. Project (150 MW) - Assam :** The proposed Lower Kopili H.E. Project is located in N.C. Hills district of Assam. The proposal comprises of construction of a 71.35 M. high concrete gravity Dam across the Kopili river in the down stream of the Kopili Power station.The impounded water is proposed to be led through a 6.8 M dia. (Horse shoe) and 3.56Km long Head Race Tunnel to a semi-underground Power House with installation of 3 (three) units of 50 MW each. Presently Hydro-meteorological investigations of the project are in progress. However, estimate for 2nd stage clearance of the project could not be submitted as the DPR was returned for reviewing the hydrology of the project. The MOU with the Govt. of Assam for execution of the project and other statutory clearances required for granting TEC could not be obtained yet.

2. **Ranganadi H.E. Project -Stage-II (180 MW) - Arunachal Pradesh :** This Project is located 10 KM upstream of the present Ranganadi Diversion Dam. The Project envisages construction of a 134M high concrete Dam with installed capacity of 180MW. The DPR for the Project has been submitted and further collection of data is required for checking consistency and modification of hydrology. Hydro-meteorological investigations of the Project are under finalisation. 2nd stage clearance of the Project is under progress.

3. **Tripura Gas Based Power Project (500MW) - Tripura :** The proposed Tripura Gas Based Project is located at Monarchak of Tripura. The MOU between NEEPCO and Govt. of Tripura was signed on 31/12/2000. The Feasibility Report was submitted in Aug'2000. CEA has accorded TEC to the project on 19th Feb.,2002. States in other regions have expressed interest in purchasing power from the project.

*Agartala Gas Turbine Power Station (4x21 MW) Tripura*

# POWER FINANCE CORPORATION LIMITED (PFC)

The Power Finance Corporation Limited (PFC) was incorporated in 1986 under the Companies Act, 1956. The mission of PFC is to function as the prime Development Financial Institution dedicated to the growth and overall development of the Power Sector. The borrower-portfolio of PFC comprises the State Electricity Boards (SEBs), State Generation Corporations (SGCs), Municipality-run power utilities besides central, private, joint sector and co-operative sector power utilities. The funds provided by the Corporation are in the nature of additionality to Central Plan Allocation (in respect of SEBs, etc.) and based on the merits of the individual projects. The Power Finance Corporation is a schedule 'A' organisation.

## 2.0 PERFORMANCE HIGHLIGHTS

As on 31.12.2001, PFC sanctioned loans of the order of Rs. 8078 crores (during 2001-02) for a wide range of power projects in various parts of the country and disbursements are to the tune of Rs. 2219 crores. As on 31st December, 2001 the Authorised Capital and the Paid-up (equity) capital of the Corporation stood at Rs.2000 crores and Rs.1030 crores, respectively. The Profit After Tax (provisional), as on 31.12.2001 was about Rs. 593 crores. In addition to the above, PFC had paid a dividend of Rs.150 crores for the year 2000-01 to the Govt. of India which owns all its equity. Besides being a consistently profit-making Corporation, PFC was placed in the highest category of 'Excellent' for the eighth consecutive year, by Govt. of India on the basis of its overall performance during the year 2000-01.

A table showing at a glance year-wise financial performance of PFC, for the past 3 years, is as under :

(Rs.in crores)

| FINANCIAL PERFORMANCE AT A GLANCE (LAST 3 YEARS) | | | |
|---|---|---|---|
| Year | 1998-99 | 1999-2000 | 2000-01 |
| Sanctions | 3519 | 6492 | 7706 |
| Disbursements | 2647 | 3405 | 3230 |
| Profit before tax | 660 | 739 | 746 |
| Profit after tax | 541 | 622 | 604 |
| Realisation | 698 | 993 | 1416 |
| Dividend | 108 | 124.5 | 150 |

## 3.0 RESOURCE MOBILISATION – DOMESTIC

The Corporation has continued to mobilise funds from the domestic market at competitive rates through bonds/term loans from bankers/ FIs. Upto February 2002, Corporation has raised Rs.3419.55 crores out of which Rs. 500.00 crores were raised through long term loans at fixed rate from banks, LIC/FIs, Rs.1573 crores as short term from various banks as a fixed rate and Rs. 1346.55 crores by way of unsecured bonds.

### 3.1 Bonds:

Corporation has raised Rs. 1346.55 crores through taxable unsecured bonds in the nature of debentures till Feb., 2002.

### 3.2 Term Loan:

The Corporation has drawn Rs. 500 crores as

unsecured term loan for a period of 10 years at the fixed rate of 10.70% p.a. payable annually from Life Insurance Corporation of India. Corporation has also drawn unsecured short term loan amounting to Rs. 1346.55 crores at 9.40% period upto six months from various banks.

### 3.3 Future Plan/Projection:

So far as the future projections upto March 2002 is concerned, Corporation may be requiring around Rs. 675 crores to be mobilised from Domestic Market. The funds will be mobilised through term loan from Banks/FIs and issue of taxable bonds.

## 4.0 RESOURCE MOBILISATION - INTERNATIONAL

In order to meet its increasing fund requirements, PFC continued to tap the External Commercial Borrowing markets also. The details of the Loan raised/to be raised in the current Financial Year are as under:

### 1. MOU with the Japanese Study Group on Electric Power Development for India

PFC entered into an MoU with the Japanese Study Group on Electric Power Development for India on February 12, 2001. The intention of the MoU is to promote cooperation between PFC and the Study group in providing technical and financial support to RM & U projects for Hydro Electric Power Plants supplied by Japanese equipment. The MoU envisages the creation of a Master Plan for development of new hydel power aggregating upto 5000 MW.

### 2. Line of Credit Agreement with Export Development Corporation of Canada

In an attempt to provide power projects with a broader set of financing solutions, PFC has built relations with various export credit agencies for financing import components of power projects. This objective was given further impetus through a US $ 75 Million Line of Credit Agreement signed with the Export Development Corporation (EDC) of Canada on June 6, 2001. The Line of Credit is intended for on-lending by PFC to finance the purchase of goods and/or services by various Canadian Exporters. The facility is very competitively priced, with long tenor credit (repayment period of upto 12 years plus moratorium).

## 5.0 EXTERNAL CREDIT UTILISATION

### 5.1 World Bank:

PFC is exploring the possibility of tying up for a line of credit of US$ 500 Million with the World Bank.

### 5.2 Asian Development Bank:

Discussion is on for another line of credit from ADB for an amount of US $ 250 Million for the projects in the reform-oriented states. As per the tentative plan, the agreement with ADB would be signed in the Financial Year 2002-03

### 5.3 DFID (UK) Assistance:

The ODA (predecessor of DFID) of UK signed an Agreement with Government of India on 17th September, 1993 for Energy Efficiency Programme, under a Project of Renovation and Uprating of Hirakud Hydro Power Station of Stage – I Unit 1&2 has been approved. The funds are to be channelised through PFC. PFC has sanctioned a sum of US$ 23.52 Million and claims were submitted to Government of India equivalent to Rs. 65.20 crores as on 31st December, 2001.

### 5.4 Kreditanstalt fur Wideaufbau(KfW):

PFC signed loan agreement with KfW of Germany in June, 1995 for mixed credit of DEM 46.5 Million under Energy Investment Programme, for financing rehabilitation of existing Power Plants and distribution system. Rehabilitation of Koyna HEP Stage I & II in Maharashtra and Hirakud HEP Stage I (Unit 3 & 4) are to be covered from the loan. PFC has disbursed Rs. 54.39 crores as on 31st December 2001 for Koyna HEP of MSEB.

## 6.0 INSTITUTIONAL DEVELOPMENT

### 6.1 Operational & Financial Action Plan (OFAP):

As part of its development role, PFC has been endeavoring to improve operational & financial health of the state power utilities through formulation and implementation of Operational & Financial Action Plan (OFAP). Using OFAPs as a tool, PFC, based on diagnostic study of different areas of operation, formulates an action plan to bring about improvements in the performance levels of power utilities.

The major achievements of this mechanism are (i) Booking of subsidy by SEBs to achieve 3% ROR (ii) Release of subsidy by State Govt. (iii) Revision of tariff at regular intervals (iv) Structural reform and restructuring (v) Improvement in liquidity through control over receivables (vi) Capital restructuring, etc.

During 2001-02, OFAPs for DVB, Pragati Power, UPPCL and GSECL have been formulated and accepted by the concerned utilities and State Governments. 31 OFAPs are in place for various power utilities, as on date.

### 6.2 Studies

**(i) Reform based security mechanism**

A study on Reform based security mechanism to speed up the process of financial closure of private power projects, was carried out in respect of Andhra Pradesh and Madhya Pradesh.

PFC prepared the Memorandum of Agreement in respect of Andhra Pradesh to speed up the financial closure of select IPPs. The MOA has been initiated by GOAP, APTRANSCO, IDBI and PFC.

**(ii) Orissa power sector reforms**

Post reform study was carried out in respect of Orissa power sector and the study report was circulated to all SEBs and State Governments.

## 7.0 ACCELERATED GENERATION AND SUPPLY PROGRAMME (AG&SP):

The programme provides incentives to State Electricity Boards, State and Central Corporations and State Power Departments as interest subsidy @ 4% on PFC's normal lending rates, on disbursements made by PFC during the 9th Plan to priority projects. Additional interest subsidy of 1% is provided to projects in the North-Eastern Region. There is also a provision of grants under the Programme for all such studies like RLA/LE, reform & restructuring and DMS that are considered desirable and necessary by PFC to meet the policy objectives of the Government of India and PFC under the programme.

During 2000-2001, PFC has disbursed about Rs 1569 crores. Further, during the current financial year upto Jan. 2002 PFC has disbursed Rs. 1398 crores as mentioned below:

**(All amounts in Rs. Crores)**

| Sl. No. | Discipline | 2000-2001 | 2001-02 (upto 1/2002) |
|---|---|---|---|
| 1. | On-going generation projects | 584 | 905 |
| 2. | R&M/LE, Refurbishment schemes | 533 | 203 |
| 3. | Augmentation of supply | 449 | 286 |
| 4. | Grants for Studies | 3 | 4 |
| | **Total AG&SP** | **1569** | **1398** |

In addition, the following important hydro generation projects covered under AG&SP have been commissioned during the current financial year 2001-2002 upto 31.01.2002

- Sharavathi Tail Race HEP (4x60 MW) units 2&3 of KPCL — 120 MW
- Upper Sindh Stage-II (3x35 MW) of J&KPDCL Unit 1 — 35 MW
- Chennai III HEP (3x2.5 MW) Unit1&2 — 5 MW

Cumulatively, 5224 MW capacity addition during the 9th Plan (till Jan. 2002) has since been achieved by way of commissioning languishing generation projects under AG&SP. Also, additional generation of 9500 MU p.a. is expected to have been achieved by way of completion of various renovation, modernisation and uprating of old Thermal & Hydro plants and 845 MU additional generation by completing schemes under augmentation of supply has so far been achieved during the 9th plan (till Jan.2002).

During the 9th Five Year Plan generation capacity additions in the State Sector is now anticipated to be around 90% of the target of 10,500 MW, mainly due to GoI's AG&SP (Programme), which is much beyond the expected achievement of about 45% in the Central Sector and 40% in the Private Sector.

### 7.1 100% Metering

PFC is providing financial assistance for metering schemes under relaxed conditionalities viz. 3% ROR and OFAP requirement is not insisted upon, Exposure limit is relaxed for metering schemes. Metering schemes are also eligible for interest subsidy of 4% as they are covered under AG&SP of GOI. PFC has sanctioned 66 schemes of metering for financial assistance of Rs.1393 crores and disbursed Rs.441 crores till Jan. 2002. During 2001-02 till Dec. 2001 PFC has sanctioned 24 schemes for financial assistance of Rs.648 crores and has disbursed Rs.200 crores.

Keeping in view the Government of India's resolve on 100% metering and relaxed norms under which PFC provides financing for metering schemes; it is expected that 100% metering would be achieved very soon.

### 7.2 Financial Assistance for Power Sector Studies

Power Finance Corporation (PFC) provides technical and financial assistance by strategically providing grants, interest free and/or concessional loans to carry out such Power Sector/R&M/Distribution system studies, which supplement their efforts to improve performance. PFC earmarks 0.4% and 0.6% of its net profit of the previous year for disbursements towards grants and interest free loans, respectively and further, 1% towards concessional loans for studies towards study Phase-I model DMS, R&M and LE studies – thermal and hydro, power system studies and survey & investigation for HE projects.

Cumulatively upto Jan. 2002, PFC has sanctioned total grant/ concessional loan for studies worth Rs. 22 crores for model DMS, R&M, Reform & Restructuring and institutional development studies. Out of above, Rs. 8 crores has been disbursed upto 30.01.2002.

## 8.0 RENOVATION, MODERNISATION AND LIFE EXTENSION OF THERMAL & HYDRO PLANTS

Renovation, Modernisation and Life Extension of old thermal and hydro plants is a priority area of financing by PFC. PFC is providing financial assistance for R&M projects under relaxed conditionalities viz. achievement of 3% ROR by borrower is not insisted upon.

Cumulatively upto Jan. 2002, PFC has sanctioned Rs. 4586 crores, out of which Rs. 2156 crores had been disbursed towards Renovation & Modernisation of thermal & hydro power plants.

## 9.0 FINANCING OF PRIVATE SECTOR POWER PROJECTS

PFC has so far supported 6677 MW of generation capacity by sanctioning financial assistance to 24 private power projects worth about Rs. 5848 crores. This includes important generation projects viz. Rs. 170 crores to Jaiprakash Hydro Project at Baspa-II HEP (3x100mw), Rs. 167 crores to Lanko Kondapalli Power Project, Rs. 398 crores to Jaiprakash Power Ventures Ltd. for Vishnu Prayag HEP (4x100mw), Rs. 548.70 crores for Rosa Power Supply Co., Rs. 275 crores to Konaseema EPS Oakwell Power Ltd., etc.

During the current year 2001-02 (upto

Jan.,2002) Malana HE project of M/s Malana Power Corpn. Ltd. in Himachal Pradesh is commissioned and added 86 MW generation capacity. Cumulatively, 691 MW in the private sector has been commissioned with PFC's support.

## 10. FINANCING WORKING CAPITAL REQUIREMENTS

PFC has decided to provide finance against Working Capital requirements of State Utilities. This helped the State utilities especially when they have to resort to cash credit from banks and short term loans from other FIs for Working Capital requirements which are very expensive.

The schemes cover all existing borrowers in the State Sector who are not declared as defaulters by PFC at any point of time in the 12 months preceeding the month in which the application for Working Capital Loan (WCL) is received by PFC. The actual quantum of WCL to be granted will be determined based on the utility's need for such loans, security available etc. Loans for the Working Capital bear interest rates of 11.75% p.a. for periods upto 90 days and 12.10% p.a. for periods between 90 to 180 days. The Corporation has, so far, sanctioned cumulatively Rs.2845 crores (excluding one time roll over upto 31/1/2002). Out of this, Corporation has disbursed Rs.2489 crores upto 31/1/2002. The borrower can also roll over the WCL for not exceeding 180 days at a time. The corporation has rolled over WCL cumulatively Rs. 1910 crores upto 31/1/2002. The rebate for timely payment at 0.5% is available for this scheme as in the case of term loans.

### 10.1 Leasing Scheme for Power Equipment

PFC had during the year 1995-96, introduced financial leasing of power equipment to the entities in power sector. All entities in State Sector, municipal bodies, private sector, joint sector engaged in power generation, transmission and distribution, energy conservation, R&M etc. and associated sector are eligible for funds under this scheme.

PFC had so far sanctioned an amount of Rs.285 crores under this scheme and disbursed an amount of Rs.285 crores.

### 10.2 Direct Discounting of Bills Scheme

The credit under this scheme is available to all equipment manufacturers to enable them to sell their equipment on deferred payment terms to the purchasers in power sector. Under the scheme, the delivery of equipment machinery/ plant is made by the seller to the purchaser against usance bills duly accepted/guaranteed by purchaser's banker. Duly executed usance bills are discounted by the seller with PFC so that the seller gets immediate payment while the purchaser gets the facility of deferred payment terms. The scheme covers sale of machinery, capital goods and turnkey projects. Extent of assistance under this scheme is available upto 100% of the invoice value including insurance, freight and taxes.

The Corporation has so far sanctioned an amount of Rs.100 crores and disbursed the same under this scheme.

## 11.0 NEW BUSINESS ACTIVITIES

With a view to offering diversified products under one roof, PFC has recently launched two new services namely, Lenders Engineers' Services and Consultancy Services. While the objective of the former is to protect the lenders from Project Investment & Implementation risks, the aim of the later is to offer turnkey solutions for investors keen on setting up power facilities in the country.

## 12.0 TARGETS, ACHIEVEMENTS (1/4/2001 TO 31/12/2001)

(Rs. in crores)

| Parameters | Target for 2001-02 | Achievement as on 31.12.01 (Unaudited Financial Results) | Difference between Target & achievement anticipated 1.4.2001 to 31.12.2001 |
|---|---|---|---|
| Sanctions | 6300 | 8078 | - |
| Disbursements | 3840 | 2219 | 1621 |
| Realisation | 94% | 92% | - |
| Resource Mobilisation | 2285 | 2766 | - |
| Accelerated Generation & Supply Programme (disbursement) | 1600 | 1093 | 507 |
| Accelerated Power Development Programme (sanction) | 570 | 285 | 285 |
| Gross Margin | 575 | 771 | - |
| Net Profit to Closing Networth ( % ) | 12.68 | 14.3 | - |
| Operating Ratio ( % ) (Operating cost to Operating Revenue) | 71.02 | 51.4 | - |

## 13.0 FUTURE PERSPECTIVE – PLANNED DURING THE YEAR 2001-02

During the current financial year 2001-02, PFC has targeted to achieve disbursements exceeding Rs.4000 crores. On a cumulative basis, the disbursement during the 9th Plan (1997-2002) would aggregate about Rs.14,500 crores. PFC has projected to achieve disbursements of around Rs 4400 crores as per the draft MoU with the Government of India for the year 2002-03.

*A view of Bokaro 'B' TPS of Damodar Valley Corporation - A PFC funded project*

# POWER GRID CORPORATION OF INDIA LTD. (POWERGRID)

Power Grid Corporation of India limited (POWERGRID) was incorporated on October 23, 1989 with an authorized share capital of Rs. 5,000 crores as a public limited company, wholly owned by the Government of India.

The formation of POWERGRID was an attempt to address the need for creating a **"National Power Grid"** so that inadequacies in power transmission system caused by the existence of a number of players, could be rectified.

POWERGRID started functioning on management basis with effect from August, 1991 and it took over transmission assets from NTPC, NHPC, NEEPCO and other Central/Joint Sector Organisations during 1992-93 in a phased manner. In addition to this, it also took over the operation of existing Regional Load Despatch Centres from CEA in a phased manner, which are now being upgraded with State of-the-art Unified Load Despatch and Communication (ULDC) schemes. According to its mandate, the Corporation, apart from providing transmission system for evacuation of central sector power, is also responsible for establishment and operation of Regional and National Power Grids to facilitate transfer of power within and across the Regions with reliability, security and economy on sound commercial principles.

Based on its performance POWERGRID was recognised as a **Mini-ratna** company by the Government of India in October 1998. Its persistent efforts to accord the deserved priority to vital transmission sector was duly recognised by the Government of India by statutorily notifying POWERGRID as **Central Transmission Utility** of the country after amendments in the Electricity Laws in 1998.

