

## **VI. ENERGY**

### **DELHI VIDYUT BOARD**

#### **INTRODUCTION**

Delhi Vidyut Board is entrusted with the responsibility of Generation, Transmission and Distribution of electricity in the areas within the Municipal limits of M.C.D. It also makes available the bulk supply of power to NDMC and MES for distribution in their respective areas. The restructuring of DVB and privatization of Distribution Business is in progress and expected to be completed shortly.

The development of land in Delhi, is governed by Master Plan prepared by Delhi Development Authority (DDA). In addition, other agencies like MCD, CPWD, NDMC, DSIDC and HUDCO also take up the development of land for residential, commercial and industrial purposes. DVB's development activities are dependent on the programmes and policies of such local bodies, since arrangements have to be made for meeting the power requirements of such development, as also natural growth of power in the whole of the National Capital Territory of Delhi.

Delhi has certain special problems, which over the years, have made the working of DVB, particularly difficult. These problems include unplanned and haphazard growth of the city; large number of industrial units (1,35,000 nos.) in non-conforming areas; unauthorized colonies and jhuggi jhopri basties (which house about one third of the total population) and so on. This has put serious constraints on the development of a systematic electricity network in the city, leading to very high T&D losses.

#### **POWER DEMAND AND AVAILABILITY OF POWER:**

The maximum demand of power in Delhi has touched 2989 MW on 10.5.2002 (excluding load shedding of 57 MW). As per the projections made by the Sixteenth Power Survey Committee of Central Electricity Authority, Ministry of Power, Government of India, the maximum demand of Delhi will further grow to 3450 MW in 2002-2003 and 4310MW by the end of Tenth Plan 2006-2007.

The power requirements of Delhi are being met by DVB's own generation from IP Station, Combined Cycle G.T.P.S. and Rajghat Power Station and also from Dadri, BTPS, Barasuil Hydro Electric Project of NHPC; Singrauli and Rihand Super Thermal Project of NTPC. DVB also gets power from ANTA and AURIYA Gas Turbine Power Stations of NTPC. The shortfall, if any, is met through assistance from the Northern Regional Grid.

The following steps are being taken up by DVB to bridge the gap between the demand and the availability of power.

- i) A 400KV Ring is being established around Delhi which will bring bulk power to Delhi from the centrally sponsored generation schemes that are coming up in the Northern Region.
- ii) A number of new generation projects have been identified and action is being taken so as to derive benefits at the earliest. The details of these projects are given in the subsequent pages.

In addition to above, it will be necessary to take up with Government of India, for further allocation of power from the Central Sector Power Projects coming up in the Northern Region and to purchase power from Himachal Pradesh and Punjab etc., during peak load period.

## **REVIEW OF NINTH FIVE YEAR PLAN**

An outlay of Rs.3,005.0 Crores (including Rs.50.0 Crores for TYA Dev. Works) was approved for Ninth Plan 1997-02 of DVB. This amount includes DVB's requirement of funds for new generation projects, R&M Works at the existing generating stations as well as for the Transmission and Distribution works and other miscellaneous works required to be executed during the years. Against this approved outlay, the actual expenditure during the Ninth Plan is Rs. 2712.94 Cr.

An allocation of Rs.1,770.0 Crores was made for T&D works during Ninth Plan against which actual expenditure is Rs. 1866.53 Cr. The Major achievements during this period are commissioning of 400KV Ring from Mandaula – Bawana – Bamnauli along with 2X315MVA transformers at Bawana and 1X315MVA transformer at Bamnauli. Besides this, the capacity addition at various voltages is as under:

220KV	1050MVA, 40.47 Ckt Kms.
66KV	1040MVA, 56.228 Ckt Kms.
33KV	871MVA, 196.5 Ckt Kms.
11KV&LV	1382.5MVA, 3967.59 Ckt Kms.

The following are some of the reasons of minor shortfalls in achieving the Physical Targets in T&D system during Ninth Plan.

- i. In-ordinate delay in allotment of land from DDA for the Sub-Stations.
- ii. Prolonged delay in getting route approval for transmission lines by various agencies like DDA, PWD Environment and Forest Departments and railway crossings.
- iii. Unauthorized encroachment on approved routes and consequential delay in getting these encroachments cleared and stay orders vacated from different courts.
- Iv Inadequacy of experienced contractors to undertake these works.

