

# DESIGN AND ENGINEERING OF TRANSMISSION SYSTEM & SUB-STATIONS

## I. CONSULTANCY / TECHNICAL ASSISTANCE BY CEA

(A) In the last five year or so Central Electricity Authority provided Design and Engineering Consultancy / Technical Assistance for the following transmission lines and associated substations.

### 1. Consultancy to APTRANSCO

400/220 kV Substation at Hyderabad and Kurnool and 400 kV Bay extension work at Ghanapur and Nuna substations

400 kV D/C Srisailam-Vijaywada and Srisailam – Hyderabad Transmission Lines (878 ckt-km)

### 2. Assistance to UT of Daman and Dadra & Nagar Haveli

220/66 kV Sub-station at Magarwada & Kharadpada and 66/11 kV Sub-station at Varkund

Bay extension work at 6 Nos existing 66 kV Sub-stations

220 kV ( 52 ckt km ) and 66 kV ( 52.75 ckt-km ) Transmission Lines associated with Magarwada and Kharadpara projects

### 3. Consultancy to Bihar State Electricity Board

Erection and commissioning of transmission system involving rehabilitation of 220 kV Ganga crossing (10 km crossing)

### 4. Assistance to Power Development Department of J&K

220/132/33 kV Sub-stations at Barn and Gladni of Power Development Department, J&K

## (B) The works in hand are

### 1. Consultancy to Tala Hydroelectric Project Authority, Bhutan

Complete design and engineering of

Two Nos 400 kV D/C Transmission Lines associated with Tala HEP(126 ckt km)

400/220 kV Sub-station at Malbase ( 4 x 67 MVA ) associated with Tala HEP.

### 2. Consultancy to Bihar State Hydro-electric Power Corporation Ltd

Design of Sub-station structures and associated civil work for installation of 15 MVAR Reactor at 3x5 MW Eastern Gandak Project at Valmikinagar

### 3. Consultancy for 765 kV system of Uttar Pradesh Power Corp. Ltd.

For the first time, CEA has undertaken consultancy work for preparation of technical specification relating to 765kV switchyard associated with additional generation of 1000 MW of Anpara 'C' Thermal Power Station.

### 4. Consultancy for Damodar Valley Corporation

Design of different types of towers (DA,DB, DS,DC,DD) including power line crossing and river crossing towers along with anchor towers for 220 kV MRBTPS-Kalyaneswar D/c line of Damodar Valley Corporation.

#### **5. Consultancy for Bhutan Power Corporation Ltd., Bhutan**

Technical technical specifications for 66 kV S/c Transmission Line from Yurmoo-Bumthang and 132 kV S/c transmission lines from Tintibi – Yurmoo (Mangdechhu) and associated substations.

#### **6. Consultancy for Power Development Department of J&K**

For various 220 kV and 132kV transmission lines and associated 6 Nos. 220kV substations and 11 Nos. 132kV substations in Jammu and Kashmir Regions.

#### **7. Consultancy for Salma Hydroelectric Project, Afghanistan**

110 kV S/c Transmission line and associated substation for Salma Hydroelectric Project

### **II. PILOT PROJECTS DONE / UNDERTAKEN BY CEA**

#### **1. Power development in National Capital Region- techno-economic feasibility studies :**

CEA completed the detailed techno-economic feasibility studies for setting up of captive power generation plants including transmission and distribution network in the towns of Manesar in Haryana, Bhiwadi in Rajasthan and Ghaziabad in UP.

#### **2. Design of EHV Transmission Lines in snow bound hilly areas**

CEA has undertaken a pilot project to study the effect of ice-loading on EHV lines in snow bound hilly areas in District Kinnaur of Himachal Pradesh. For this purpose, a span of EHV Conductor has been erected at Kalpa(Rekongpio) in Kinnaur Distt. of Himachal Pradesh. Anemometers have also been installed to measure corresponding wind velocity. These anemometers are working on dual power, one from solar panel and other from 220 V AC main. The measured wind data would be used to carry out realistic design of EHV line in snow bound hilly areas in the country. Engineers of Himachal Pradesh SEB are involved in the project along with CEA Engineers.

#### **3. Pilot project on Residual life assessment of substation equipment**

Construction of any transmission system requires huge investment. The cost of EHV Substation equipment contributes a major portion of cost of the substation. There is need for condition monitoring of vital equipment of substation to assess healthiness as well as to assess the residual life of these equipment for replacement and refurbishment decision. Various on line and off line diagnostic tools are available for this purpose.

A pilot project on "Residual Life Assessment of Substation Equipment" has been taken up with MSEB with an objective to imbibe the culture of Condition Based Monitoring (CBM) of substation equipment. Following diagnostic tools have been procured and are being used in various 400 kV and 220kV substations of MSEB in Kolhapur region.

- i) Digital Earth Tester
- ii) Transformer Winding Resistance Meter
- iii) Contact Resistance Meter
- ii) Automatic relay test kit (3 phase)
- iii) Circuit Breaker Operation Analyzer with Dynamic Contact Resistance Meter(DCRM)
- iv) On line Dissolved Gas Analyzer

v) Leakage current monitor for lightning arrester

vi) Frequency Response Analyzer for Transformers.

The on line Dissolved Gas Analyzer has been installed in 220/33 kV Mudsighi Substation at Kolhapur to monitor the healthiness of the 50 MVA transformer.

In addition to above, following diagnostic tools are under procurement during 2005-2006.

Partial Discharge Measuring Equipment for Transformer / reactor / instrument transformer etc.  
Automatic Capacitance & Tan Delta

Results of studies as well comparison for validation has already started to yield rich benefits in terms of strict quality control of transformers supplied at various voltage levels.