## ACHIEVEMENTS OF POWERGRID

As on 1/12/2001, POWERGRID is operating over **40,000 ckt. kms**. transmission lines, which include 563 ckt. kms. of 800 kV, 1,630 ckt. kms. of HVDC system, 29,317 ckt. kms. of 400 kV & 6,752 ckt. kms. of 220 kV lines alongwith 68 Sub-stations with transformation capacity of about **34,000 MVA**. The transmission system availability is maintained consistently over 98% by deploying best Operation and Maintenance practices at par with international utilities and today POWERGRID is " **one of the largest transmission utility**" in the World. About 40% of total power generated in the country is being transferred over to POWERGRID's transmission network.

POWERGRID has received the Prime Minister's MoU award for being amongst the **top ten PSUs** for two times in succession i.e in 1997-98 and 1998-99.

During the year 2000-2001, POWERGRID earned a net profit of Rs. 742.49 crores on a Turnover of Rs. 2682.62 crores. Compared to the previous year, there is an increase of about 23.57% in the net profit, against 26.30% increase in the turnover. Paid up capital of the company including Share Capital Deposit as on 31st March, 2001 stands at Rs. 3063.88 crores, as against Rs. 3,049.54 crores as on 31st March, 2000.

POWERGRID gives utmost importance for implementation of its projects without any time and cost over run. Stringing of 1470 ckt. Kms. of transmission lines was completed during the year 2000-01, exceeding the MoU target of 1077 ckt. Kms.

During the year 2000-2001, the completed transmission lines, include Kishenpur-Moga 800 kV line (ckt.-II). A new 400/220 kV sub-station at Jallandhar was established, besides extension of many existing sub-stations. During the year, five new power transformers with aggregate transformation capacity of 1575 MVA have been added to the system. Other major accomplishments include completion of Nathpa-Jhakri- Abdullapur 400 kV D/C line, RAPP-B-Anta 220 kV S/C line, Neyveli-Bahoor 220 kV

S/C line, Agartala-Kumarghat 132 kV S/C line, Jallandhar-Dasuya 220 kV D/C line etc. The Agartala-Kumarghat 132 kV S/C line, against all odds like severe law and order problems in the state of Tripura, was also completed.

Construction activities for transmission systems associated with Talcher STPP-II, Tehri HEP and Dhauliganga HEP are some of the major generation linked projects under construction. Construction works in respect of Inter-regional links like East-South inter-connector project, East-North HVDC inter-connector at Sasaram, and East-West AC inter-connector Raipur-Rourkela transmission system etc. are also in full swing. New generation linked schemes being undertaken include transmission systems for Tala HEP, Rihand-II, Sipat, Ramagundam-III, and Dulhasti HEP etc.

Inadequate and weak sub-transmission and distribution systems have hampered the load growth in some states, leading to sub-optimal utilisation of available generation and EHV grid. For gainful utilisation of generating resources, POWERGRID has identified several new system improvement schemes across the country. Such on-going grid strengthening schemes include System strengthening in SR, Kolhapur- Mapusa transmission system, Jamshedpur-Rourkela, Series compensation at Kanpur-Ballabhgarh, Kahalgaon-Biharshariff line, Ranganadi-Ziro line, establishment of Hiriyur S/S. The new schemes, which are under active consideration include strengthening schemes in Andhra Pradesh, Uttar Pradesh, Bihar, SR-II, Series Compensation for Raipur-Rourkela, Nagarjunsagar-Cuddappa & Nagarjunsagar-Gooty etc.

## BUSINESS DEVELOPMENT

The major Consultancy assignments being executed by POWERGRID include Installation of OPGW Cables on the Dahanu-Mumbai 220 kV Line for M/s. BSES valued at Rs.7.92 crores, turnkey execution of 110/11kV Pillaitheruvasal Sub-station at Karaikal & loop-in-loop-out (LILO) of 110 kV S/C Tirpattinam-Sorakudi transmission line at Sorakudi Sub-station for Electricity Dept, Pondicherry valued at Rs. 8.8 crores. The corresponding Consultancy Fees are Rs. 95 lakhs and Rs. 1.94 crores, respectively.

POWERGRID is also providing Consultancy Services in the areas of Supervisory Control and Data Acquisition (SCADA), Energy Management System (EMS) and Distribution Management System (DMS) to various clients, namely Delhi Vidyut Board, NDMC, Narmada Control Authority and Government of Pondicherry, etc. During the year 2000-01, the consultancy fees earned through Consultancy Business has been Rs. 12.83 crores.

## UNIFIED LOAD DESPATCH & COMMUNICATION FACILITIES

POWERGRID has undertaken implementation of state-of-the-art Unified Load Despatch and Communication (ULDC) facilities throughout the country. Unified LD&C facilities are one of the basic pre-requisites for economic despatch of power between Regions/ States leading to effective and efficient management of Grids on real time basis.

ULDC schemes of Northern and Southern Regions have been inaugurated in January, 2002.

The ULDC projects for North-Eastern, Eastern and Western Region are also at various stages of implementation. The detailed engineering for NER is nearing completion and RTU & PLCC installation work at site is under progress. For the Eastern Region project, all the packages except for Microwave communication have been awarded and the detailed engineering activities are under progress. For Western Region, the bid solicitation process is complete and evaluation activities (post technical stage) are under progress.

## ENDEAVOUR IN RESEARCH & DEVELOPMENT

POWERGRID is associated with premier academic institutions like IIT Delhi and IIT, Kharagpur for research and development in the

various fields of Power system. Apart from involving academic institutions, POWERGRID is taking active assistance from Central Power Research Institute (CPRI), Bangalore and Bharat Heavy Electricals India Ltd. (BHEL).

- **Technological Milestones and Future Upcomings**

→ To achieve the objectives of storing, processing and analyzing disturbance outputs, Southern Region has developed computer interfacing of Disturbance Recorders type SOREL. This is in the process of implementation in various sub-stations & shall result in substantial savings.

→ Installation of FACTS on Kanpur–Ballabgarh 400 kV line has been taken up, in association with BHEL as an R&D project, for the first time in India at this voltage level. The project would lead to increase in the power carrying capability of the line and at the same time would improve the stability of the grid. The efforts would encourage indigenous development of the technology.

→ For the first time in India, a controlled reactor (of 50 MVAR) was installed on 400 kV Jabalpur–Itarsi line, on experimental basis. This controlled reactor will absorb the reactive power in regulated manner as per the system requirement.

→ POWERGRID has developed in-house expertise for tower & foundation designs to be used in transmission line projects, which would result into reduced implementation periods of the projects. Four nos. 400 kV S/C & D/C towers for various wind zones were designed & successfully tested and 13 more are designed and ready for testing. Designs for 16 nos. 400 kV S/C & D/C, +/- 500 kV HVDC and 800 kV S/C & D/C lines are under progress.

→ POWERGRID has taken up preliminary designs for 800 kV D/C transmission line and multi-circuit & multi voltage for 220/ 400kV level for adoption in future. POWERGRID has developed HVDC and high strength AC disc insulators in association with BHEL & CPRI, which have been deployed in various projects.

→ POWERGRID after detailed studies, has taken initiative in increasing the maximum allowable conductor temperature to 85 degree Centigrade from existing 75 degree Centigrade in selected corridors. This would help in enhancing the transfer capacity of transmission line. To start with, POWERGRID is using the same in Tala transmission system.

## DISASTER MANAGEMENT

One of the worst-ever earthquake rocked the Kutch area of Gujarat resulting in severe damage to around 40 sub stations of GEB comprising of 200 kV, 132 kV & 66 kV voltage levels. Considering the gravity of situation, POWERGRID took an immediate action to provide relief & rehabilitation and sent teams of technical manpower for providing support to GEB for the restoration of affected sub stations. In addition to this, DG sets of various capacities were rushed to provide power supply for essential services such as water works, street lighting etc. Further, several truckloads of relief materials in the form of food items, medicines, water, clothes were sent to affected areas. POWERGRID took up 10 sub-stations for restoration, including civil works, construction of new control room buildings, etc., where ever required, as well as electrical works including supply of damaged equipments for 220 kV sub-stations at Anjar, Nakhatrana & Nanikhahar, 132 kV sub stations at Samkhiyali and 66 kV sub-station at Khedoi, Madhapar, Lokhand, Dudhai, Nakhatrana, Kotda (chakkar).

The expenditure incurred by POWERGRID on the above said relief works has been donated to the State of Gujarat as a gesture of goodwill.

## ASSISTING SEBs

POWERGRID, has extended its expertise to assist the State Electricity Boards in improving their transmission and distribution networks.

Inadequate shunt compensation in the

distribution network of State utilities has been a consistent problem faced in the country leading to higher T&D losses, degradation of voltage profiles, and under-utilisation of EHV transmission network. SEBs or the successor utilities on account of financial constraints have not been able to accord a high priority and raise funds from multilateral/ international lenders. To cope up with this, POWERGRID, as a facilitator has extended its services to various SEBs on "no profit-no loss basis".

## REDEFINING THE GREEN BOUNDARIES

POWERGRID has integrated environmental and social management procedures into its corporate operations through its Environmental and Social Policy and Procedures (ESPP).

Some of the actions taken for implementation of ESPP include: Finalisation of Rehabilitation Action Plan (RAP) for Sasaram & Kolar Sub-stations, Socio Economic Survey of Allahabad, Purnea, Hosour & Bhiwadi sub-stations, Social Assessment and Management Plan (SAMP) for Siliguri sub-station, Public Consultation for East-North inter-connector, Sasaram HVDC, Talcher-II Transmission System, Talcher-Meramundali transmission line were done at various locations. POWERGRID had received viz. Indo-German Greentech Environment Excellence Award.

## VENTURING INTO TELECOM BUSINESS

POWERGRID's EHV transmission network of about 40,500 ckt. kms. criss-crosses the entire length and breadth of the country connecting the major metropolitan cities/ towns viz. Delhi, Calcutta, Chennai, Bangalore, Hyderabad, Mumbai etc. Hence, it provides an excellent infrastructure for stringing optical fibre cable, which can be used to set-up a high grade long distance telecom network of high capacity. This will maximise the returns to POWERGRID, which would be deployed for expeditious implementation of National Grid and will also accelerate application of Information Technology to urban and rural areas as well as increase the tele-density.


*A view of outdoor yard*

**POWERGRID has obtained Infrastructure Provider-II license from Department of Telecommunications on January 29, 2001 to pursue leasing of bandwidth capacity to various customers on its telecom network.**

The Delhi-Mumbai optical fibre link of POWERGRID was launched on January 13, 2001 and expected to be commissioned by the mid of the year 2002, which en-route will link various commercial cities like Muradnagar, Moradabad, Lucknow, Vindhyachal, Jabalpur, Itarsi, Indore, Dhule, Nasik and Padge. POWERGRID is one of the first agencies, who will be offering leasing of capacity on this link to various customers including Infrastructure Providers, potential NLDOs, Access providers, ISPs, Corporates etc.

Bandwidth capacity for commercial telecom business is available on Delhi-Chandigarh, Delhi–Jaipur, Jabalpur - Itarsi - Dhule, Kishenpur - Moga and Bangalore - Salem - Ooty. POWERGRID's extensive marketing efforts for generating business for leasing capacity have yielded immediate results. Capacity Agreements with Service Fee of about Rs 5.81 crores per annum has been signed/ finalized with Bharti Telesonic for leasing bandwidth on Jabalpur- Dhule, Delhi - Chandigarh & Delhi - Jaipur telecom links. POWERGRID has also signed MOU with major Telecom players for mutual co-operation in the field of telecom.

POWERGRID plans to build up broadband optical fibre backbone telecom network of about 14,000 kms by December, 2003 which will span entire length and breadth of the country. The network includes installation of about 2,700 Kms of underground optic fibre to connect POWERGRID substations to a centralised location in the nearby cities and to create Point of Presence (PoP)/ access links within the cities to cater to customers requirement. POWERGRID's telecom network will cover all metros, major cities and towns of commercial importance (56 cities) in 2-3 years time including NorthEastern Region. POWERGRID's road map for establishing telecom network in a phased manner includes: **Delhi-Mumbai by Mid, 2002, Hyderabad–Bangalore-Chennai by October, 2002, Delhi- Hyderabad by October, 2002, Hyderabad - Calcutta by December 2002, Delhi- Calcutta by December 2002. The network can be extended to other cities/towns for specific needs of customer.**

*A view of 400 kV Itarsi switchyard*

**Statement**

## EXISTING/PROPOSED INTER-REGIONAL POWER TRANSFER CAPACITY (By the end of XI Plan) (MW)

| | EXISTING | IX PLAN | X PLAN | XI PLAN | TOTAL |
|---|---|---|---|---|---|
| **EAST-NORTH** | | | | | |
| Dehri-Sahupuri 220 kV S/c | 200 | | | | |
| Sasaram HVDC back-to-back* | 350 | 150 | | | |
| Muzaffarpur-Gorakhpur 400 kV D/c (Tala Transmission System) | | | 2500 | | |
| Barh/Kak/N.K'pura 765 kV 3x S/c | | | 5000 | 2500 | |
| Hirma-Jaipur HVDC bipole | | | 2500 | | |
| **Sub-Total** | **550** | **150** | **10,000** | **2,500** | **13,200** |
| **East-West** | | | | | |
| Bodhipadar-Korba 220 kV 3 circuits | 450 | | | | |
| Rourkela-Raipur 400 kV D/c | | | 1000 | | |
| Hirma-Raipur 400 kV D/c | | | 1000 | | |
| Hirma-Seepat 400 kV D/c | | | 1000 | | |
| **Sub-Total** | **450** | | **3,000** | | **3,450** |
| **West-North** | | | | | |
| Vindhyachal HVDC back-to-back | 500 | | | | |
| Existing 220 kV AC lines | 200 | | | | |
| Malanpur-Bhiwadi 765 kV S/c | | | 800 | 1700 | |
| Zerda-Sirohi 400 kV D/c | | | 1000 | | |
| **Sub-Total** | **700** | | **1,800** | **1,700** | **4,200** |
| **East-South** | | | | | |
| Gazuwaka HVDC back-to-back | 500 | | 500 | | |
| Existing 220 kV AC lines | 200 | | | | |
| Talcher-Kolar HVDC pipole | | | 2000 | | |
| 2nd HVDC bipole | | | | 2500 | |
| **Sub-Total** | **700** | | **2,500** | **2,500** | **5,700** |
| **West-South** | | | | | |
| Chandrapur HVDC back-to-back | 1000 | | | | |
| Karnataka-Maharashtra | | | 500 | | |
| Existing 220 kV AC lines | 300 | | | | |
| **Sub-Total** | **1,300** | | **500** | | **1,800** |
| **East-North East** | | | | | |
| Bongaigaon-Malda 400 kV D/c | 800 | | | | |
| Bipara-Salakati 220 kV D/c | 200 | | | | |
| **Sub-Total** | **1,000** | | | | **1,000** |
| **Total** | **4,700** | **150** | **17,800** | **6,700** | **29,350** |

***** Part of the Sasaram HVDC back-to-back link is already commissioned i.e. Biharshariff-Sarnath 400 kV D/c and is being utilized to transfer power from Eastern Region to Northern Region in radial mode.

# POWER TRADING CORPORATION OF INDIA LIMITED (PTC)

Power Trading Corporation of India Limited (PTC) was set up in April 1999 with an authorized capital of Rs. 150 Crores. PTC has equity of Rs. 24 Crores (60%) as received from the Promoter Companies (POWERGRID, NTPC and PFC) and equity of Rs. 16 Crores (40%) has to be raised from the Financial Institutions and other Investment Companies. This was as per the Business Plan prepared in May 2000. However, there is a proposal under consideration for strengthening and restructuring the capital base of the company.

PTC's main function is to catalyse development of Mega Power Projects by acting as a single entity to enter into Power Purchase Agreements (PPAs) with Independent Power Producers (IPPs) on the one side and Multipartite PPAs with users/SEBs under long term arrangement on the other, thus insulating the IPPs from protracted negotiations with multipartite SEBs and receivable risks. PTC has also been mandated for power trading to optimally utilize the existing resources in the country as also promoting exchange of power with neighbouring countries. Government of India has identified PTC as a nodal agency to deal with matters relating to exchange of power between India and its neighbouring countries.

PTC has set the following vision for itself:

- Promote Power Trading to optimally utilize the existing resources
- Catalyze development of Mega and other Power Projects including Hydro Projects
- Promote exchange of power with neighbouring countries
- Develop power market in not too distant a future

Identification of probable sellers and buyers (for short term and long term), coordination with various agencies for dispatch, metering and billing, revenue realization, energy accounting, co-ordination with REBs, RLDCs, SLDCs etc. and finding alternative buyer(s) are among the major services offered by PTC.

## TRADING OF POWER

PTC has embarked upon trading by organizing purchase of power from surplus locations and selling to deficit SEBs. PTC started trading with limited transactions during 1999-2000 (28.35 MUs) and 2000-01 (43.77 MUs) but trading on sustained basis commenced from June 2001. PTC set the target of trading 1500 MUs for the financial year 2001-02, out of which 946 MUs have been achieved between June 2001 and December 2001. Major transactions of PTC include trading of about 160 MW power from West Bengal to Delhi and Haryana, 70 MW Malana Hydro Power from Himachal Pradesh to Delhi, 75 MW power from Goa to Gujarat and Karnataka and 100 MW power from Chhattisgarh to Karnataka. Presently, PTC transactions are covering four out of the five electricity regions of the country.

PTC has approached regulatory authorities for creation of enabling environment and is also working out on framework agreements to catalyse electricity trading and development of projects. To increase its trading activities in future, PTC has set its eye on the surplus power available with captive power plants (CPPs) and also pooling power from distributed generation viz., wind power plants and small hydro power plants. With new captive power policy announced by GOI wherein it would be easy for CPPs to trade their power freely, PTC hopes to get a major share of captive surplus capacity for trading.

In addition to inter-state exchange of power within the country, PTC is likely to take over trading of 270 MW of Chukha Hydro Power Project (Bhutan) and 60 MW Kurichhu Hydro Power Project (Bhutan) very shortly and future trading opportunities include purchase of power from Tala Hydro Power Project (1020 MW) in

Bhutan and some small power projects in Nepal.

## DEVELOPMENT OF PROJECTS

PTC is presently negotiating Power Purchase Agreements (PPAs) for purchase of power from two large Power Projects namely, Hirma (3960 MW) in Orissa and Ennore (1850 MW) in Tamil Nadu. In addition, PTC has taken up development of Pipavav Mega Power Project (2000 MW) in Gujarat through ICB route. Energy from these projects will be sold to only those states, which undertake reform of their power sector. The attractive tariff would encourage the states to undertake power sector reforms in order to be the beneficiaries.

## PTC AS RISK MITIGATOR

PTC will manage risk and ensure timely payment to the power generators. The Payment Security Mechanism for PTC is presently under finalisation and is likely to have a multi-layer structure.

## OPPORTUNITIES AND CONSTRAINTS

With implementation of Availability Based Tariff (ABT), the prospects and volume of trade are likely to increase. ABT, proposed to be implemented for inter-state Generating Stations, will encourage trading of energy by providing correct commercial signals. The greatest benefit that may be derived from such trading is that it will help not only in achieving better economic efficiency and improved reliability but also in converting unscheduled interchanges to scheduled interchanges of power between the States and improving the quality of power supply.