#### **APPROACH TO TENTH PLAN 2002-2007**

A 400KV double circuit ring except Bamnauli- Ballabgarh has been commissioned around Delhi to draw power from the Northern Grid and also to receive power from other sources as well. The T&D system for 220 KV and below would also be adequately strengthened. Adequate capacity of shunt capacitors would also be installed to improve the system parameters. Steps are also being taken to reduce the T&D losses. It is expected that with these measures, it would be possible to reduce the T&D losses considerably. The performance of Thermal power stations including Gas Turbines would also be improved to increase the availability of power from the existing sources.

An outlay of Rs. 881 Cr. for 10<sup>th</sup> Plan & Rs. 211 Cr. for Annual Plan 2002-2003 has been approved by the Govt. of NCT of Delhi, keeping in view the fact that privatization of distribution shall be effective from 1.04.2002.

A brief write up of major schemes as per the approved outlay is given in the subsequent pages.

**A. GENERATION PROJECT**

**1. R&M WORKS AT I.P. STATION (Rs. 2500.00 Lakhs)**

In order to make optimum use of the units at IP Generating Station, certain Renovation and Modernization works have been initiated. With the completion of these works, DVB will be able to improve the plant utilization and also the efficiency of the units. An amount of Rs. 2500.00 lakhs is approved for 10<sup>th</sup> plan which includes Rs. 1000.00 Lakhs for Annual plan 2002-03 for carrying out various renovation works at I.P. Station.

**2. R&M WORKS AT RPH (Rs. 1765.00 Lakhs)**

2 X 67.5 MW units of RPH were commissioned in the year 1988-1989 and 1989-1990. In the year 2003-2004 unit no.II will have rendered service for 15 years and in the years 2004-2005. Unit no.1 will complete 15 years after this. As per CEA's norms, R& M works on both the units can be taken up after 15 years of service. In view of this an outlay of Rs.1765 lakhs has been approved for Tenth Plan and Rs.1053 lakhs for A.P. 2002-2003.

**3. 3 X 34.08 MW WASTE HEAT RECOVERY UNITS (Rs. 1300 lakhs)**

The total estimated cost of the project including IDC is Rs.278.53 Crores. The first unit was commissioned in March, 1995 and remaining two units in October, 1995 and March, 1996. PG tests of first and third module have already been conducted. For module II, PG test could not be conducted as BHEL has yet to commission HR SG-4. An outlay of Rs.30.00 Crores was approved for 9<sup>th</sup> Plan against which the actual expenditure is Rs.13.11 Crores. An outlay of Rs.1300 lakhs during the first year of Tenth Plan i.e. 2002-2003 has been approved for closing of the contract with BHEL. This includes supply, erection and last 10% payment to BHEL subject to settlement of pending issues with M/s BHEL including liquidated damages and balance of additional works carried out during the execution of the project.

**4. REFURBISHMENT OF WHRU MODULE – II AND OVERHAULING OF WHRU MODULE I & II (Rs. 10000.00 lakhs)**

The waste Heat Recovery units have completed 18000 running hours and will require overhauling during Tenth Plan as per the recommendations of original equipment manufacturer. In the 10<sup>th</sup> Five

Year Plan 2002-07 an amount of Rs. 10000 lakhs is required for refurbishment of 3 WHR Modules. On 1<sup>st</sup> January, 2002, Module-II has come after more the 3½ year after its rehabilitation by M/s. BHEL. About Rs. 1000 lakhs were spent on rehabilitation apart from other expenditure on auxiliaries.

On opening it was found that both the turbine rotors of Module 1&3 require complete reblading and accordingly turbine rotor of Module-I has already been sent to M/s. BHEL, Hyderabad, for reblading and expected cost will be around Rs. 10 Cr. Module No. 1 on receipt of the turbine rotor will be overhauled during the period 2002-03 or even more time may be taken by M/s. BHEL.

On receipt of turbine rotor of Module-I from M/s BHEL, Hyderabad, for its reblading and the expenditure will be around Rs. 10 to 15 Cr. By the time Module I & III will be on the bars. Module-II will be due for overhauling and during 10<sup>th</sup> Five Year Plan 2002-07 Module-II will also be overhauled and other Modules will also fall due for overhauling as the overhauling of each Module is normally carried out after 2 years. The anticipated expenditure during the 10<sup>th</sup> Five Year Plan will be approximately Rs. 10000 lakhs. It is expected that during 2002-2003 only Rs. 900 lakhs will have to be paid to M/s. BHEL, Hyderabad, towards part payment of reblading of steam turbine rotor of Module No. I and for other spares of auxiliaries but in 2003-04 about Rs. 2000 lakhs is likely to be spent and balance in other three years.