# TEHRI HYDRO DEVELOPMENT CORPORATION LTD. (THDC)

## BACKGROUND

THDC, a Joint Venture Corporation of the Govt. of India and Govt. of U.P., was incorporated as a Limited Company under the Companies Act,1956, in July'88, with the following objectives:

- To plan, promote and organise an integrated and efficient development of hydro resources of Bhagirathi river and its tributaries at Tehri and complementary downstream development (the Tehri Complex) for power generation and other purposes in all its aspects.
- To undertake in a similar manner the development and harnessing of such hydroelectric sites/projects in Bhagirathi/ Bhilangana valleys as may be entrusted to the company by the State Govt.

Tehri Power Complex(2400 MW) transferred to THDC by Govt. of Uttar Pradesh in June,1989 comprises the following components viz., the 260.5 M. high rock fill Tehri Dam and 1000 MW Hydro Power Plant (HPP) (Stage-I of the Complex), the 1000 MW Tehri Pump Storage Plant (PSP) situated just downstream of the confluence of Bhagirathi and Bhilangana rivers at Tehri; and a 97.5 m. high concrete Dam with 400 MW Hydro Power Plant at Koteshwar, 22 KM downstream of Tehri, along-with 800 KV Associated Transmission System for evacuation of power from the Tehri Hydro Power Complex.

The Corporation has an authorised share capital of Rs.2000 Cr. The cost of the Project is being shared in the ratio of 75:25 (equity portion) for Power Component, while the Irrigation Component (20% of Stage-I cost) is to be entirely funded by the Govt. of Uttar Pradesh.

The Corporation is engaged in the implementation of Tehri Project (Stage-I). The 400 MW Koteshwar HEP has also been cleared by the Govt. for implementation and work has been taken up. The 1000 MW Tehri Pump Storage Plant (PSP) would be taken up after firming up of Detailed Project Report, for which French Consultants are carrying out preparation under mechanism of French Aid.

The U.P. State Govt. had entrusted investigation, development and execution of two Green Field Hydro Electric Projects i.e. 416 MW Pala Maneri & 520 MW Loharinag Pala located upstream of Maneri Bhali Stage-I on the river Bhagirathi. Investigation work for these two projects were taken up. State Government of UP, subsequently informed to keep the work of these two projects in abeyance pending the formation of Uttaranchal State.

## BENEFITS

The benefits from the Tehri Hydro Power Complex are as under :

- Addition to the installed generating capacity in the Northern Region (1000 MW on completion of Tehri Stage-I) : 2400 MW
- Annual energy availability (Peaking) (3568 MU on completion of Tehri Stage-I) : 6500 MU
  - Irrigation (additional) 2.7 Lac. ha.
  - Stabilisation of existing irrigation (besides above) 6.04 Lac. ha.
- 300 Cusecs (162 million gallons per day) of drinking water for Delhi which will meet the requirements of about 40 Lac. people.
- In addition, 200 Cusecs (108 million gallons per day) of drinking water for towns and villages of U.P. which will meet the requirement of 30 Lac. people.

- Flood moderation.

- Integrated development of Garhwal region, including construction of a new hill station town with provision of all civic facilities; improved communication, education, health, tourism, development of horticulture, fisheries, and afforestation of the region.

## 1.0 TEHRI DAM & HPP, STAGE-I (1000MW)

Tehri Dam Project is a multipurpose hydro Project under construction on the river Bhagirathi in Uttranchal. Tehri Hydro Power Plant (Stage-I) includes the construction of 260.5m high rockfill Dam, spillway structures, power tunnels and an underground power house cavern with an installed capacity of 1000 MW (4X250MW).

Government of India on 15.3.1994 accorded approval for execution of Tehri Dam & HPP(Stage-I) alongwith the essential and committed works of Tehri Pump Storage Plant and Koteshwar Dam Project at a cost of Rs. 2963.66 Crs. (at March, 1993 Price Level).The Revised Cost Estimate amounting to Rs.5209.10 Cr. at Aug'99 price level (excluding IDC & FC of Rs. 481.54 Cr.) for Tehri Stage-I has been cleared by PIB in its meeting held on 07.03.2000. Note for CCEA approval is under process.

## 1.1 Status of the Project Works

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

- Various infrastructural works have been completed.

- All the four Diversion Tunnels have been completed.

- Coffer Dam which is a part of Main Dam is complete.

### i) Dam

The 260.5 m. high Earth & Rock Fill Dam, has been raised to an average level of EL.779 m. Balance height left to be raised is only 60m. Over 74% of the total fill placement is complete.

The work of Inspection Gallery of 308.64m length in the Clay Core at EL 725/730 m., a unique structure of its nature was executed during the year as scheduled. The Gallery of this type has been executed for the first time in India for monitoring the behaviour of the Dam after execution.

### ii) Spillways

Works at various fronts viz. Chute Spillway, Right Bank Shaft Spillways and Left Bank Shaft Spillways, involving highly complex design and engineering are progressing well. The open excavation of Right Bank Shaft Spillways and Intermediate Level Outlet has been completed. Underground excavation of Intermediate Level Outlet, Pilot Shaft T-3, Adit to Separation Chamber of T-1 and Aeration Tunnel T-1&T-2 have been completed. Around 95% of concreting work in Approach Channel and Control Structure has been completed.

### iii) Power House

#### a. Civil Works

The work of Power House Complex is in full swing. Both the EOT Cranes have been installed.The underground excavation of Power house Cavern and Transformer Hall Cavern, Underground excavation of complete Water Conductor System, Concreting of Control Block and underground excavation of Tailrace Tunnels have been completed. Around 77% concrete lining for Tailrace Tunnels (Overt) has been completed.

#### b. Electrical Works

Assembly/Erection of the Power House E&M Equipment is in progress. The erection of

draft tube cone for first unit has been completed and 2nd Stage concreting done for the first unit. Erection of Spiral Casing for first unit has been completed and Hydraulic test carried out. Assembly of Stator on Service Bay of 1st unit and erection of Draft Tube Liner of 2nd unit is in progress.

The fabrication of Penstock Steel Liners is in advance stage of completion and erection works are in progress.

### iv) E&M

Contracts for Turbine, Generator, Valves and Control Systems with financing arrangements by way of Suppliers Credit/ Buyers Credit from KfW, Germany have been awarded to a consortium of manufacturers from Russia/Ukraine, and ABB-Germany. Some Electro-Mechanical equipments have already reached the Project site. Major components of Turbine, Generator and Butterfly Valve of first unit have been received, and the balance supplies are in progress.

## 1.2 Rehabilitation

Rehabilitation is being implemented in two phases. The Phase-I covers those families which are affected by construction of Coffer Dam, including the Old Tehri Town. In Phase-II, all remaining families affected by construction of Main Dam would be rehabilitated.

The Phase-I Rural Rehabilitation is nearly completed, with 98.5% of the families have been paid compensation and rehabilitated. In Phase-II, 435 out of 2845 rural families have been rehabilitated and land for the balance families in Hardwar/Dehradun areas is being acquired. The entire Phase-II affected population would be rehabilitated before the impoundment of the reservoir.

The urban affected population is being rehabilitated in New Tehri Town and at Rishikesh/Dehradun in accordance with their option. The New Tehri Town has been developed at a height of 1350-1850 M., and has all modern facilities including a University Campus, Hospital, Educational and Financial Institutions, Markets, Places of worship and public utility buildings.

The major recommendations of the Hanumantha Rao Committee, approved by the Govt. in regard to rehabilitation of the affected population include definition of family so as to make all major sons and major daughters who attained the age of 21 years, and dependent parent (Mother/Father) of the fully affected entitled land owner on 19.07.1990, eligible for ex-gratia payment of 750 days minimum agricultural wage each, grant of house construction assistance to the urban land owner families, linked with the progress of construction and shifting, allotment of one constructed shop, recognition of the right of people, living in the villages upstream of Tehri reservoir, over the water from Bhagirathi and Bhilangna rivers and tributaries for drinking and irrigation purposes.

In accordance with the decision of the Govt., based on the recommendations of the Hanumantha Rao Committee, the responsibility for the Rehabilitation & Resettlement has now been transferred to the State Govt., to be carried out under the overall supervision and control of Commissioner, Garhwal assisted by various State Govt. officials, with funds for R&R to be provided by THDC.

## 1.3 Environment

Ministry of Environment and Forests had laid down certain conditions. Studies were to be carried out and based on their findings, action plans had to be drawn up for execution pari-passu with construction of the project. All the required studies have been completed and reports submitted to the MOEF. It has been established that there would be no adverse effect on the environment and bio-diversity of the area due to Tehri Project.

THDC is carrying out Catchment Area Treatment in the high and very high erodibility

classification. Around 37972 Ha. area has been treated so far. In accordance with the conditions laid down by the MOEF, Forest Deptt., Govt. of Uttaranchal had submitted a proposal for setting up of a Botanical Garden at Koti in Tehri Garhwal. The construction work and establishment of the Botanical Garden has been taken up by the Forest Deptt. The proposed Botanical Garden is to be located adjacent to the Reservoir in an area of 14.28 Ha.

The consultancy and implementation of the Action Plan for mitigating the possible impact on "Mahseer Fish" due to construction of Tehri Dam has been taken up by the National Research Centre on Cold Water Fisheries, Bhimtal, Distt. Nainital.

MOEF granted forest clearance in June, 1987 with the stipulation that the project authorities will carry out compensatory afforestation in an area of 3815 ha. of non forest land. An area of 4516 ha. has already been planted in districts of Jhansi and Lalitpur in U.P. The plantation done on non-forest land is now being converted into protected forest by State Forest deptt.

### 1.4 Commissioning Schedule

1ST Unit of Tehri Project was scheduled to be commissioned in March'2002 and all remaining units by Dec.'2002.

Closure of Diversion Tunnels T-3/T-4 could not take place in March,2001 due to non vacation of Old Tehri Town, consequent to which work on Stilling Basin of Chute Spillway could not commence. This is a critical activity and would require about 18 months to complete.

Diversion Tunnels T-3&T-4 have now been closed in first week of Dec.,2001. Commissioning of 1st Unit of 250 MW is now scheduled in March,2003 and remaining units by Aug.,2003.

### 1.5 Expenditure

Expenditure incurred on Tehri Dam & HPP Stage- I (1000MW) upto Nov.'2001 is Rs.3604.95 Cr.

## 2.0 KOTESHWAR PROJECT(400 MW)

Koteshwar Project comprises a 97.5 m. high concrete dam and surface power house comprising 4 units of 100 MW each is located 22 Km. downstream of Tehri Dam. Koteshwar Project is a run-of-the-river scheme with minimum diurnal storage. There are no problems relating to geological, environmental or rehabilitation aspects. There are only two villages, with 103 families which are likely to be submerged with the coming up of the reservoir. In addition, there would be only 14 villages, which would be partially submerged, involving 280 families. The approved rehabilitation package for Tehri Stage-I would also be applicable for affected families of Koteshwar Project.

CCEA has approved the proposal for execution of Koteshwar H.E Project (4x100MW) at a cost of Rs.1301.56 Cr. incl. IDC of Rs.190.04 Cr. at Oct.'99 price level in April,2000.

The Project is scheduled to be commissioned within a period of 5 years from April, 2000.

### 2.1 Status of Project Works

Necessary access to the Project in the form of the all-weather road is available. The construction of Diversion Tunnel, which is a prelude to taking up the work of Dam and Surface Powerhouse in the river bed, has already been taken up.

The Diversion Tunnel has been day lighted on 26.09.2001 and the balance works are in progress.

The tenders for Civil works of the Dam & Power House packages have been issued to the pre-qualified parties. The pre-qualification of bidders for the E&M packages has been completed and the tenders are under process of issue.

## 2.2 Expenditure

Expenditure incurred on Koteshwar HEP (400MW) upto Nov.'2001 is Rs.63.57 Cr.

## 3.0 TEHRI PUMP STORAGE PLANT (PSP) 1000 MW

The Tehri PSP is part of the 2400 MW Tehri Hydro Power Complex being executed by THDC. Tehri PSP Scheme has been envisaged to generate 1000 MW of peaking power for enhancing system reliability and also to provide balancing load to the thermal base generation during off peak hours. Reservoir created by the Tehri Dam would function as the upstream reservoir for this Project. Koteshwar Dam, will create a balancing reservoir to regulate the releases from Tehri Reservoir and serve as the downstream reservoir for the PSP.

Certain essential works of PSP were taken up alongwith the execution of Stage-I works. Excavation of Head Race Tunnels for PSP has been completed; lining work is also partly done. The Intakes for Head Race Tunnels for PSP are being constructed alongwith the Stage-I works. The Transformer Hall constructed in Stage-I would also serve the PSP. Thus, major Civil Works to be taken up in PSP would involve only the Machine Hall and Tail Race Tunnels.

The Pump Storage Plant envisages 4 reversible units of 250 MW each. The main feature of the Project is the large variation of about 90 m between the maximum and minimum head, under which the reversible units shall operate. The work of updation of DPR for the Tehri PSP is under finalisation.

# NATHPA JHAKRI POWER CORPORATION LIMITED (NJPC)

## NATHPA JHAKRI POWER CORPORATION LIMITED

The Nathpa Jhakri Power Corporation Limited (NJPC) was incorporated on May 24, 1988 as a joint venture of the Govt. of India (GOI) and the Govt. of Himachal Pradesh (GOHP) with an authorised share capital of Rs 1000 crores to execute hydro power projects in Satluj basin within Himachal Pradesh. The present authorised share capital of NJPC is Rs 4500 crores. The equity-sharing ratio of Govt. of India and Govt. of Himachal Pradesh is 3:1 respectively.

## NATHPA JHAKRI HYDRO-ELECTRIC POWER PROJECT (NJHPP)

The Nathpa Jhakri Hydroelectric Power Project (NJHPP) is the first project undertaken by NJPC.

### Location

The 1500 MW Nathpa Jhakri Hydro-electric Power Project (NJHPP) derives its name from the names of two villages in the Project vicinity - Nathpa in district Kinnaur and Jhakri in district Shimla - in the interiors of Himachal Pradesh. The Project's Dam is being constructed near village Nathpa and its Power House is being constructed on the left bank of the river Satluj at Jhakri. The power house site is about 150 km from the nearest railhead (narrow gauge), Shimla. The Project stretches over a length of about 50 kms from the Dam site to the Power House site, on the Hindustan-Tibet Road (NH-22), which also connects the rail head to the Project.

### Salient Features

On completion, NJHPP would consist of the following:

- 57.5 m high concrete Dam on Satluj river at Nathpa to divert 486 cusecs of water through four Intakes.
- An underground Desilting Complex, comprising four chambers, each 525 m long, 16.31 m wide and 27.5 m deep.
- 10.15 m dia and 27.4 km long Head Race Tunnel (one of the longest power tunnels in the world), terminating in a 21 m dia and 301 m deep Surge Shaft.
- Three circular steel-lined Pressure Shafts, each of 4.9 m dia and 633 m length, bifurcating near the Power House to feed six generating units.
- An underground Power House with a cavern size of 222 m x 20 m x 49 m having six Francis Turbines of 250 MW each to utilise a design discharge of 405 cusecs and a design head of 425 m.
- 10.15 m dia and 982 m long Tail Race Tunnel to discharge the water back into the river Satluj.
- Annual energy generation of around 6700 million units in a 90% dependable year.

## PROJECT BENEFITS

Besides the benefits of social and economic upliftment of the people in its vicinity, the 1500 MW NJHPP will generate around 6700 MU of electrical energy in a 90% dependable year and 7447 MU in an average year. It would also provide 1500 MW of valuable peaking power to the Northern Grid.

Out of the energy generated at the bus bar, 12 percent energy shall be supplied free to the state of Himachal Pradesh. From the remaining 88% energy generation, 25% is to be supplied to HP at bus bar rates and the balance to the other states of the Northern Region including HP, as per allocation to be made by the Govt of India.

In addition, thousands of people living in the project vicinity have been provided direct and indirect employment by the various national and international contracting agencies working on the project.

## PROJECT COSTS AND COMMISSIONING SCHEDULES

The last approved cost of NJHPP is Rs 7666.31 crores at June, 1998 price level with completion cost at Rs 8058.34 crores and project completion by Mar 2002.

However, on account of the unprecedented flash floods that occurred in the river Satluj in the early hours of August 01, 2000, the unit-wise project commissioning is now scheduled from end 2003 to mid 2004. Efforts shall, however, be made to commission all Units by end 2003. The completion cost of the project is estimated at Rs 9169 crores, the increase being primarily on account of damages caused due to the flash flood of August, 2000 and the resultant delay in the completion of the project.

## FINANCING DETAILS

### Funding Plan

The Project is to be financed on a 1:1 debt equity ratio. The equity portion is to be shared between the Govt. of India (GOI) and the Govt of Himachal Pradesh (GOHP) in the ratio of 3:1 respectively.

### Loans

The World Bank has sanctioned a loan of US$437 million for NJHPP and US$ 10 million for preparation of the Detailed Project Report and carrying out the survey and investigations of the proposed Rampur Hydro-electric Power Project downstream of NJHPP. Additional commercial foreign currency loans equivalent to Rs. 1191.05 crores for Electro-Mechanical packages with various European Commercial Banks were also negotiated for NJHPP. In addition, a loan of Rs 1118 crore has been sanctioned for NJHPP by the Power Finance Corporation Limited (PFC).

### Project Execution Status (As on end November, 2001)

THE PRESENT STATUS OF THE VARIOUS ONGOING WORKS AT THE NATHPA JHAKRI PROJECT IS AS GIVEN BELOW:

### Infrastructure Works

Several roads and bridges damaged during the devastating flashflood of August 2000 have been either rebuilt or replaced for the smooth transportation of goods.

*A view of Dam Site*

## Major Civil Works

The Satluj River has been diverted through the Diversion tunnel on September 18, 2001 i.e. one month ahead of schedule. A total of 2257 cum and 5850 cum of concrete has been poured in the Dam and the Intake areas respectively during November 2001. As on date 63% of the dam and 53% of the Intake concreting have been completed. In the Desilting Chambers, Beam concreting has been completed to the extent of 36% and 62 nos. Cable Anchors have also been installed. In the Silt Flushing Tunnel, excavation of SFT collector and 4 nos. Branch Tunnels have been completed.

The erection of steel liner and backfill concreting in the Head Race Tunnel in the Manglad (710m) and Daj (376m) areas have been completed. The heading excavation of HRT has been completed and the benching excavation of HRT is also nearing completion. The overt concrete lining of HRT has been completed to the extent of 47%.

*A view of Power House*

The excavation of the machine hall and the transformer hall cavern has been completed. In the pressure shaft erection of steel liners has also been completed. In the TRT Outfall area, excavation, concreting and Cable Anchoring works have been completed to the extent of 94%, 74% and 89% respectively. In the Pot Head Yard area 72% excavation and 57% concreting works have also been completed.

## Hydro-mechanical Works

Around 95% of sluice liner fabrication has been achieved. All the parts of sluice liner for three nos. blocks have been received at site and erection work in the Dam has started.

All the six sets of 2nd stage embedments, and three nos. Gate Leaves relating to Draft Tube Gates (DTGs) have been delivered at site. Embedded parts have been erected in 4 Nos. shaft and are in progress in the remaining 2 Nos. shafts. The balance 3 Nos. Draft Tube Gate Leaves and Tailrace Gates are under fabrication in BHEL works.