**5. NEW PRIVATE GENERATION PROJECTS (CONSULTANCY) (Rs. 500 lakhs)**

An outlay of Rs.3.0 Crores was approved for 9<sup>th</sup> Plan for consultancy of new project against which the actual expenditure is Rs.49.10 lakhs. An amount of Rs. 500.00

lakhs is approved for 10<sup>th</sup> plan which includes Rs. 100.00 Lakhs for Annual Plan 2002-03 for payment as consultancy charges.

#### **6. PRAGATI POWER PROJECT (330MW)**

Pragati Power Project has been awarded to M/s BHEL on turn-key basis. The total cost of the project is Rs. 1087.91 Crores based on BHEL contract Price + Taxes Duties, etc. G.T.-I was test commissioned on 15.03.2002 but could not run due to problem in Gas Turbine burners. The problem has since been resolved & GT-I shall again be commissioned during May-2002. The second unit is expected to be commissioned in June/July 2002, and complete plant by Nov.2002.

No outlay has been approved for this project in 10<sup>th</sup> plan as DVB is availing loan from PFC.

#### **7. OVERHAULING OF FOUR GAS TURBINES AND AUXILIARIES FOR ALL GAS TURBINES (Rs. 20000 Lakhs)**

An action plan was prepared for major overhauling of four nos. gas turbines i.e. 2, 3, 5 & 6 as GT-1 and GT-4 were partly overhauled by DVB in Jan., 1997 and Dec., 1998 respectively. All the gas turbines were commissioned in 1986 and have run for more than 50,000 hours and could not be overhauled due to inadequate availability of Power to DVB. As per recommendations of the manufacturer they need to be overhauled after every 24000 to 32000 fired hours. DVB vide its resolution dated 17.03.1999 approved for the overhauling of four nos. of GTs and also approved to send the Enquiry to GE, ALSTHOM, BHEL and BGGTS who have either designed, supplied the gas turbines or are manufacturing associates of gas turbines. Bids were opened on 31.05.1999 with the validity period of 180 days. After negotiations, order was split into four parts and placed on 22.09.1999.

An expenditure of Rs.111.81 Crores has been incurred during the 9<sup>th</sup> Plan. The overhauling shall be continued during Tenth Plan and also for A.P. 2002-03. An outlay of Rs.5400 lakhs has been approved for A.P. 2002-03 and for Tenth Plan the outlays is Rs. 20000 lakhs.

## **B. TRANSMISSION AND DISTRIBUTION SCHEMES**

### **1. 400KV SCHEMES (Rs. 18000.00 lakhs)**

In order to draw power from Northern Regional Grid of which DVB is a constituent partner, a 400KV ring is being established around Delhi. This will enable DVB to draw its share of power from the Singrauli STPS, Dadri STPS and Nathpa Jhakri Hydro Electric Project etc. This 400KV transmission system consists of 400KV double circuit line from Mandaula to Ballabgarh through Bawana and Bamnauli. The 400KV S/Stns. at Ballabgarh and Mandaula have already been commissioned by Power Grid Corporation. DVB was required to erect 2 nos. 400KV bays at each of these stations out of which 2 nos. 400KV bays at Ballabgarh could not be erected and commissioned due to Court stay on 2 nos. location on Bamnauli B.Garh ckts. 400KV Bawana and Bamnauli S/Stns. have already been commissioned by DVB with 2x315MVA and 1x315MVA power transformers respectively.

To meet the growing power demand of Delhi, a system, capable of transmitting and distributing bulk power has become essential. 2 nos. more 400/220KV S/Stns have been proposed during the Tenth Five Year Plan. The proposed 400/220KV S/Stn at Maharani Bagh shall meet the load of South and East Delhi. Power at this S/Stn will be drawn by 'looping in' and 'looping out' the existing 400KV D/C lines between Dadri and Ballabgarh. The other proposed 400/220KV S/Stn. at Mundka is for the load demand of West and North-West Delhi. Power at this S/Stn. will be drawn by 'looping in' & 'looping out' 400KV D/C line between Bawana and Bamnauli.

The portion of 400KV ring between Mandaula-Bawana and Bawana-Bamnauli has already been commissioned. The remaining portion between Bamnauli-Ballabgarh could not be completed for want of forest clearance from Govt. of Haryana. The forest clearance has now been obtained but two locations in Haryana are still under Court stay and Hon'ble Court has ordered renotification.