## Major Electro-mechanical Works

On the restoration front, the contracts for dismantling of three nos. rotors and five nos. stator assemblies and also for shifting of scrap material to outside the project has been awarded to M/s EUCONA-BHEL. The restoration of two nos. EOT Cranes in the Power House Cavern has been completed. Dismantling of rotors for Units 1,2 and 3 has been completed. Dismantling of stator cores of Unit 5 has been completed and for Unit 3, the progress is around 70%. On the erection front, the Turbine Assembly has been completed to around 50% and 35% respectively for Units 5 and 6. Subsequent works on stator and rotor assembly, as well as MIV and cooling water systems for both the Units has also commenced. The generator rotor assembly work in respect of Unit 5 has commenced and 25% works has been completed. The Turbine Guide Apparatus assembly for Unit 5 has been completed.

## FISCAL STATUS

Against the Revised Budget Estimate of Rs. 1138 crores (Rs 1069 crores for NJHPP, Rs. 2 crores for Rampur and Rs. 67 crores towards repayment of loans of NJHPP) for the year 2001-02 the total financial expenditure till end November 2001 has been Rs. 483.86 crores (43%). The cumulative expenditure incurred up to November 2001 is Rs. 5854.79 crores, about 76.4% of the approved Revised Cost Estimate (RCE–II) of NJHPP of Rs. 7666.31 crores at June, 1998 price level. The balance funds shall be utilized towards the execution of the Major Civil, Hydro-mechanical and Electro-mechanical works.

## ENVIRONMENT, REHABILITATION & RESETTLEMENT ENVIRONMENT

NJHPP is one of the most eco-friendly Projects in the country. Being a run of the river Project, it has minimum adverse impact on the ecology of the area with the least disturbance to the flora and fauna. Afforestation of 246 hectares of forest land is being taken up in comparison to 123 hectares of forest land acquired for the Project. The dumping of excavated material only in pre-identified areas and prevention of its flowing into the river by constructing adequate toe-walls further ensures the Project's harmony with the environment.

## REHABILITATION & RESETTLEMENT

NJPC has taken utmost care for the resettlement and rehabilitation of the few Project Affected Families (PAFs) whose land or house or shop has been affected due to the construction of NJHPP.

## FUTURE PROJECTS

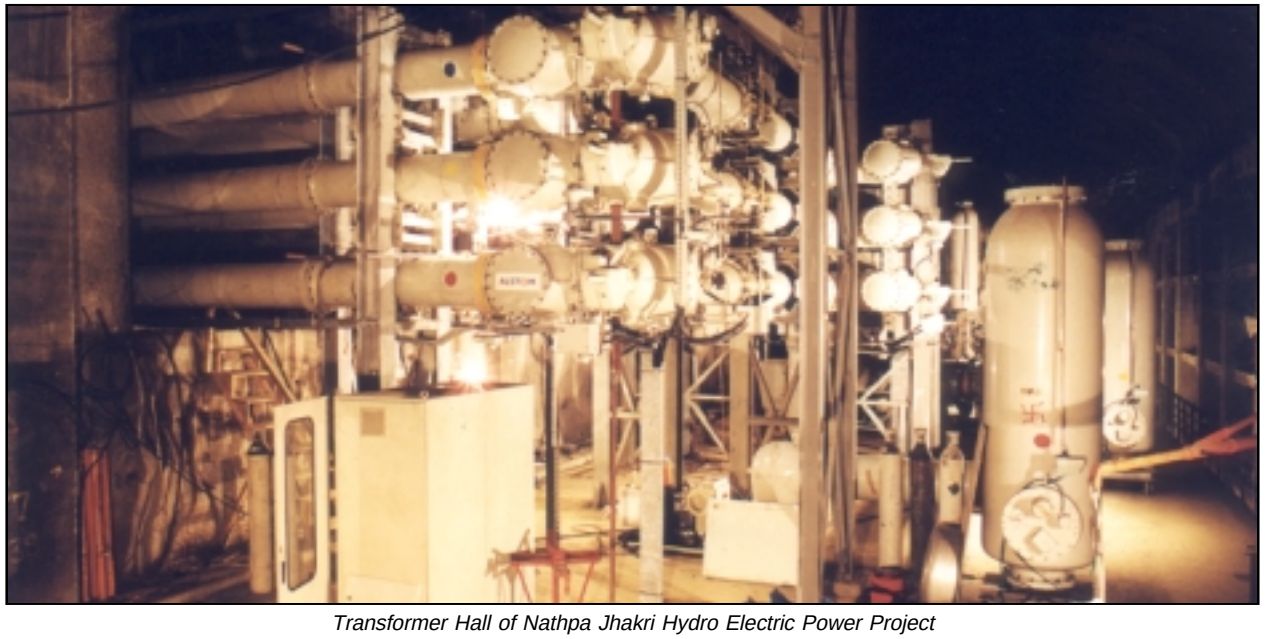
### Rampur Hydro-electric Power Project

Based on the Govt. of Himachal Pradesh decision for execution of the proposed Rampur project by NJPC the draft implementation agreement to be signed between NJPC and GOHP has been submitted to Govt. of Himachal Pradesh.

## OTHER PROJECTS

NJPC is also planning to approach Govt. of Himachal Pradesh for taking up the execution of other hydro-electric power projects in the Satluj river basin in the Himachal Pradesh during the Xth-XIth Plan period, prominent amongst which are:

- Thopan Powari Hydro-electric Power Project (approx. 400MW)
- Shongtong Karcham Hydro-electric Power Project (approx. 400MW)



*Transformer Hall of Nathpa Jhakri Hydro Electric Power Project*

# DAMODAR VALLEY CORPORATION (DVC)

Damodar Valley Corporation (DVC) came into existence by an act of the Central Legislature on 7th July, 1948 as the first Multi-purpose Integrated River Valley Project of the country & since then DVC is carrying out the multi-faceted responsibilities for economic and industrial growth of the region. DVC is Committed to the economic and industrial growth of the Damodar Valley region which extends over an area of 24235 sq. km in the State of Jharkhand and West Bengal.

**DVC** has the following major objectives:

- Generation, Transmission and Distribution of Power
- Flood Control
- Promotion & Operation of Scheme for Irrigation water supply for industrial and domestic use, navigation & drainage.
- Promotion of Afforestation & Control of soil erosion in the Valley area.
- Promotion of Public Health & Agriculture, industrial, economic & general well being of DVC's area of operation.

## POWER SYSTEM

### Generation

DVC has constructed five Thermal Power Stations, three Hydel Power Stations and one Gas Turbine Station for generation of electrical energy in its command area. Out of 2761.5 MW total installed capacity of DVC power system, 2535 MW is from thermal route which comprises of the thermal units of different vintages ranging from 1953 to 1998, 144 MW from Hydel and 82.5 from Gas Turbine Station. The existing power plants of DVC are

### Thermal:

| | | |
|---|---|---|
| Bokaro A | : | 175 MW (3x 45 MW) & (1x40 MW) |
| Bokaro B | : | 630 MW (3x210 MW) |
| Chandrapura | : | 750 MW (3x130 MW) & (3x120 MW) |
| Durgapur | : | 350 MW (1x140 MW) & (1x 210 MW) |
| Mejia | : | 630 MW (3x210 MW) |

*A view of Maithon Dam*

### Gas Turbine

GTP, Maithon : 82.5 MW (3x27.5 MW)

### Hydel

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

### Transmission

DVC started with 66 KV transmission system and switched over to 132 KV system to transmit electricity to different consumers. To cater the need of new generation bulk consumers as well as inter-state transfer of power, DVC gradually added 220 KV Double Circuit transmission lines. DVC's transmission system is spreaded over its area of command and even beyond in the States of West Bengal & Jharkhand. It is also inter-connected with NTPC, NHPC (Chukha) and operates as a constituent of integrated Eastern Regional Power Grid. The transmission infrastructure of DVC is as under:

| Pressure | Line Length (Ckt. Km) | No. of Sub-stations |
|---|---|---|
| 220 KV | 1242 | 8 |
| 132 KV | 3246 | 31 |
| 33KV | 1067 | 14 |

## OVERALL PERFORMANCE AND ACHIEVEMENT

During the year 2000-2001 DVC has achieved record highest daily system generation of 31.883MU energy on 8th November, 2000. In December, 2000, DVC achieved record monthly system generation of 809.433MU that include thermal generation of 802.60MU. DVC's annual system generation was 8187.831MU. During April, 2001 to December, 2001 DVC's system generation was 5763.915 MU comprising of 5501.767 MU from thermal, 248.033 MU from Hydel & 14.115 MU from Gas Turbine units. During the period, DVC's turn- over from sale of power was around Rs. 1669.42 crore (provisional) leading to profit of Rs. 216.23 crore (provisional).

### Performance Highlight

(April, 2001 to December, 2001)

System Generation : 5763.915 MU
PLF of Thermal units(%) : 35.32%

**Anticipated Target during the remaining period of the year**

(1.1.2002 to 31.3.2002)

System Generation : 2153 MU

## ENVIRONMENTAL MANAGEMENT

Fly Ash emission levels of most of the thermal generating units of DVC are within limit. However, to reduce the emission level further, augmentation of ESPs is in progress. For solid waste management ash evacuation from ash ponds of Power Stations are carried out regularly and dumped in the abandoned open cast mines of ECL, CCL & BCCL. For better utilisation of ash generated at Mejia TPS, M/s. Lafarge India Ltd. is in the process of installation of a Cement Plant at Mejia TPS of capacity 1 million MT per annum. One Brick Plant was also set up at DTPS for the purpose but could not be run for lack of interest of potential entrepreneur.

## RENOVATION & MODERNISATION

Comprehensive Residual Life Assessment Study, Life Extension and Renovation & Modernisation (RLA, LE and R&M) activities for ten old vintage (32 to 45 years) units at Chandrapura TPS, Bokaro 'A' TPS & Durgapur TPS have been taken up with the following objectives

- ❖ Improvement in availability
- ❖ Extension of economic operating life
- ❖ Improvement in efficiency
- ❖ Augmentation of capacity

RLA study of the oldest units of BTPS 'A' Plant have already been started. Major agencies engaged for this purpose are M/s. BHEL, M/s. Mitsui Babcock & GEPSIL. CEA has been requested for consultancy service in this regard.

## FUTURE PROJECTS

During the 10th Plan Period the following new coal based generation capacities have been planned for the DVC power system to meet future load growth in the region as well as for export of power to the deficit region of the country.

| | | |
|---|---|---|
| Kodarma | : | 1000 MW |
| CTPS | : | 500 MW |
| Maithon Left Bank | : | 1000 MW |
| MTPS | : | 710 MW |
| DSP | : | 500 MW |
| Ramgarh | : | 1000 MW |
| BTPS | : | 210 MW |
| DSP | : | 500 MW |
| Total | : | 5420 MW |

## WATER MANAGEMENT

For flood control, the Damodar Valley Corporation has so far constructed four multi-purpose dams at Tilaiya, Konar, Maithon & Panchet and an irrigation system comprising of a barrage on River Damodar at Durgapur and a canal system of 2495 km. The existing infrastructure for water management is

- Dams & Barrage : 4+1
- Flood Reserve Capacity : 1270 MCM
- Irrigation Potential Created : 3.64 lakh Hec.
- Irrigation Command Area : 5.69 lakh Hec.
- Canals : 2495 km.

The management of Barrage and Irrigation System has, however, been transferred to Govt. of West Bengal in 1964. DVC continues to supply irrigation water for Rabi, Kharif & Boro cultivation in the lower valley area including supply of water for industrial use.

### Soil conservation & Afforestation

Soil Conservation & Afforestation are some of the important activities of DVC. These are carried out effectively to control soil erosion and land degradation in upper Damodar-Barakar catchment by adopting integrated soil conservation/watershed management and to check siltation of DVC reservoirs. These activities also retain soil fertility for sustained production of food, fuel, fiber etc. Since 1993 micro watershed concept in soil conservation was adopted by DVC. The whole Damodar-Barakar catchment area was categorized into 716 micro-sheds, out of which 219, 178, 180 & 139 came under VERY HIGH, HIGH, MEDIUM & OTHERS categories respectively. The critical areas were pin- pointed and emphasis was given to treat more vulnerable ones considering erosity factor.

*A view of Microlift Irrigation – Maithon*

# BHAKRA BEAS MANAGEMENT BOARD (BBMB)

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

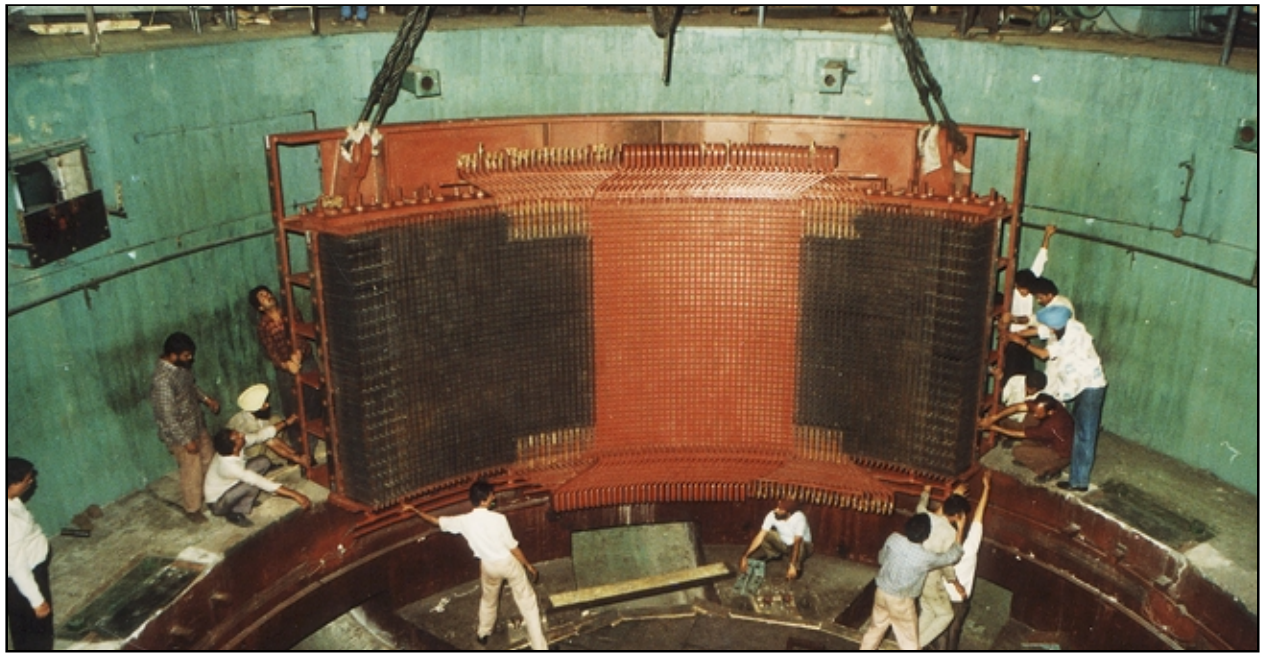
## FUNCTIONS

The Bhakra Beas Management Board manages the facilities created for harnessing the waters impounded at Bhakra and Pong in addition to those diverted at Pandoh through the BSL Water Conductor System. It has also been assigned the responsibility of delivering water and power to the beneficiary States in accordance with their due/entitled shares. The Board is responsible for the administration, maintenance and operation works at Bhakra Nangal project, Beas Project unit I and Unit II including Power Houses and a network of transmission lines and grid sub-stations. The functions of Bhakra Beas Management Board are:

To regulate the supply of Sutlej and Ravi-Beas waters to the States of the Punjab, Haryana, Rajasthan and Delhi, through a wide network of canals.

To distribute power from Bhakra Nangal and Beas Projects to the States of Punjab, Haryana, Rajasthan, Himachal Pradesh and U.T. of Chandigarh.

Keeping in view the technical expertise available with BBMB, the Govt. of India through a notification in April, 1999 has also entrusted additional functions to Bhakra Beas Management Board of providing and performing Engineering and related technical and consultancy services in various fields of Hydro Electric Power and Irrigation Projects and to carry on all kind of business related thereto either independently or as a joint venture with any Central/State/Public Sector Undertakings



*Renovation & Modernisation work in progress at Right Power Plant Bhakra Dam*

or Establishment(s) under the administrative control of Ministry of Power or as a joint venture with any other Agency/Organization with the approval of Government of India.

The works being managed by the BBMB are broadly grouped as three large multipurpose projects viz. Bhakra Nangal Project, Beas Project Unit-I (BSL Project) & Beas Project Unit-II(Pong Dam).

The Bhakra Nangal project comprises the Bhakra Dam, Bhakra Left Bank and Bhakra Right Bank Power Houses, Nangal Dam, Nangal Hydel Channel and Ganguwal and Kotla Power Houses. Bhakra Dam is a majestic monument across the river Sutlej. It is a high straight gravity concrete Dam rising 225.55 m (740 ft) above the deepest foundation and spanning the gorge with 518.16 m (1700 ft) length at the top. The Gobind Sagar Lake created by the Dam has 168.35 Sq.Km. area and a gross storage capacity of 9621 million cubic-metre (7.80 MAF). The two power houses, one on the Left Bank (5x108=540 MW) and the other on the Right Bank (5x157=785 MW) have a combined installed capacity of 1325 MW. The Ganguwal and Kotla Power Houses fed from Nangal Hydel Channel have an installed capacity of 168.15 MW.

The Beas Project Unit-I(BSL Project) diverts Beas Water into the Sutlej Basin, falling from a height of 320 metre (1050 ft) and generating power at Dehar Power House having an installed capacity of 6x165MW = 990 MW. This project comprises a diversion dam at Pandoh, 13.1 Km long Pandoh Baggi Tunnel having capacity of 9000 Cusec, 11.8 Km. Long Sundernagar Hydel Channel, Balancing Reservoir at Sundernagar, 12.35 Km. Long Sundernagar Sutlej Tunnel, 125 Metre high Surge Shaft and Dehar Power Plant.

The Beas Dam at Pong is the highest earth fill (earth core, gravel shell) Dam in India, being 132.6 metre (435 ft) high with a gross storage capacity of 8570 million cubic metre (6.95 MAF). The Pong Power Plant (3x60+3x66=378 MW) is located in the stilling basin downstream of pen stock tunnels.

The total installed generating capacity of the BBMB Power Houses is 2861.15 MW detailed as under:-

| Power House | Installed Capacity | MW |
|---|---|---|
| Bhakra (Right Bank) | 5x157 | 785 |
| Bhakra (Left Bank) | 5x108 | 540 |
| Ganguwal | 1x29.25+1x27.63+1x26.70 | 83.58 |
| Kotla | 1x29.25+1x27.20+1x28.12 | 84.57 |
| Dehar | 6x165 | 990 |
| Pong | 3x60+3x66 | 378 |
| | **Total** | **2861.15** |

## GENERATION & TRANSMISSION SYSTEM

The BBMB Power Plants have the highest Plant availability factor. The generation during 2000-2001 was 10424 MU against the target of 11000 MU. During the current year 2001-2002 the generation from the BBMB Power Houses have been 7180 MUs upto 30.11.2001 against the target of 7343 MUs. It is expected that the generation target of the current year of 2001-2002 i.e. 10060 MUs shall be achieved keeping in view the position of water in the Reservoirs.

The power generation at BBMB Power stations is being evacuated through BBMB Power evacuation system running into 3735 Circuit KM length of 400KV, 220KV, 132KV and 66KV transmission lines and 24 EHV Sub-stations. The BBMB Power evacuation system operates in an integrated manner in the Northern grid with its transmission network spreading over the States of Himachal Pradesh, Punjab, Haryana and Delhi. The system is interconnected with transmission system of Power Grid and the States of Uttar Pradesh, Rajasthan and Delhi.

## IRRIGATION

At the time of partition of India, about 80% of the irrigated area of Punjab went to west Pakistan leaving India with very meagre irrigation resources. The mighty Bhakra-Nangal and Beas Projects changed the scenario and turned the northern India into Granary of the Nation.

The State of Punjab, Haryana and Rajasthan are being supplied on an average about 28 MAF of water per year, which irrigates 1 crore 20 lac acres of land.

## RENOVATION, MODERNISATION AND UPRATING (RM&U)

All the 5 units of Bhakra Right Bank Power Houses, which were commissioned during the year 1966 to 1968 have been uprated from original capacity of 120MW to 157MW each.

The RM&U of two units each at Ganguwal and Kotla Power Houses have already been completed adding about 13.69 MW into the system.

RM&U of three units of 60 MW to 66 MW of Pong Power Plant has already been completed. This has resulted in additional capacity of 18 MW. The RM&U of remaining three units will also be taken in hand one by one and is expected to be completed by year 2003 & this shall uprate the capacity of the existing machines by another 18 MW.

BBMB also plans to carry out RM&U of all 5 units of Bhakra Left Bank Power House & remaining one units each at Ganguwal & Kotla Power Houses in near future.

The RM&U work on the old Power Plants has given another about 30 years lease of life to the machines.

## CONSULTANCY SERVICES

BBMB has acquired long experience and apt expertise in dealing with the problems encountered with the operation and maintenance of Hydro Power Plants and their associated civil works and hydro mechanical structures such as Dams, Hydel Channels, Tunnels, Gates etc. This is accomplished by teams of highly qualified, experienced and dedicated professionals in various disciplines.

BBMB has introduced Consultancy Services for extending its expertise to other organizations globally; Govt. of India has also authorized BBMB to undertake Consultancy Services either independently or as a joint venture with any Central/State/Public Sector Undertakings.

BBMB has entered into joint ventures with the following:

- MOU signed with PFC for providing Lender's Engineering Services and Technical Advice for Hydro Projects.
- MOU Signed with Uttar Haryana Bijlee Vitran Nigam Ltd (UHBVN). for under taking Third party inspections on behalf of UHBVN at manufacturer's works.
- MOU Signed with Dakshin Haryana Bijlee Vitran Nigam Ltd (DHBVN). for under taking Third party inspections on behalf of DHBVN at manufacturer's works.
- MOU signed with M/s BSES Mumbai for the execution of the development of Transmission Line systems on turnkey basis.

The scope of work being undertaken by BBMB Consultancy Services is as under:

1. Renovation, Modernisation & Uprating – studies and supervision.
2. Reservoir maintenance and flood control. Technical problems related to Civil, Electrical and Mechanical fields.
3. EPC jobs related to Power Plants, Tranmission & Distribution system.
4. Post Construction operation and maintenance of multipurpose Hydro Electric Projects.
5. Dam safety, inspection and analysis of observed data.
6. Design, Fabrication, Testing and Inspection of various Hydraulic and general steel structures, such as Gates, Hoists, Penstocks, Transmission Line Towers etc.
7. Testing facilities for materials such as concrete, soil aggregate etc.
8. Third party inspection of all type of equipment.

9. Controls instrumentation, protection, tele-communication, projects related to Information Technology.

10. Lender's Engineering Services to Financial Institutions.

BBMB Consultancy Services is currently engaged in various jobs such as:

1. Third party inspections for distribution equipment being procured by UHBVN Ltd. and DHBVN Ltd.

2. Consultancy to Tamil Nadu Electricty Board for R,M&U of Mettur Dam Power House and Papanasam Power House.

3. Technical appraisal of Mahatma Gandhi Hydro Electric Tail Race Project to Power Finance Corporation (PFC).

4. Thermovision scanning and hot line maintenance services to most of the SEBs/Power Utilities in the Northern India.

*Downstream view of Bhakra Dam*

# CENTRAL POWER RESEARCH INSTITUTE (CPRI)

The Central Power Research Institute (CPRI) was established in Bangalore by the Government of India in 1960. It became an Autonomous Society in the year 1978 under the aegis of the Ministry of Power, Government of India. The main objective of setting up of the Institute was to serve as a National Laboratory for undertaking applied research in electric power engineering besides functioning as an independent National Testing and Certification Authority for electrical equipment and components to ensure reliability and improve, innovate and develop new products. More specifically the objectives cover the following :

## OBJECTIVES:

- To serve as a national centre for applied research in electrical power engineering.
- To function as an independent and impartial authority for certification and testing of electrical equipment manufactured in the country for quality assurance
- To Perform tests for product development
- To offer consultancy on problems referred by utilities and industries.
- To Undertake sponsored research programmes on subjects of interest to Industries & power utilities

The Institute is headed by a Director General and has several research laboratories and testing facilities and employs about 280 qualified Scientists and Engineers besides other supporting staff. The Head Office of the Institute is at Bangalore and its other units are located at Bhopal, Hyderabad, Nagpur, Ghaziabad, Thiruvananthapuram and Raichur.

## PERFORMANCE AND ACHIEVEMENTS - AT A GLANCE

The CPRI continued to play a vital role in quality assurance to ensure reliability of power equipment through testing and certification in accordance with National and International standards. The Institute is meeting its non-plan expenditure through revenue generated by testing & consultancy for the last thirteen years. The Institute is expected to reach the revenue target of Rs. 30 Crores during the year. Marketing & Publicity has been given a boost by participating in International Exhibitions which has resulted in an increase in testing orders by overseas clients.

The Institute continued its strides in the area of Research with around 36 projects ongoing in different areas of electrical engineering.

The Institute in its endeavour to help Utilities and Industries, expects to take up many sponsored projects of relevance to the Power-sector. Some of the important projects taken up/ continued during the year are :

1. **Indo-Norwegian Environmental Project**
   Karnataka State Council for Science and Technology (KSCST) in collaboration with CPRI and KPCL, is co-ordinating the Environmental project funded by NORWAY at an outlay of Rs. 225 lakhs. Under this project, a self sustaining Fly Ash Utilisation Demonstration Centre at Raichur is to be established for which CPRI is giving consultancy at a cost of Rs.15.00 lakhs. The project which started during the previous year is being implemented as per schedule.
2. A project titled “Study on Marble Waste Powder Utilisation” was sanctioned by DSIR for investigation by CPRI at a cost of Rs.5.00 lakhs during the previous year.
3. A joint R&D programme with M/s.Farcom Cables, Bangalore sponsored by DSIR under PATSR scheme has been taken up for “Development of Technology for Fire Retardant Low smoke Power Cables” at a cost of Rs.104.00 lakhs.

During the reporting period, 13 technical reports were brought out covering the outcome of research in various areas and a large number of technical papers were presented in both National and International Seminars / Workshops. CPRI through its unit "Thermal Research Centre", Koradi-Nagpur supported by other units, joins the select few in the country for undertaking Renovation & Modernisation of Thermal & Hydel power plants.

## NEW TEST FACILITIES

The new test facilities added during the year was :

" Heat Run Test upto 25 kA in three phase and single phase mode on Busducts, high Current bushings & other allied Switchgear" in STDS, CPRI, Bhopal.

## UNIQUE TESTS/CONSULTANCIES CARRIED OUT

Several unique tests/ consultancy works have been carried out during the year at the various laboratories of the Institute. Some of the important ones are:

i) Harmonic measurements for M/s ISPAT, Mumbai

ii) Service condition monitoring of 220kV and 132kV power transformers installed in Punjab State Electricity Board

iii) Renovation & Modernisation of unit 3 of Gurunank Dev Thermal power station, Bhatinda, Punjab.

iv) Estimation of Transmission losses in Andhra Pradesh Transmission system for APERC.

v) Remaining Life Assessment study of Boilers at Gujarat Electricity Board, Ukai, HP Turbine of NTPC, Korba and at Harduagunj.

*Drop Tube Coal Combustion Furnace developed by CPRI for CFRI, Dhanbad*

vi) Electric Field measurements for Delhi Vidyut Board.

vii) CPRI has been appointed as Consultant cum Advisor under the APDP programme for the states viz, Andhra Pradesh, Karnataka and Kerala for upgradation of Distribution systems.

viii) "Protection coordination studies" for the

National FACTS Projects on "TCSC installation on Kanpur – Ballabgarh 400 kV line, for BHEL and POWERGRID.

ix) Vibration measurements on transmission line conductors for POWERGRID.

## IX PLAN SCHEMES

Under the Ninth Plan, four capital project proposals have been sanctioned with a total outlay of Rs.3962 lakhs. Three projects have since been completed.

The work on the fourth capital project viz., Establishing Seismic Vibration Test Facility sanctioned at an estimated cost of Rs.2865 lakhs is progressing as per schedule. After the site identification and detailed tests, civil works have been started and completed. The equipment for the project chiefly containing the Siesmic shaker table has been received along with the related accessories & instrumentation. Its installation is being commenced.

## PATENTS

The Institute had filed a total of 14 applications for new inventions, with the Patent authorities. As of date, the Institute has been awarded 9 patents, sealed 3 patents and 2 applications are under process.

## R&D Perspective Plan

CPRI was entrusted with the formulation of Perspective Plan for R&D in Indian Power Sector. The document outlining the R&D Road Map for 15 years has been finalised and submitted by the Standing Committee on R&D, after going through a number of brain storming sessions organised by CPRI.

## TECHNOLOGY TRANSFER

The Institute intends to promote indigenously developed technologies by participating in Exhibitions and Seminars etc. The technology know-how for the single phase static energy meter transferred to M/s Wellwin Industries, Madras. As on today 4 industries have taken this technology for commercialisation. Technology on Transformer Oil acidity value testing kit has been transferred to M/s Essvee Industries, Bangalore.

## QUALITY ASSURANCE

The Institute laboratories at Bangalore , Bhopal & Hyderabad have been audited and re-certified for accreditation by M/s NABL as per ISO 25 norms. The laboratories of the Institute have also been audited by the expert Asia Pacific Laboratory Accreditation Committee (APLAC). CPRI laboratories are approved for testing for certain products like communication cables, LT capacitors etc., by UnderWriters Laboratories & Canadian Standards Association.

## TRAINING

CPRI team has successfully completed the technical / quality audit of electrical equiment manufacturers in Malaysia and also conducted quality system and training programme for Inspectors of M/s.Tanega Nasional Berhad (TNB) at Kuala Lumpur, Malaysia.

# NATIONAL POWER TRAINING INSTITUTE (NPTI)

National Power Training Institute, a National Apex Body set up by the Government of India has been engaged in the service of Human Resources Development in the Power Sector for the last three and a half decades. Besides its Corporate Office located at NPTI Complex, Sector-33, Faridabad, NPTI operates on an All India basis through its four Regional Institutes located at New Delhi, Nagpur, Neyveli and Durgapur. Since its inception, NPTI has imparted training to more than 60,000 personnel from India & abroad. The performance during the current year in respect of number of trainees and trainee-weeks is 200% of the same period last year. Some of the important activities undertaken by NPTI are summarised below:

## 1. LAUNCHING OF B.E./ B.TECH (POWER ENGINEERING) COURSES

NPTI's attempts to weave formal education with industry oriented inputs materialized with the launching of the first ever 4-year degree course in B.Tech. (Power) at its Northern Region Institute, New Delhi. This was inaugurated by the Union Minister of Power, Shri Suresh P. Prabhu on 5 September 2001. This course is duly approved by the AICTE and affiliated to Guru Govind Singh Indra Prastha University, Delhi.

NPTI has also launched the B.E.(Power) course at its Western Region Institute, Nagpur on 11th September 2001. The course is approved by the AICTE and is affiliated to Nagpur University. The course was formally inaugurated by the Hon'ble Union Minister of State for Power, Smt. Jayawanti Mehta on 10th October 2001.

## 2. ISO 9001:2000 CERTIFICATION

NPTI has been consciously making sincere efforts to achieve highest possible quality standards in its operations. In a record period of 3-1/2 months, NPTI has qualified for ISO 9001: 2000 Certification, which was granted with effect from 26-9-2001 by DNV, Norway duly accredited by the RvA, the Netherlands.

## 3. TRANSNATIONAL TRAINING

A 15 week training program on 'O&M of Combined Cycle Power Plants' has been organized at NPTI Corporate Office for 5 Engineers from M/s AES Barka, Sultanate of Oman from 20th August 2001. This was the first ever program for foreign trainees on Combined Cycle Gas Turbine Power Plants. Another 3 week training program on Gas Turbine Power Plants for Engineers from Bangladesh was conducted at NPTI Corporate Office from 8th Oct' 2001. NPTI is taking a number of innovative endeavours with a view to enlarge its operations and also earn more revenue on its drive to self-sustainance.

## 4. SUB-GROUP ON MANPOWER PLANNING AND TRAINING

Report of the Sub-group on Manpower Planning & Training has been prepared under the Chairmanship of the Director General, NPTI for the Working Group on Power for the 10th Plan. As per the report the additional Manpower requirement for the 10th Plan would be of the order of 4.49 lakhs. The total manpower by the end of the 10th Plan would be of the order of 13.47 lakhs and towards the end of 11th Plan the same would be 15.23 lakhs. The overall training load expected during the 10th plan is 7.4 lakh man-months/year against the available training infrastructure of only 0.7 lakh man-months/year.

## 5. ORIENTATION TRAINING PROGRAM ON POWER SECTOR REFORMS

NPTI has taken up the initiative to conduct orientation-training program on Power Sector Reforms. There is an urgent need to train and sensitize a large number of people enabling them to participate proactively in the change process and at the same time appreciate and take care of consumer interest and improve the organizational performance.

NPTI started conducting the orientation-training program from the month of July'2001. A total of 2833 participants have undergone the orientation program during July-Dec.2001. The participants were from organisations like WBPDCL, TNPL, MAPS/ IGCAR (NPCIL), Pondicherry Electricity Department, NTPC, AECo, RSEB, HSEB, IREDA, SBI etc., besides other internal trainees of NPTI.

## 6. MARKETING OF MULTIMEDIA CBTS AND PUBLICATIONS

All the CEOs & Power Plant Chiefs in the country have been approached to procure NPTI's CBT Packages (having NPTI copyright) and its Publications. NPTI has received orders for CBT packages from APGENCO, PSEB, TNEB, DVB, BBMB, OHPC and NHPC.

Similarly, NPTI publications have been procured by the Organisations like IREDA, GEB, GIPC, WBPDC, NTPC, NHPC, BHORUKA Power Corpn., HINDALCO Renusagar Power Corpn., APERC, BSES, BHEL etc.

## 7. TRAINING ON SIMULATORS

Training programs on the 500 MW/210 MW Simulators have been conducted covering 251 trainees (171 % of the same period last year) from PSEB, BSEB, RSEB etc.

### Campus-Market-Linkage

A dedicated group has been created at NPTI to establish the right kind of linkages with the market and network with various agencies to synergise efforts of business development, which has brought concrete results in terms of phenomenal increase in training load. In this regard High Level delegations were received from IEEMA, Surya Foundation and ABB Alsthom etc. towards NPTI's efforts on establishment of Campus-Market Linkages. In addition, Nuclear Power Corporation (NPC) of India Ltd. have approached NPTI to train 170 Technicians and Plant Operators during 2001-2002, for course durations of 4 to 12 weeks. Tehri Hydro Development Corporation (THDC) have also approached NPTI to train their Engineers, Operators and Technicians at Northern Region Institute. NPTI also conducted a specialized program on Energy Efficiency and Energy Conservation for IREDA Executives during 8-10 Nov' 2001.

## 8. RECOGNITION

NPTI has been awarded 1st prize (Vaijayanti Shield) by the Office of the Town Official Language Implementation Committee, Faridabad for its creditworthy performance in Hindi.

*Hon'ble Union Minister of Power, Shri Suresh P. Prabhu conferring the First Benoy Sinha Gold Medal as a token of ' Best Faculty Award' on Shri J.S.S. Rao, Dy. Director, NPTI, Faridabad*

## 9. LOOKING AHEAD

NPTI is also looking ahead to:

- Launch first ever MBA in Power Management already approved by AICTE under the aegis of Centre for Advanced Management and Power Studies (CAMPS) at Faridabad.
- Conduct All India Orientation Programs on Power Sector Reforms.
- Promote NPTI services to power companies abroad.
- Augment Computer Based Training (CBT) to Web Based Training (WBT).
- Augment Regional Power Training Institutes.
- Setting up of Hydro Training Institute incorporating a Hydro Simulator.
- Establishing and maintaining a 10 MW Hydro Power Project for Training and self sustainance.
- Setting up of Training Institute in the North Eastern Region.
- Setting up of T&D Resource Centre.
- Setting up of Power Environment Resource Centre.
- Energy Audit in Power Plants and Industries.
- Acquiring Deemed University Status for NPTI

## 10. NATIONAL TRAINING POLICY FOR THE POWER SECTOR

NPTI was identified as the Nodal Agency for the formulation of National Training Policy for the Power Sector. The Policy Document has been finalized and submitted by the Standing Committee on Training after going through a number of brain storming sessions organized by the NPTI.


*Smt. Jayawanti Mehta, Hon'ble Union Minister of State for Power dedicating the 210 MW Thermal Power Plant Simulator to the Nation at NPTI (WR) Nagpur on 10th Oct'2001*

# ENERGY MANAGEMENT CENTRE (EMC)

Energy Management Centre (EMC) was set up in April, 1989 as an autonomous organisation under the administrative control of the Ministry of Power. Energy Management Centre is designed to implement and monitor the energy conservation programmes and to provide policy guidance and advise on energy efficiency. EMC has been more active in improving efficiency in the end-use of energy, building capacity for conducting energy audit and providing management services and conducting studies on policy issues for effective policy intervention. EMC is working on a networking principle with lead agencies, it has created under the various international co-operation progarmme, and has been actively involved in training of trainers.

Since inception, EMC has successfully implemented eight multilateral and bilateral aided energy efficiency improvement projects in the country such as India-UNDP Project on Energy Audits in Selected Areas, India-EC Energy Bus Project, Indo-German Technical Cooperation on Energy Efficiency for the State of Karnataka, Indo-US Bilateral Cooperation on Energy Efficiency, Swedish Agency for Research Cooperation for Developing Countries (SARCC) Programmes, Energy Efficiency Support Project funded by Government of India – Asian Development Bank etc. Main objectives of these projects were to build capacity in the country for energy efficiency area and also focus on training and exchange of information. Demonstration projects have also been implemented through international cooperation programmes.

# OTHER ACTIVITIES

## 17.1 CONSULTATIVE COMMITTEE OF MEMBERS OF PARLIAMENT

During the year 2001-2002, the Ministry of Power coordinated and organized Five meetings of the Consultative Committee of Members of Parliament for the Ministry of Power. The subjects for discussion at these meetings were (i) "HYDRO POTENTIAL IN THE COUNTRY AND HYDRO POWER POLICY FOR ITS EXPLOITATION; (ii) "NATIONAL POWER GRID" (iii) "TRANSMISSION AND DISTRIBUTION LOSSES – PROBLEMS AND SOLUTIONS" (iv) "RURAL ELECTRIFICATION", and (v)"ELECTRICITY BILL, 2001".