An outlay of Rs. 18000 lakhs for Tenth Five Year Plan and Rs. 5000 lakhs for Annual Plan 2002-03 has been approved for 400KV works.

**2. 220KV SCHEMES (Rs. 33100.00 lakhs)**

This is a continuing scheme which envisages establishment of new 220KV S/Stns. and Lines, as well as augmentation of transformation capacity of the existing 220KV S/Stns. in order to meet the growing power demand of Delhi.

An outlay of Rs. 400.0 crores for Ninth Five Year Plan was approved for 220KV works. The actual expenditure during the 9<sup>th</sup> plan is Rs. 194.07 crores. The approved outlays for Tenth Plan and the Annual Plan 2002-03 are Rs. 331.0 Cr. and Rs. 60.0 Cr. respectively.

**3. SLDC/SCADA SYSTEM (Rs. 200.00 lakhs)**

At present, the power system of DVB is controlled manually through system operation control room with the help of telephone lines, VHF sets, wireless sets and PLCC links etc. The complexity of the Power system & the quantum of information to be processed by the control room engineers has reached a point, where human capacity is inadequate for proper handling of emergency situations. In order to have proper monitoring, supervision and control of the system, a Unified Load Dispatch and Communication Scheme for Northern Region of India including Delhi Vidyut Board, covering generating stations, 400KV and 220KV system is being implemented by Power Grid. The MOU between DVB and Power Grid was signed on 15/1/1996.

The amount actually spent on this part of the scheme would be recovered by Power Grid from DVB in 15 years after its commissioning. DVB's SCADA system covering 66KV and 33KV system is being implemented by DVB itself. The estimated cost of this part of SCADA scheme is Rs. 85.94 crores including IDC.

An amount of Rs.200.00 lacs is approved for 10<sup>th</sup> Five Year Plan and the same amount has been retained for Annual Plan 2002-03 for this scheme.

**C RURAL ELECTRIFICATION (PMGY) (RS.735.00 LACS)**

The detailed scheme is being worked out by D.V.B. A provision of Rs.735 lacs is approved for 10<sup>th</sup> Five Year Plan which includes Rs.147.00 lacs for Annual Plan 2002-03.

**D. POWER SECTOR REFORMS (POWER DEPARTMENT)  
(Rs.256500.00 LACS)**

Due to privatisation of Delhi Vidyut Board, an amount of Rs.256500.00 lacs is approved for 10<sup>th</sup> Five Year Plan which includes Rs.120000.00 lacs for Annual Plan 2002-03 for giving loan to Distribution Companies. This amount will be refunded in 12 years with a moratorium of 3 years.

**E. DELHI ELECTRICITY REGULATORY COMMISSION  
(Rs.1000.00 LACS)**

The Delhi Electricity Regulatory Commission (DERC) was notified on 3<sup>rd</sup> March,1999 under Electricity Regulatory Commissions Act, 1998. The chairman of the Commission was appointed in December 1999. The Commission has been made functional and 34 post on temporary basis have been sanctioned by the Government. For the year 2001-02 budget under Non Plan Major Head "2801" Rs.3.2002 crores (Rupees Three Crores Twenty Lakhs Two Thousands Only) was available.

The commission as a body is responsible for determination of tariff and licensing; bring about a balance between the interest of the State, the consumers, the units involved in generation, transmission, distribution and supply of electricity and investors in the electricity industry and to monitor, control and regulate the working of these units; gather information and monitor price and quality of service; prevent monopoly abuse; promote competition and foster private participation in power sector; regulate and adjudicate on the tariffs and other related issues and also act as a body to resolve or set up machinery to resolve to speedily disputes among the licensees.

After the commencement of Reform Act, DERC has been notified as the Electricity Regulatory Commission for Delhi under Section 3 of the Reform Act. As a result of the above, DERC has been conferred the following functions:

- a) To determine the tariff for electricity, wholesale, bulk, grid or retail, as the case may be,
- b) To determine the tariff payable for the use of the transmission facilities;
- c) To regulate power purchase and procurement process of the licensees and transmission utilities including the price at which the power shall be procured from the generating companies, generating stations or from other sources for transmission, sale, distribution and supply in the National Capital Territory of Delhi;
- d) To promote competition, efficiency and economy in the activities of the electricity industry to achieve the objects and purposes of this Act;
- e) To aid and advise the Government in matters concerning electricity generation, transmission, distribution and supply in the National Capital Territory of Delhi;
- f) To regulate the operation of the power system within the National Capital Territory of Delhi;
- g) To set standards for the electricity industry in the National Capital Territory of Delhi including standards relating to quality, continuity and reliability of service;
- h) To promote competitiveness and make avenues for participation of private sector in the electricity industry in the National Capital Territory of Delhi and also ensure a fair deal to the consumers;
- i) To aid and advise the Government in the formulation of its power policy;
- j) To collect and publish data and forecasts on the demand for, and use of electricity in the National Capital Territory of Delhi and to require the licensees to collect and publish such data;