## 17.2 IMPLEMENTATION OF OFFICIAL LANGUAGE POLICY

The Ministry of Power, its attached and subordinate offices and Public Sector Undertakings, Autonomous bodies, Boards, Societies, Institutions under the administrative control of Ministry of Power have continued their efforts to ensure effective implementation of the Official Language Policy of the Government and encourage progressively the use of Hindi in day to day official work.

In compliance with the Constitutional and statutory requirements of Section 3 (3) of Official Language Act as amended from time to time all documents required to be issued bilingually, are being issued bilingually by the Ministry. Similrly, all communications received in Hindi are replied to in Hindi compulsorily.

To encourage the progressive use of Hindi through positive competitiveness among the attached offices and Public Sector Undertakings, Autonomous bodies, Societies, Institutions, Boards under the administrative control of Ministry of Power, a scheme for awarding Vidyut Rajbhasha Running Shield, Rajbhasha Trophy and Vidyut Rajbhasha Cup has been introduced.

In compliance with Official Language Policy, a Hindi Fortnight was organised from 14th September, 2001 to 28th September, 2001. During this period various programmes like Hindi Essay Competition, Hindi typing competition, Hindi debate competition, Hindi stenography competition, Hindi poetry competition and Hindi workshops were organised for the officers as well as staff of the Ministry. Those who came out with flying colours in these competitions, were awarded cash prizes.

With a view to assessing the progressive use of Hindi in attached, subordinate offices and Public Sector Undertakings, Boards and Institutions under the administrative control of Ministry, periodic inspections were carried out. During the period under review offices of Ministry of Power were visited and guidance was given to them after inspection. Inspection reports of above mentioned offices were prepared and necessary directions issued on the basis of inspection reports. This has been very helpful and beneficial in promoting the use of Hindi in Official work.

Meeting of Hindi Salahkar Samiti and Official Language Implementation Committee of Ministry of Power were convened regularly in which progress made by Ministry as well as its attached, subordinate offices was discussed. Comprehensive measures have been taken to implement the decision taken in these meetings.

## 17.3 WELFARE OF MINORITIES

Though separate schemes do not exist in the Ministry of Power for welfare of the minorities, the scheme recommended for welfare of the minorities from time to time by the agencies concerned are scrupulously followed. The Prime Minister's 15 point programme on Welfare of Minorities is being implemented in the Ministry of Power. It has been ensured that in case of Director Recruitment to Group C and D posts, a Member of Minorities Communities is included in the Selection Committee.

## 17.4 WELFARE OF SC/ST/OBCs

SC/ST Cell in the Ministry functions under the direct control of Liaison Officer who is of the rank of Deputy Secretary. The function of the SC/ST cell is to assist the Liaison Officer in monitoring implementation of reservation policy (viz., reservation for SC/ST, Physically Handicapped, Ex-Servicemen etc.) of Govt. of India in all the organizations including Public Sector Enterprises under the administrative control of Ministry of Power. SC/ST Cell also sends periodical reports viz., consolidated annual statement to Department of Personnel & Training, Department of Public Enterprises, Ministry of Social Justice and Empowerment and National Commission for SC/ST. It also renders assistance to the Liaison Officer in conducting annual inspection of reservation rosters maintained by various organizations under the administrative control of this Ministry.

During the year 2001, annual inspections of reservation rosters maintained by 16 organizations (including project offices) have been carried out. During the course of these inspections, the Liaison Officer also had interaction with the SC/ST officials of these organizations. The interaction with the SC/ST officials by the Liaison Officer at personal level, to a great extent had alleviated the misconceptions / misapprehensions many SC/ ST officials having about the management and reservation rules. Further, the interactions also contributed considerably in the reduction of influx of grievance cases. As a result this year only 15 cases have been received compared to the magnitude of the organizations the Ministry has under its administrative control.

A meeting with all the heads of organizations including CMDs of PSUs under the administrative control of this Ministry was held on 23.4.2001 under the aegis of Hon'ble Minister of State for Power to monitor the implementation of reservation rules in all the organizations under Ministry of Power. During the said meeting, clearance of backlog of vacancies reserved for SC/ST in all the organizations was deliberated in length. All the organizations were directed to clear the backlog of vacancies reserved for SC/ST in a time bound manner and to send periodical progress report. All the organizations were also directed to nominate a Liaison officer for SC/ST as far as possible for the persons belonging to SC/ST community. Various other welfare measures viz., extension of financial/infrastructural assistance to celebrate Dr.Ambedkar and Balmiki Jayanthis, proper utilization of fund allocated for the welfare of SC/ST, Rural Electrification programme for SC/ST colonies/ bastis, clean environment etc. were also reviewed.

To take stock of the progress made by all the organizations in clearing the backlog of vacancies reserved for SC/STs, MOS(P) had held a review meeting with all the heads of organizations on 19.12.2001. During the meeting it was observed that almost all the organizations had cleared the physical backlog of SC/ST vacancies. It was insisted that all the organizations under this Ministry's administrative control should take appropriate steps in clearing the backlog of reserved vacancies.

SC/ST Cell also renders assistance to the Liaison Officer (OBC) in monitoring implementation of OBC reservation in all the organizations under the administrative control of Ministry of Power.

## 17.5 GRIEVANCE CELL

The Grievance Cell in Ministry of Power deals with redressal of grievances relating to various grievances pertaining to Public Sector Undertakings, Autonomous bodies, Statutory bodies and Attached office under the administrative purview of Ministry of Power. The status of redressal of grievances is being monitored on monthly basis.

The status of grievance redressal for the year ending on 31.12.2001 is as under:-

| Number of Grievances Received | Number of Grievances Disposed | Number of Grievances Pending |
|---|---|---|
| 31 | 21 | 10 |

The Core Group under the chairmanship of the Secretary (Personnel) has approved the Citizens' Charter of the following Organizations:

i) Central Power Research Institute
ii) Rural Electrification Corporation Limited
iii) Power Finance Corporation Limited

There is an 'Information and Facilitation Centre' of the Ministry which is functioning at Ground Floor of the Shram Shakti Bhawan, New Delhi. The Website of the Ministry is accessible on NIC Webserver at the address of www.nic.in/powermin. It is also available through the LAN of NIC-MOP. The address of this website is 164.100.8.17/powermin.

## 17.6 CONTROLLER OF ACCOUNTS (COA)

The Secretary is Chief Accounting Authority of Ministry of Power. The office of Controller of Accounts functions under overall supervision of JS & FA. It has Controller of Accounts with one Deputy Controller of Accounts and 7 Pay & Accounts Officers including one outstation Pay and Accounts officer in Bangalore having cheque drawing powers and one for Internal Audit. The monthly accounts of all the PAO's are submitted regularly to the Principal Accounts Office every month who is responsible for consolidation and submission of Accounts in Detailed Classified Form to Controller General of Accounts. The Principal Accounts Office is also responsible for the preparation of Appropriation Account, Statement of Central Transactions (SCT) and Finance Account on annual basis for submission to the Controller General of Accounts ( CGA ) for consolidation of Government of India Accounts.

The Office of Controller of Accounts also bring out an annual accounting booklet called 'Accounts at a Glance ' which contains total transactions of the Ministry and its various organisations . It gives a brief overview of Accounting trends. The office of the Controller of Accounts is also responsible for preparing the Receipt Budget of the Ministry.

### Internal Audit Wing

The Internal Audit Wing ensures adoption of sound procedure, rules and financial propriety on transactions of accounts. This Wing also advises the DDOs to ensure Financial propriety on behalf of P & A.O.

Performance of the Internal Audit Wing during the year 2000-01 is as under:-

| Year (Accounts Due for Audit during 2000-01 | No.of Units due/ Inspected | No.of Paras Raised | No. of Paras settled | No. of paras Outstanding Upto 30.11.01 |
|---|---|---|---|---|
| 1999-2000 | 23/22 | 256 | 187 | 69 |

## Audit Observations

The organisation-wise break up of the Outstanding Audit Observations and Inspection Reports for audit of C & AGs as on 31.3.2001 is as under :-

| Sl.No. | Organisation | No. of Inspection Reports | No. of Paras |
|---|---|---|---|
| 1. | Ministry of Power | 2 | 26 |
| 2. | Central Electricity Authority | 4 | 21 |
| 3. | CERC | 1 | 15 |
| 4. | Controller of Accounts: | | |
| | (i) PAO (CEA), New Delhi | 1 | 4 |
| | (ii) PAO(Sectt.), New Delhi | 1 | 1 |
| | (iii)PAO (CEA), Bangalore | 1 | 2 |
| | TOTAL | 10 | 69 |

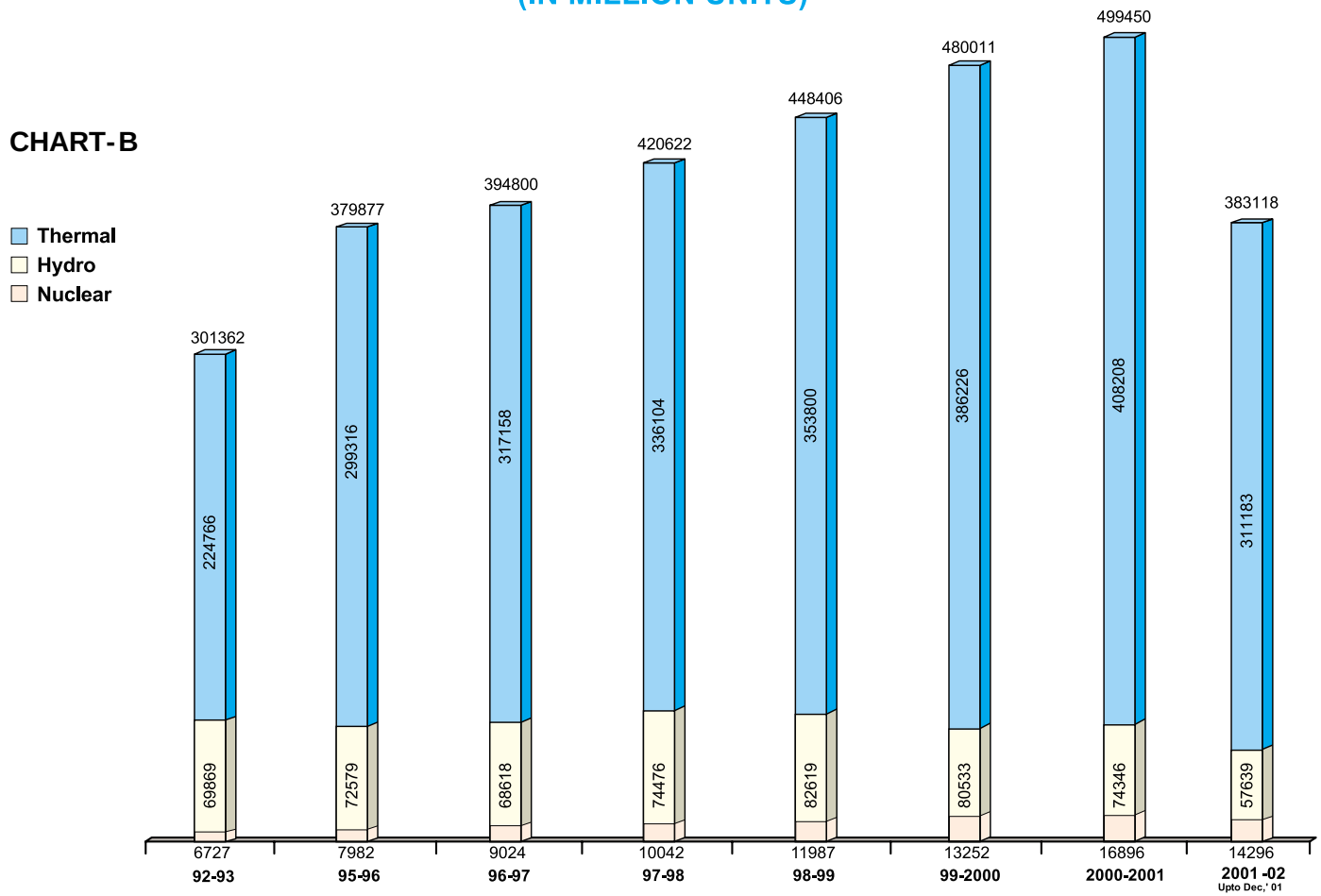
## 17.7 RECREATION ACTIVITIES IN MOP

The Ministry is promoting sports and cultural activities. Power Sports Control Board (PSCB), with the Minister in-charge of the Ministry of Power as Chairman, constituted as a nodal agency with the participation of Central Power organization i.e. Central Electricity Authority and all the Public Sector Undertakings/Autonomous bodies etc. under the administrative control of the Ministry of Power is arranging various tournaments in various disciplines every year, all over the country with the help of member organizations.

The Ministry has a Recreation Club for its staff for looking after the cultural and sports activities. The Hon'ble Minister of Power and the Secretary (Power) are its Chief patron and patron, respectively. The teams from Ministry of Power have been taking part in different disciplines in various tournaments and cultural meets organized by PSCB and inter-ministerial tournaments organized by Central Civil Services Cultural and Sports Board of the Department of Personnel and Training, Government of India.

# GROWTH OF ELECTRICITY GENERATION (UTILITIES)
## (IN MILLION UNITS)

**CHART-B**



# GROWTH OF INSTALLED CAPACITY (UTILITIES)
## (IN MEGA WATTS)

**CHART-C**

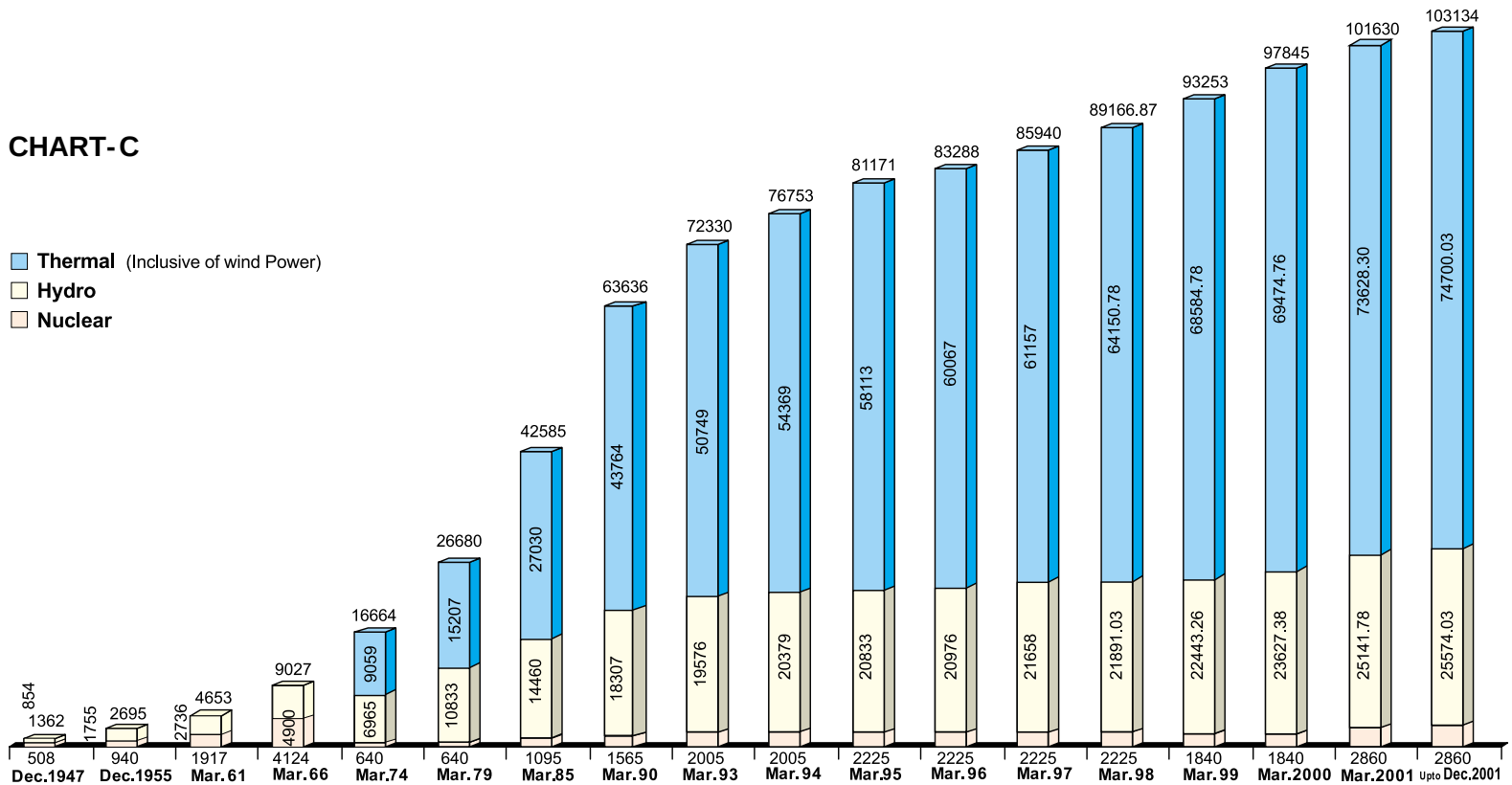
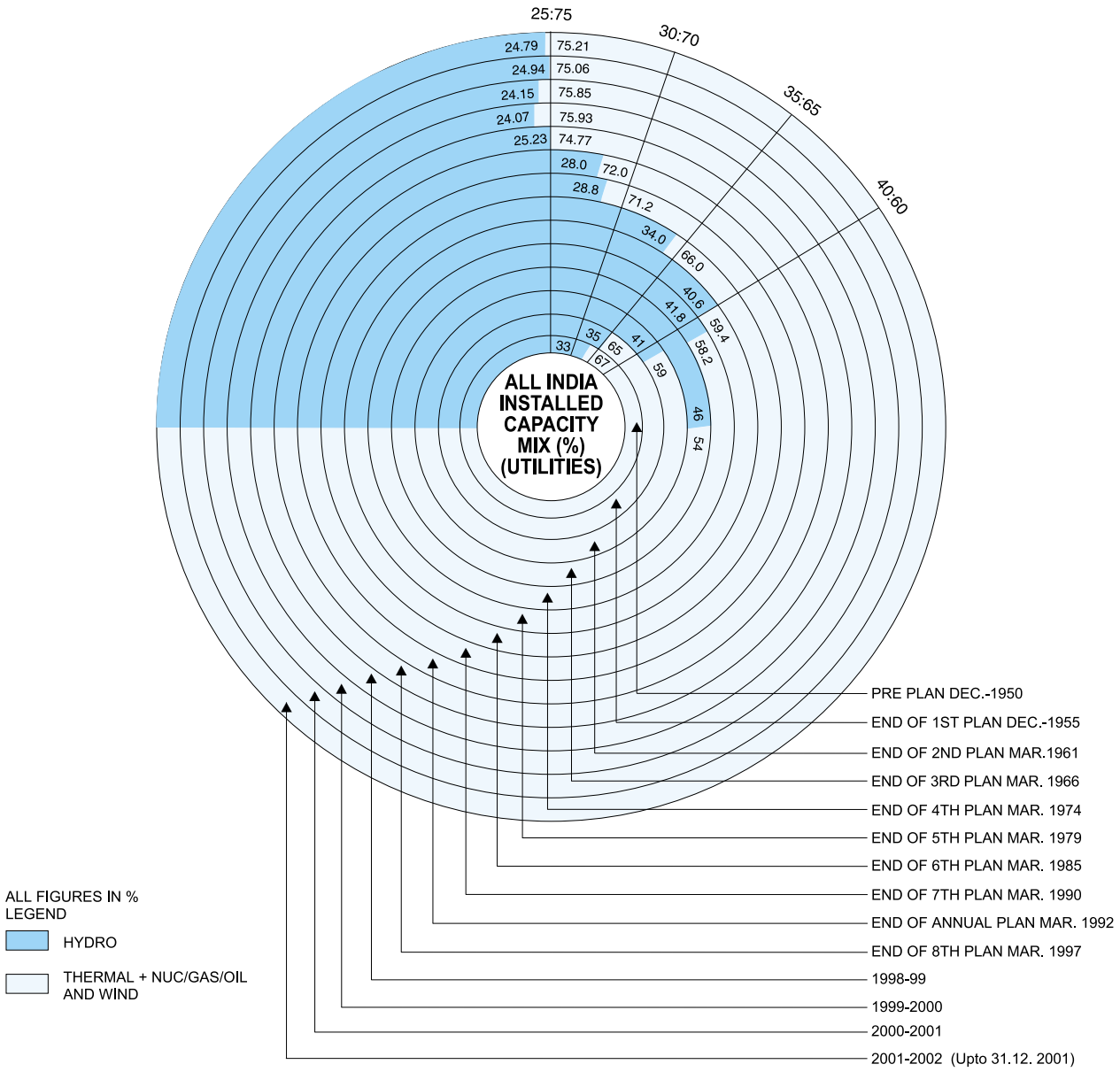