- k) To regulate the assets, properties and interest in properties relating to the electricity industry in the National Capital Territory of Delhi including the conditions governing entry into, and exit from the electricity industry in such manner as to safeguard the public interest;
- l) To issue licenses for transmission, bulk supply, distribution or supply of electricity and determine the conditions of the licences;
- m) To regulate the working of licensees and other persons authorized or permitted to engage in the electricity industry in the National Capital Territory of Delhi and to promote their working in an efficient, economical and equitable;
- n) To require licensees to formulate prospective plans and schemes in co-ordination with the others for the promotion of generation, transmission, distributions, supply and utilization of electricity, quality of service and to device proper power purchase and procurement process;
- o) To adjudicate upon the disputes and differences between the licensees and/or to transmission utilities and to refer the matter for arbitration;
- p) To aid and advise the Government on any other matter referred to the commission by the Government

In view of the important role of the Delhi Electricity Regulatory Commission in the development of infrastructure and promotion and growth of electricity sector in Delhi, it has been desired to meet its expenses through a Plan Scheme so that DERC can be provided requisite funds as a grantee organization of Government of National Capital Territory of Delhi.

An amount of Rs.1000.00 lakh is approved for 10<sup>th</sup> Five Year Plan which includes Rs.200.00 lakh for Annual Plan 2002-03 for meeting day to day expenditure of DERC.

**DEDA**

## **1. INTEGRATED URBAN ENERGY PROGRAMME (RS.90.00 LAKH)**

This scheme was reviewed by Hon'ble F.M. and it was decided to install institutional Solar Water Heating System but no progress has been made by D.E.D.A. A token provision of Rs.90.00 lakh is approved for 10<sup>th</sup> Five Year Plan which includes Rs. 60.00 lakh for Annual Plan 2002-03 for meeting the salary expenditure of the staff till a decision is taken to wind up D.E.D.A.

## **2. PLYING OF BATTERY BUSES SCHEME (RS.60.00 LAKH)**

Battery Bus scheme is a continuing scheme in the IXth Plan 1997-2002. The battery buses were supplied by BHEL alongwith choppers which could not run successfully in field conditions. Efforts of BHEL to improve the chopper could not succeed. Consequently two buses were given to Prof. Arockiaswamy of IIT Delhi for development of chopper. After sustain efforts a chopper has been developed by IIT Delhi. IIT Delhi also installed two newly developed choppers and free of charge in two buses for intensive field trail. These two buses fitted with newly developed choppers were dedicated to the citizen of Delhi by Hon'ble Chief Minister Delhi on 23/6/00 which are under trial in IIT Campus. It shows that the technology developed is being stabilized. IIT Delhi is also trying to involve the reputed firms for manufacturing and after sales service in this field and also requested DEDA to consider revival of some more buses from its fleet on the technology developed and agreed o undertake the installation and commissioning of these buses.

Further a meeting was held on 21/9/2000 in the chamber of Hon'ble Chief Minister to discuss various schemes/activities of DEDA. The meeting was also attended by Hon'ble Finance Minister alongwith other Ministers and Senior Officers of Government of Delhi and Minister of Non-conventional Energy Sources, Government of India wherein it has been decided that DEDA may run battery operated buses on experimental basis on the technology developed by IIT Delhi. Accordingly it is proposed to revive 8 more buses so that the total fleet of 10 buses could be operated. However, the same depends upon the outcome of the trial being conducted.

In addition to the operation of battery buses. DEDA has also providing parking/charging facilities for battery operated three wheelers on chargeable basis from its

existing charging stations. These three wheelers are being operated by M/s. Mahindra Ecomobile Ltd. And M/s. Scooter India Ltd. Recently an agreement has been executed between DEDA & MEML in this regard.

A provision of Rs. 60.00 lakh is approved for 10<sup>th</sup> Five Year Plan which includes Rs.40.00 lakh for Annual Plan 2002-02 for meeting the salary expenditure of the staff retained by D.E.D.A. under this scheme.