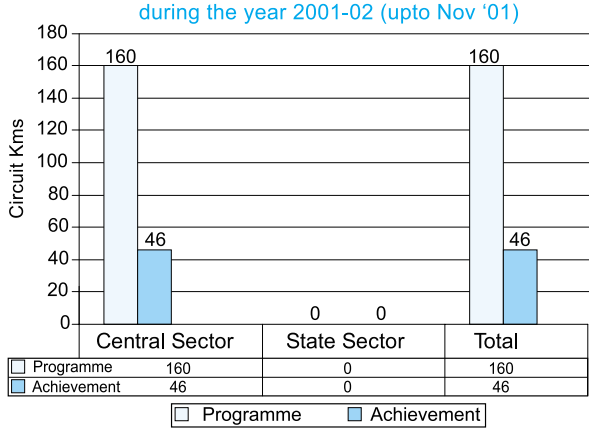
**CHART- D**

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

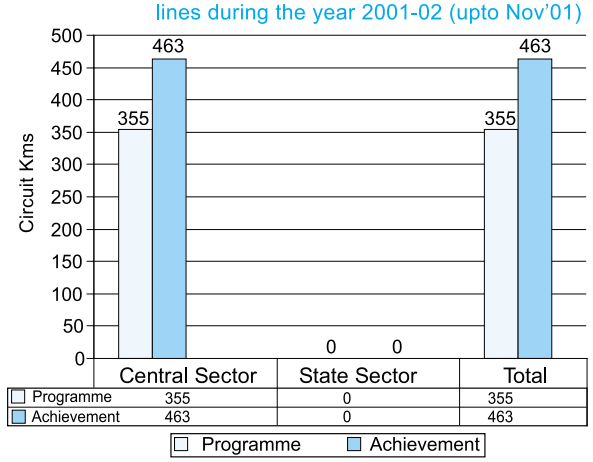


## CHART- E

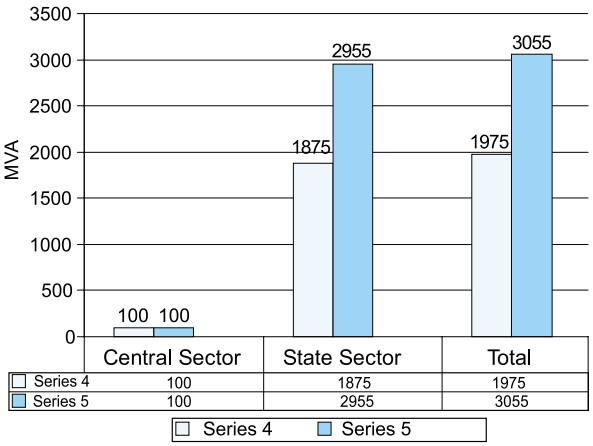
Achievement of 800 kV transmission lines during the year 2001-02 (upto Nov '01)



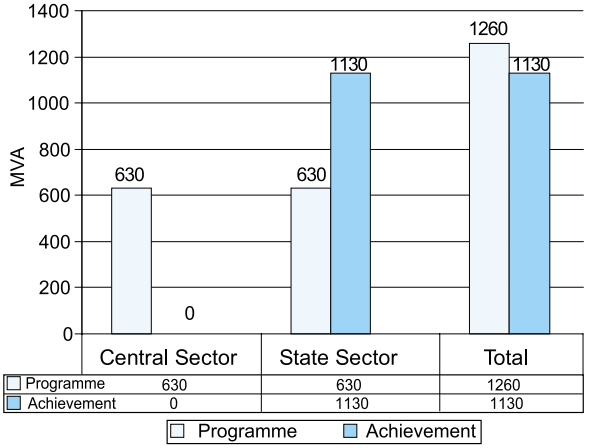

Achievement of +/- 500 kV HVDC transmission lines during the year 2001-02 (upto Nov'01)



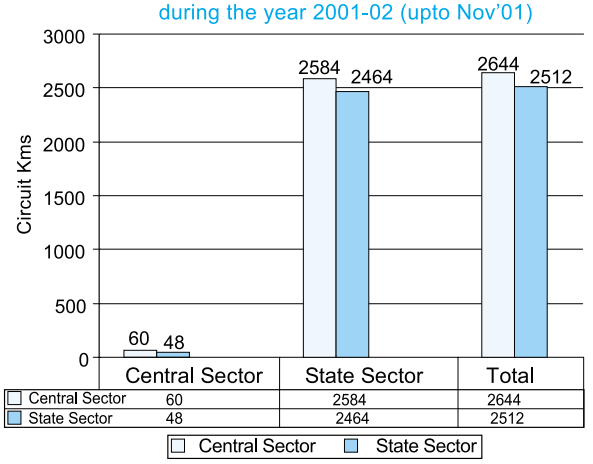

Achievement of 220 kV Sub-Stations during the year 2001-02 (upto Nov'01)



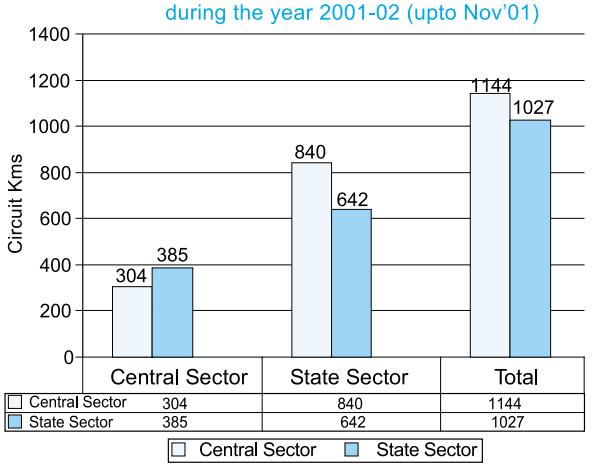

Achievement of 400 kV Sub-Stations during the year 2001-02 (upto Nov'01)




Achievement of 220 kV transmission lines during the year 2001-02 (upto Nov'01)




Achievement of 400 kV transmission lines during the year 2001-02 (upto Nov'01)



## STATEMENT-I

### INSTALLED CAPACITY (IN MW) OF POWER UTILITIES IN THE STATES/UTS AS ON 31.12.2001

| State | Ownership Sector | Total | Modewise breakup | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Thermal | | | Total | | |
| | | | Hydro | Coal | Gas | Diesel | Thermal | Wind | Nuclear |
| Delhi | State | 617.00 | 0.00 | 335.00 | 282.00 | 0.00 | 617.00 | 0.00 | 0.00 |
| | Private | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Central | 2308.00 | 217.00 | 1797.00 | 207.00 | 0.00 | 2004.00 | 0.00 | 87.00 |
| | **Sub-Total** | **2925.00** | **217.00** | **2132.00** | **489.00** | **0.00** | **2621.00** | **0.00** | **87.00** |
| Haryana | State | 1990.32 | 883.90 | 1102.50 | 0.00 | 3.92 | 1106.42 | 0.00 | 0.00 |
| | Private | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Central | 1290.00 | 314.00 | 383.00 | 534.00 | 0.00 | 917.00 | 0.00 | 59.00 |
| | **Sub-Total** | **3280.32** | **1197.90** | **1485.50** | **534.00** | **3.92** | **2023.42** | **0.00** | **59.00** |
| Himachal | State | 323.80 | 323.67 | 0.00 | 0.00 | 0.13 | 0.13 | 0.00 | 0.00 |
| | Private | 86.00 | 86.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Central | 239.00 | 109.00 | 54.00 | 62.00 | 0.00 | 116.00 | 0.00 | 14.00 |
| | **Sub-Total** | **648.80** | **518.67** | **54.00** | **62.00** | **0.13** | **116.13** | **0.00** | **14.00** |
| Jammu | State | 451.63 | 267.69 | 0.00 | 175.00 | 8.94 | 183.94 | 0.00 | 0.00 |
| & Kashmir | Private | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Central | 709.00 | 433.00 | 114.00 | 129.00 | 0.00 | 243.00 | 0.00 | 33.00 |
| | **Sub-Total** | **1160.63** | **700.69** | **114.00** | **304.00** | **8.94** | **426.94** | **0.00** | **33.00** |
| Punjab | State | 4528.94 | 2398.94 | 2130.00 | 0.00 | 0.00 | 2130.00 | 0.00 | 0.00 |
| | Private | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Central | 1216.00 | 456.00 | 406.00 | 264.00 | 0.00 | 670.00 | 0.00 | 90.00 |
| | **Sub-Total** | **5744.94** | **2854.94** | **2536.00** | **264.00** | **0.00** | **2800.00** | **0.00** | **90.00** |
| Rajasthan | State | 2741.52 | 971.62 | 1725.00 | 38.50 | 0.00 | 1763.50 | 6.40 | 0.00 |
| | Private | 7.60 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 7.60 | 0.00 |
| | Central | 1942.00 | 207.00 | 453.00 | 358.00 | 0.00 | 811.00 | 0.00 | 924.00 |
| | **Sub-Total** | **4691.12** | **1178.62** | **2178.00** | **396.50** | **0.00** | **2574.50** | **14.00** | **924.00** |
| Uttar Pradesh | State | 5612.75 | 1510.75 | 4102.00 | 0.00 | 0.00 | 4102.00 | 0.00 | 0.00 |
| & Uttaranchal | Private | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Central | 2812.00 | 201.00 | 2085.00 | 482.00 | 0.00 | 2567.00 | 0.00 | 44.00* |
| | **Sub-Total** | **8424.75** | **1711.75** | **6187.00** | **482.00** | **0.00** | **6669.00** | **0.00** | **44.00** |
| Chandigarh | State | 2.00 | 0.00 | 0.00 | 0.00 | 2.00 | 2.00 | 0.00 | 0.00 |
| | Private | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Central | 68.00 | 33.00 | 15.00 | 15.00 | 0.00 | 30.00 | 0.00 | 5.00 |
| | **Sub-Total** | **70.00** | **33.00** | **15.00** | **15.00** | **2.00** | **32.00** | **0.00** | **5.00** |
| | Central-Unallocated | 898.00 | 40.00 | 533.00 | 261.00 | 0.00 | 794.00 | 0.00 | 64.00 |
| Total | State | 16267.96 | 6356.57 | 9394.50 | 495.50 | 14.99 | 9904.99 | 6.40 | 0.00 |
| Northern | Private | 93.60 | 86.00 | 0.00 | 0.00 | 0.00 | 0.00 | 7.60 | 0.00 |
| Region | Central | 11482.00 | 2010.00 | 5840.00 | 2312.00 | 0.00 | 8152.00 | 0.00 | 1320.00 |
| | **Grand Total** | **27843.56** | **8452.57** | **15234.50** | **2807.50** | **14.99** | **18056.99** | **14.00** | **1320.00** |

Note :- *Based on derated capacity of 2 units each of 220 MW of Narora Atomic Power Station in U.P.

Contd...

## INSTALLED CAPACITY (IN MW) OF POWER UTILITIES IN THE STATES/UTS AS ON 31.12.2001

| State | Ownership Sector | Total | Hydro | Modewise breakup | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Thermal | | | Total Thermal | Wind | Nuclear |
| | | | | Coal | Gas | Diesel | | | |
| Goa | State | 0.16 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 |
| | Private | 48.00 | 0.00 | 0.00 | 48.00 | 0.00 | 48.00 | 0.00 | 0.00 |
| | Central | 406.60 | 0.00 | 357.00 | 34.60 | 0.00 | 391.60 | 0.00 | 15.00 |
| | **Sub-Total** | **454.76** | **0.05** | **357.00** | **82.60** | **0.00** | **439.60** | **0.11** | **15.00** |
| Daman & Diu | State | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Private | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Central | 14.20 | 0.00 | 8.00 | 4.20 | 0.00 | 12.20 | 0.00 | 2.00 |
| | **Sub-Total** | **14.20** | **0.00** | **8.00** | **4.20** | **0.00** | **12.20** | **0.00** | **2.00** |
| Gujarat | State** | 4660.58 | 547.00 | 3759.00 | 320.00 | 17.28 | 4096.28 | 17.30 | 0.00 |
| | Private | 2639.80 | 0.00 | 1060.00 | 1430.00 | 0.20 | 2490.20 | 149.60 | 0.00 |
| | Central | 1538.30 | 0.00 | 829.00 | 424.30 | 0.00 | 1253.30 | 0.00 | 285.00 |
| | **Sub-Total** | **8838.68** | **547.00** | **5648.00** | **2174.30** | **17.48** | **7839.78** | **166.90** | **285.00** |
| Madhya Pradesh & Chhatisgarh | State | 4371.01 | 932.91 | 3437.50 | 0.00 | 0.00 | 3437.50 | 0.60 | 0.00 |
| | Private | 22.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 22.00 | 0.00 |
| | Central | 1618.20 | 0.00 | 1268.00 | 257.20 | 0.00 | 1525.20 | 0.00 | 93.00 |
| | **Sub-Total** | **6011.21** | **932.91** | **4705.50** | **257.20** | **0.00** | **4962.70** | **22.60** | **93.00** |
| Maharashtra | State | 9743.57 | 2400.17 | 6425.00 | 912.00 | 0.00 | 7337.00 | 6.40 | 0.00 |
| | Private | 3250.40 | 447.00 | 1650.00 | 920.00 | 0.00 | 2570.00 | 233.40 | 0.00 |
| | Central | 2027.90 | 0.00 | 1339.00 | 391.90 | 0.00 | 1730.90 | 0.00 | 297.00* |
| | **Sub-Total** | **15021.87** | **2847.17** | **9414.00** | **2223.90** | **0.00** | **11637.90** | **239.80** | **297.00** |
| Dadra & Nagar Haveli | State | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Private | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Central | 15.50 | 0.00 | 9.00 | 4.50 | 0.00 | 13.50 | 0.00 | 2.00 |
| | **Sub-Total** | **15.50** | **0.00** | **9.00** | **4.50** | **0.00** | **13.50** | **0.00** | **2.00** |
| | Central - Unallocated | 891.30 | 0.00 | 650.00 | 175.30 | 0.00 | 825.30 | 0.00 | 66.00 |
| Total Western Region | State | 18775.32 | 3880.13 | 13621.50 | 1232.00 | 17.28 | 14870.78 | 24.41 | 0.00 |
| | Private | 5960.20 | 447.00 | 2710.00 | 2398.00 | 0.20 | 5108.20 | 405.00 | 0.00 |
| | Central | 6512.00 | 0.00 | 4460.00 | 1292.00 | 0.00 | 5752.00 | 0.00 | 760.00 |
| | **Grand Total** | **31247.52** | **4327.13** | **20791.50** | **4922.00** | **17.48** | **25730.98** | **429.41** | **760.00** |

Note :- * Based on derated capacity of 2 units each of 160 MW of Tarapore Atomic Power Station in Maharashtra.

** Retirement of 27 MW Dhuvaran Gas Turbine Unit-II w.e.f. 04.09.2001.

Contd...

## INSTALLED CAPACITY (IN MW) OF POWER UTILITIES IN THE STATES/UTS AS ON 31.12.2001

| State | Ownership Sector | Total | Hydro | Modewise breakup | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Thermal | | | Total Thermal | Wind | Nuclear |
| | | | | Coal | Gas | Diesel | | | |
| Andhra | State | 6028.84 | 2971.94 | 2952.50 | 99.00 | 0.00 | 3051.50 | 5.40 | 0.00 |
| Pradesh | Private | 916.70 | 0.00 | 0.00 | 793.40 | 36.80 | 830.20 | 86.50 | 0.00 |
| | Central | 1001.00 | 0.00 | 857.00 | 0.00 | 0.00 | 857.00 | 0.00 | 144.00 |
| | **Sub-Total** | **7946.54** | **2971.94** | **3809.50** | **892.40** | **36.80** | **4738.70** | **91.90** | **144.00** |
| Karnataka | State | 4238.07 | 2847.55 | 1260.00 | 0.00 | 127.92 | 1387.92 | 2.60 | 0.00 |
| | Private | 575.00 | 18.00 | 260.00 | 220.00 | 25.20 | 505.20 | 51.80 | 0.00 |
| | Central | 674.00 | 0.00 | 544.00 | 0.00 | 0.00 | 544.00 | 0.00 | 130.00 |
| | **Sub-Total** | **5487.07** | **2865.55** | **2064.00** | **220.00** | **153.12** | **2437.12** | **54.40** | **130.00** |
| Kerala | State | 2031.60 | 1795.00 | 0.00 | 0.00 | 234.60 | 234.60 | 2.00 | 0.00 |
| | Private | 186.00 | 12.00 | 0.00 | 174.00 | 0.00 | 174.00 | 0.00 | 0.00 |
| | Central | 804.00 | 0.00 | 398.00 | 350.00 | 0.00 | 748.00 | 0.00 | 56.00 |
| | **Sub-Total** | **3021.60** | **1807.00** | **398.00** | **524.00** | **234.60** | **1156.60** | **2.00** | **56.00** |
| Tamil Nadu | State | 5221.55 | 1995.15 | 2970.00 | 237.00 | 0.00 | 3207.00 | 19.40 | 0.00 |
| | Private | 1554.46 | 0.00 | 0.00 | 330.50 | 411.66 | 742.16 | 812.30 | 0.00 |
| | Central | 1969.00 | 0.00 | 1611.00 | 0.00 | 0.00 | 1611.00 | 0.00 | 358.00* |
| | **Sub-Total** | **8745.01** | **1995.15** | **4581.00** | **567.50** | **411.66** | **5560.16** | **831.70** | **358.00** |
| Pondicherry | State | 32.50 | 0.00 | 0.00 | 32.50 | 0.00 | 32.50 | 0.00 | 0.00 |
| | Private | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Central | 142.00 | 0.00 | 130.00 | 0.00 | 0.00 | 130.00 | 0.00 | 12.00 |
| | **Sub-Total** | **174.50** | **0.00** | **130.00** | **32.50** | **0.00** | **162.50** | **0.00** | **12.00** |
| | Central-Unallocated | 610.00 | 0.00 | 530.00 | 0.00 | 0.00 | 530.00 | 0.00 | 80.00 |
| Total | State | 17552.56 | 9609.64 | 7182.50 | 368.50 | 362.52 | 7913.52 | 29.40 | 0.00 |
| Southern | Private | 3232.16 | 30.00 | 260.00 | 1517.90 | 473.66 | 2251.56 | 950.60 | 0.00 |
| Region | Central | 5200.00 | 0.00 | 4070.00 | 350.00 | 0.00 | 4420.00 | 0.00 | 780.00 |
| | **Grand Total** | **25984.72** | **9639.64** | **11512.50** | **2236.40** | **836.18** | **14585.08** | **980.00** | **780.00** |

Note :- *Based on derated capacity of 2 units each of 170 MW at Madras Atomic Power Station in Tamil Nadu.

Contd...

## INSTALLED CAPACITY (IN MW) OF POWER UTILITIES IN THE STATES/UTS AS ON 31.12.2001

| State | Ownership Sector | Total | Hydro | Modewise breakup | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Thermal | | | Total Thermal | Wind | Nuclear |
| | | | | Coal | Gas | Diesel | | | |
| Bihar | State | 1988.40 | 174.90 | 1813.50 | 0.00 | 0.00 | 1813.50 | 0.00 | 0.00 |
| & Jharkhand | Private | 240.00 | 0.00 | 240.00 | 0.00 | 0.00 | 240.00 | 0.00 | 0.00 |
| | Central | 2730.50 | 84.00 | 2556.50 | 90.00 | 0.00 | 2646.50 | 0.00 | 0.00 |
| | **Sub-Total** | **4958.90** | **258.90** | **4610.00** | **90.00** | **0.00** | **4700.00** | **0.00** | **0.00** |
| West Bengal | State | 3582.77 | 164.71 | 3305.00 | 100.00 | 12.06 | 3417.06 | 1.00 | 0.00 |
| | Private | 1201.52 | 0.00 | 1201.38 | 0.00 | 0.14 | 1201.52 | 0.00 | 0.00 |
| | Central | 1750.00 | 60.00 | 1690.00 | 0.00 | 0.00 | 1690.00 | 0.00 | 0.00 |
| | DVC | 263.00 | 0.00 | 263.00 | 0.00 | 0.00 | 263.00 | 0.00 | 0.00 |
| | **Sub-Total** | **6797.29** | **224.71** | **6459.38** | **100.00** | **12.20** | **6571.58** | **1.00** | **0.00** |
| Orissa | State | 2298.49 | 1877.00 | 420.00 | 0.00 | 0.00 | 420.00 | 1.49 | 0.00 |
| | Private | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Central | 1102.00 | 0.00 | 1102.00 | 0.00 | 0.00 | 1102.00 | 0.00 | 0.00 |
| | **Sub-Total** | **3400.49** | **1877.00** | **1522.00** | **0.00** | **0.00** | **1522.00** | **1.49** | **0.00** |
| Sikkim | State | 37.90 | 32.90 | 0.00 | 0.00 | 5.00 | 5.00 | 0.00 | 0.00 |
| | Private | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Central | 118.00 | 60.00 | 58.00 | 0.00 | 0.00 | 58.00 | 0.00 | 0.00 |
| | **Sub-Total** | **155.90** | **92.90** | **58.00** | **0.00** | **5.00** | **63.00** | **0.00** | **0.00** |
| | Central - Unallocated | 878.00 | 0.00 | 878.00 | 0.00 | 0.00 | 878.00 | 0.00 | 0.00 |
| Total | State | 7907.56 | 2249.51 | 5538.50 | 100.00 | 17.06 | 5655.56 | 2.49 | 0.00 |
| Eastern | Private | 1441.52 | 0.00 | 1441.38 | 0.00 | 0.14 | 1441.52 | 0.00 | 0.00 |
| Region | Central | 6841.50 | 204.00 | 6547.50 | 90.00 | 0.00 | 6637.50 | 0.00 | 0.00 |
| | **Grand Total** | **16190.58** | **2453.51** | **13527.38** | **190.00** | **17.20** | **13734.58** | **2.49** | **0.00** |

Contd...

## INSTALLED CAPACITY (IN MW) OF POWER UTILITIES IN THE STATES/UTS AS ON 31.12.2001

| State | Ownership Sector | Total | Hydro | Modewise breakup | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Thermal | | | Total Thermal | Wind | Nuclear |
| | | | | Coal | Gas | Diesel | | | |
| Assam | State | 597.19 | 2.00 | 330.00 | 244.50 | 20.69 | 595.19 | 0.00 | 0.00 |
| | Private | 24.50 | 0.00 | 0.00 | 24.50 | 0.00 | 24.50 | 0.00 | 0.00 |
| | Central | 348.80 | 170.80 | 0.00 | 178.00 | 0.00 | 178.00 | 0.00 | 0.00 |
| | **Sub-Total** | **970.49** | **172.80** | **330.00** | **447.00** | **20.69** | **797.69** | **0.00** | **0.00** |
| Arunachal Pradesh | State | 45.43 | 29.55 | 0.00 | 0.00 | 15.88 | 15.88 | 0.00 | 0.00 |
| | Private | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Central | 43.00 | 22.00 | 0.00 | 21.00 | 0.00 | 21.00 | 0.00 | 0.00 |
| | **Sub-Total** | **88.43** | **51.55** | **0.00** | **21.00** | **15.88** | **36.88** | **0.00** | **0.00** |
| Meghalaya | State | 188.76 | 186.71 | 0.00 | 0.00 | 2.05 | 2.05 | 0.00 | 0.00 |
| | Private | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Central | 70.20 | 44.10 | 0.00 | 26.10 | 0.00 | 26.10 | 0.00 | 0.00 |
| | **Sub-Total** | **258.96** | **230.81** | **0.00** | **26.10** | **2.05** | **28.15** | **0.00** | **0.00** |
| Tripura | State | 85.36 | 16.01 | 0.00 | 64.50 | 4.85 | 69.35 | 0.00 | 0.00 |
| | Private | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Central | 64.10 | 31.10 | 0.00 | 33.00 | 0.00 | 33.00 | 0.00 | 0.00 |
| | **Sub-Total** | **149.46** | **47.11** | **0.00** | **97.50** | **4.85** | **102.35** | **0.00** | **0.00** |
| Manipur | State | 12.61 | 3.20 | 0.00 | 0.00 | 9.41 | 9.41 | 0.00 | 0.00 |
| | Private | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Central | 76.50 | 50.40 | 0.00 | 26.10 | 0.00 | 26.10 | 0.00 | 0.00 |
| | **Sub-Total** | **89.11** | **53.60** | **0.00** | **26.10** | **9.41** | **35.51** | **0.00** | **0.00** |
| Nagaland | State | 22.36 | 20.20 | 0.00 | 0.00 | 2.00 | 2.00 | 0.16 | 0.00 |
| | Private | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Central | 52.10 | 33.10 | 0.00 | 19.00 | 0.00 | 19.00 | 0.00 | 0.00 |
| | **Sub-Total** | **74.46** | **53.30** | **0.00** | **19.00** | **2.00** | **21.00** | **0.16** | **0.00** |
| Mizoram | State | 37.20 | 8.26 | 0.00 | 0.00 | 28.94 | 28.94 | 0.00 | 0.00 |
| | Private | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Central | 31.10 | 15.00 | 0.00 | 16.10 | 0.00 | 16.10 | 0.00 | 0.00 |
| | **Sub-Total** | **68.30** | **23.26** | **0.00** | **16.10** | **28.94** | **45.04** | **0.00** | **0.00** |
| | Central - Unallocated | 119.20 | 63.50 | 0.00 | 55.70 | 0.00 | 55.70 | 0.00 | 0.00 |
| Total North-Eastern Region | State | 988.91 | 265.93 | 330.00 | 309.00 | 83.82 | 722.82 | 0.16 | 0.00 |
| | Private | 24.50 | 0.00 | 0.00 | 24.50 | 0.00 | 24.50 | 0.00 | 0.00 |
| | Central | 805.00 | 430.00 | 0.00 | 375.00 | 0.00 | 375.00 | 0.00 | 0.00 |
| | **Grand Total** | **1818.41** | **695.93** | **330.00** | **708.50** | **83.82** | **1122.32** | **0.16** | **0.00** |

Contd...

## INSTALLED CAPACITY (IN MW) OF POWER UTILITIES AS ON 31.12.2001

| State | Ownership Sector | Total | Hydro | Modewise breakup | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Thermal | | | Total Thermal | Wind | Nuclear |
| | | | | Coal | Gas | Diesel | | | |
| Andaman & Nicobar | State | 39.30 | 5.25 | 0.00 | 0.00 | 34.05 | 34.05 | 0.00 | 0.00 |
| | Private | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Central | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | **Sub-Total** | **39.30** | **5.25** | **0.00** | **0.00** | **34.05** | **34.05** | **0.00** | **0.00** |
| Lakshadweep | State | 9.97 | 0.00 | 0.00 | 0.00 | 9.97 | 9.97 | 0.00 | 0.00 |
| | Private | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Central | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | **Sub-Total** | **9.97** | **0.00** | **0.00** | **0.00** | **9.97** | **9.97** | **0.00** | **0.00** |
| Total Islands | State | 49.27 | 5.25 | 0.00 | 0.00 | 44.02 | 44.02 | 0.00 | 0.00 |
| | Private | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Central | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | **Grand Total** | **49.27** | **5.25** | **0.00** | **0.00** | **44.02** | **44.02** | **0.00** | **0.00** |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ALL INDIA | State | 61541.58 | 22367.03 | 36067.00 | 2505.00 | 539.69 | 39111.69 | 62.86 | 0.00 |
| | Private | 10751.98 | 563.00 | 4411.38 | 3940.40 | 474.00 | 8825.78 | 1363.20 | 0.00 |
| | Central | 30840.50 | 2644.00 | 20917.50 | 4419.00 | 0.00 | 25336.50 | 0.00 | 2860 |
| | Total | 103134.06 | 25574.03 | 61395.88 | 10864.40 | 1013.69 | 73273.97 | 1426.06 | 2860 |

## STATEMENT-II

### THERMAL UNITS COMMISSIONED DURING APRIL - 31ST DECEMBER, 2001

| Sl. No. | Name of the Project/ Unit No. | State/Organisation | Capacity (MW) | Commissioning Schedule As envisaged at the beginning of the year | Actual |
|---|---|---|---|---|---|
| **A.** | **CENTAL SECTOR** | | | | |
| | Nil | | | | |
| **B.** | **STATE SECTOR** | | | | |
| 1. | Hazira CCGT | GUJ/GSEG Ltd. | | | |
| | GT-1 | | 52 | – | 30.09.2001 |
| | GT-2 | | 52 | – | 16.10.2001 |
| | | **Sub Total** | **104** | | |
| **C.** | **PRIVATE SECTOR** | | | | |
| 1. | PPN CCGT ST | TN/PPN Power Gen. | 105.5 | 04/2001 | 05.04.2001 |
| 2. | Tanir Bavi CCGT | Karnataka / Tanir Bavi | | | |
| | GT 1-4 (4x42.5) | Power Co. | 170 | 09/2001 | 08.05.2001 |
| | ST | | 50 | 09/2001 | 21.11.2001 |
| 3. | Jojobera TPS | Jharkhand / Tata | | | |
| | U-2 | Power Co. Ltd. | 120 | 10/2001 | 27.08.2001 |
| 4. | Samayanallur DGPP | Tamil Nadu / Balaji | (106.00) | | |
| | DG-1,2 | Power Corpn. | 2x15.143 | 06/2001 | 22.09.2001 |
| | DG-3,4 | | 2x15.143 | 07/2001 | |
| | DG-5,6 | | 2x15.143 | 08/2001 | |
| | DG-7 | | 15.143 | 09/2001 | |
| 5. | Suratgarh TPP | Raj / RRVUNL | 250 | – | 29.10.2001 |
| | ST.II U-3 | | | | |
| 6. | LVS Power Project | | | | |
| | DG-1 | AP/LVS Power Ltd. | 18.4 | 06/2001 | 18.10.2001 |
| | DG-2 | | 18.4 | 06/2001 | 18.10.2001 |
| | | **Sub-Total** | **838.3** | | |
| | | **Grand Total** | **942.3** | | |

## STATEMENT-III

### THERMAL UNITS LIKELY TO BE COMMISSIONED DURING BALANCE PERIOD OF 2001-2002 (JAN, 2002 - MARCH 2002)

| Sl. No. | Name of the Project/ Unit No. | State/Organisation | Capacity (MW) | Commissioning Schedule As envisaged at the beginning of the year | As now expected |
|---|---|---|---|---|---|
| **A.** | **CENTAL SECTOR** | | | | |
| 1. | Simhadri TPS, Unit-1 | AP/NTPC | 500 | 03/2002 | 03/2002 |
| 2. | Neyveli FST Extn. U-1 | TN/NLC | 210 | 11/2001 | 03/2002 |
| | | Sub-Total | 710 | | |
| **B.** | **STATE SECTOR** | | | | |
| 1. | Pragati CCGT | Delhi/DVB | | | |
| | GT-1 | | 104.6 | 01/2002 | 01/2002 |
| | GT-2 | | 104.6 | 03/2002 | 03/2002 |
| 2. | Leimakhong DG | Manipur/Manipur PDC | | | |
| | U-1 | | 6 | 06/2002 | 12/01–01/02 |
| | U-2 | | 6 | 06/2001 | |
| | U-3 | | 6 | 06/2001 | |
| | U-4 | | 6 | 06/2001 | |
| | U-5 | | 6 | 06/2001 | |
| | U-6 | | 6 | 06/2001 | |
| 3. | Rokhia GT Extn. Ph. II | Tripura/Govt. of Tripura | | | |
| | U-7 | | 21 | 03/2002 | 03/2002 |
| | | **Sub-Total** | **266.2** | | |
| **C.** | **PRIVATE SECTOR** | | | | |
| 1. | Dabhol CCGT (Ph-II) | Maharashtra Dabhol Power Co. | | | Uncertain due To dispute |
| | Block-I | | 722 | 06/2001 | Between MSEB |
| | Block-II | | 722 | 10/2001 | & DPC |
| 2. | Peddapuram CCGT | AP/BSES Andhra | | | |
| | GT | Power Ltd. | 142 | 06/2001 | 11/2001 |
| | ST | | 78 | 11/2001 | 02/2002 |
| 3. | Bambooflat DG | AN Island/ | | | |
| | DG-1 | Suryachakta | 5 | 03/2002 | 03/2002 |
| | DG-2 | Power | 5 | 03/2002 | 03/2002 |
| | DG-3 | | 5 | 03/2002 | 03/2002 |
| | DG-4 | | 5 | 03/2002 | 03/2002 |
| | | **Sub-Total** | **1684** | | |
| D. | **Additional Units Advanced** | | | | |
| | **STATE SECTOR** | | | | |
| 1. | Suratgarh TPP St. II | Raj / RRVUNL | | | |
| | U-4 | | 250 | | 03/2002 |
| 2. | Hazira CCGT-ST | | 52.1 | | 02/2002 |
| | | **Sub Total** | **302.1** | | |
| | | **Grand Total** | **2942.3** | | |

## STATEMENT-IV

### HYDRO UNITS ROLLED / COMMISSIONED DURING 2001- 02 (APRIL, 2001 TO DECEMBER, 2001)

As on 31.12.2001

| Sl. No. | Project/ State | No. | (MW) | Rolled/commissioned Cap. (MW) | Date |
|---|---|---|---|---|---|
| | | 1 | 2 | | |
| | **STATE SECTOR** | | | | |
| 1 | Upper Sindh - II (J&K) (2x35 MW) | 2 | 35.0 | 35.0 | 11.09.2001 (C) |
| 2 | Bansagar Tons PH-II (M.P.) (3x20 MW) | 2 | 20.0 | 20.0 | 25.08.2001 (C) |
| 3 | Srisailam LBPH (AP) (6x150 MW) | 2 | 150.00 | 150.0 | 29.10/2001 (R)/ 12.11.2001 (C) |
| 4 | Sharavathy Tail Race | 2 | 60.0 | 60.0 | 15.05.2001 (C) |
| | (Kar.) (4x60 MW) | 3 | 60.0 | 60.0 | 25.10.2001 (R)/01.11.2001 (C) |
| 5 | Kalpong | 1 | 1.75 | 1.75 | 27.06.2001 (R)/01.07.2001 (C) |
| | (A&N) (3x1.75 MW) | 2 | 1.75 | 1.75 | 14.07.2001 (R)/24.07.2001 (C) |
| | | 3 | 1.75 | 1.75 | 01.08.2001 (R)/15.08.2001 (C) |
| 6 | Likkim–Ro | 1 | 8.0 | 8.0 | 12.09.2001 (R) |
| | (Nag.) (3x8 MW) | 2 | 8.0 | 8.0 | 12.09.2001 (R) |
| | **PRIVATE SECTOR** | | | | |
| 7 | Malana | 1 | 43.0 | 43.0 | 23.06.2001 (R)/05.07.2001 (C) |
| | (H.P.) (2x43 MW) | 2 | 43.0 | 43.0 | 27.06.2001 (R)/09.07.2001 (C) |
| | **Total (All India)** | | | **432.25 (12 Units)** | |

## STATEMENT-V

### HYDRO CAPACITY LIKELY TO BE ADDED ADDITION DURING JANUARY, 2002 TO MARCH, 2002

| Sl. No. | Name of the Project/State | Unit No. | Capacity (MW) | Commng. At the beginning of year | Target Likely Date of Commissioning |
|---|---|---|---|---|---|
| | **CENTRAL SECTOR** | | | | |
| 1 | Ranganadi (NEEPCO) | 1 | 135.0 | Sep., 2001 | Dec., 2001 |
| | (Ar. Pr.) (3 x 135 MW) | 2 | 135.0 | Dec., 2001 | Dec., 2001 |
| | | 3 | 135.0 | Feb., 2002 | Feb., 2002 |
| | **STATE SECTOR** | | | | |
| 2. | Bansagar Tons PH-III | 3 | 20.0 | Sept., 2001 | March, 2002 |
| | (MP) (3x20 MW) | | | | |
| 3 | Sewa - III | 1 | 3.0 | Dec., 2001 | Mar., 2002 |
| | (J&K) (3x3 MW) | 2 | 3.0 | Dec., 2001 | Mar., 2002 |
| | | 3 | 3.0 | Dec., 2001 | Mar., 2002 |
| 4 | Srisailam LBPH | 3 | 150.0 | Feb., 2002 | Mar., 2002 |
| | (AP.) (6x150 MW) | | | | |
| 5 | Sharavathy Tail Race | 4 | 60.0 | Mar., 2002 | Mar., 2002 |
| | (Kar.) (4x60 MW) | | | | |
| 6 | Chandil LBC | 1 | 4.0 | Feb., 2002 | Feb., 2002 |
| | (Bihar) (2x4 MW) | 2 | 4.0 | Feb., 2002 | Feb., 2002 |
| 7 | Potteru PH-I & II | 1 | 3.0 | Dec., 2001 | Mar., 2002 |
| | (Ori.) (1x3 + 1x3 MW) | 1 | 3.0 | Dec., 2001 | Mar., 2002 |
| 8 | Likkim – Ro | 3 | 8.0 | Feb., 2002 | Feb., 2002 |
| | (Nag.) (3x8 MW) | | | | |
| | **Total (All India)** | | **666.0** | | |

*Assam Gas Based Power Station (291 MW)*

सत्यमेव जयते

**MINISTRY OF POWER**

**GOVERNMENT OF INDIA**