

STATUS OF DISTRIBUTION SECTOR IN THE COUNTRY & INTRODUCTION TO ACCELERATED POWER DEVELOPMENT & REFORM PROGRAMME

1. Background

Power is a critical infrastructure for the growth of Indian economy. Acceleration in the economic growth will depend upon a financially and commercially viable power sector that is able to attract fresh investments. However, the financial health of State Electricity Boards (SEBs) has become a matter of grave concern considering that their losses have reached an alarming level of Rs.26,000 crores, which is equivalent to about 1.5% of GDP. World Bank estimates this loss would increase to Rs.40,000 crores in the next five years, unless this trend is halted with corrective steps. Out of total energy generated, approximately only 55% is billed and only 41% is realized. The gap between average revenue realization and average cost of supply has been constantly increasing. During the year 2000-01, the average cost of supply from SEBs was 304 paisa per unit and the average revenue realization was 212 paisa per unit.

The major factors responsible for financial sickness of SEBs are :

- Ø Skewed tariff structure leading to unsustainable cross subsidies by State Government
- Ø Huge T&D losses, largely due to outright theft and unmetered supply. It has been estimated that theft alone causes loss of about Rs.20,000 crores annually.
- Ø Lack of accounting and accountability in distribution.
- Ø Large man power – 27 to 30% revenue is used for establishment charges
- Ø Outdated rules, regulations, management structure and practices
- Ø Unstable top Management.

Power Sector development cannot accelerate until the above issues are addressed with full commitment at all levels. Accordingly, distribution reforms have been identified as the key area for putting the sector on the right track.

2. Issues in Sub-Transmission & Distribution Systems

Sub-Transmission and Distribution (ST&D) systems constitute the link between electricity utilities and consumers and their revenue realization segment. For consumers, it represents the face of the utility. Efficient functioning of this segment of the utility in technical and financial terms is essential to sustain the growth of power sector and the economy. However, the present situation is characterized by unacceptably high ST&D losses (both technical and commercial), poor quality and reliability of supply, tardy record in billing and revenue collection etc. In this context, ST&D segment of power sector needs immediate attention and action to achieve a turn around and self-sustenance of power sector whatever be its ultimate structure.

The main issue in ST&D systems or rather more appropriately the issue confronting the power sector as a whole, is the reduction of Transmission & Distribution (T&D) losses to acceptable minimum levels. The all-India T&D losses which were about 15% till 1966-67, increased gradually and are now at 24.79% (1997-98). During the last few years some of utilities variously estimated the losses in the range over 30% to 50%. Taking into consideration the Indian conditions such as far flung rural areas, nature of loads, system configuration etc. the reasonable permissible (technical) energy losses should be 10% - 15% in different states.

While the losses in Extra High Voltage (EHV) network are about 4% - 5%, bulk of the losses occur in ST&D system. It is well known that these losses in ST&D systems include non-technical or commercial losses and theft of power by various users with or without connivance of utility staff. These constitute a large component of overall losses. There are also losses on account of defective (slow) meters, stuck up/burnt meters etc. Further on account of estimation involved in agricultural sector consumption (30% of total), absence of adequate metering at the system level, deficiencies in consumer metering, the validity of figure of T&D losses being reported become questionable. General conclusions are that the reported losses are under estimated and cover up large commercial losses (theft); actual figures are higher, technical losses are also high and bulk of the losses occur in ST&D systems.

ST&D system upgradation and technical improvements will reduce technical losses. Proper and adequate metering will reduce metering losses mentioned above. The large amount of commercial losses cannot, however, be reduced by upgradation of network. An urgent and separate programme of action comprising legislative changes, strict vigilance, enforcement of punitive measures, enhanced accountability at the field

level of utility etc. is essential to be implemented to reduce commercial losses. The main source of revenue of utilities is from sale of energy to consumers which requires prompt and correct billing and realization. This is particularly important since in power sector, consumers pay after availing the service. Apart from energy losses, deficiencies in proper billing and revenue collection for the energy used seriously affect the financial health of utilities. It is all along recognized that the performance in this segment is much below the desired level and the situation is often aggravated by political interference. There are also losses on account of maintaining non-operative collection accounts and delays in remittances by the banks, non-reconciliation of remittances, embezzlement, misappropriation of funds by employees etc. instances of undue political interference in recovery.

From the above, the inescapable conclusion is that the revenue raising segment of the utilities suffers from basic deficiencies in terms of high energy losses and poor billing, revenue collection and financial management. From the consumers perspective, power supply is characterized by poor voltage and frequent interruptions in supply. The strategy for improvement should, therefore, be aimed at rectifying these deficiencies to ensure that the ST&D systems operate at optimum levels of technical, commercial and financial efficiency. These measures should also ensure quality of supply and consumer satisfaction.

3. Strengthening and Improvement of Sub-transmission and Distribution Systems

The causes for high ST&D losses are varied and many and require different remedial measures to be implemented. In a situation of poor data base, it is difficult to satisfactorily identify and allocate losses generated by individual causes which in turn creates difficulties in pursuing different remedial measures commensurate with their possible importance. Therefore, collection of reliable and sufficiently detailed data on the sources and quantum of losses becomes crucially important for designing, multipronged programmes for reducing losses with minimum investment. Considering the present general data status, it becomes imperative that initially the improvement and strengthening of system may be taken up in two phases-short-term and long-term. In the short-term, priority attention needs to be given to the objective of loss reduction, especially the commercial losses, improvement in revenue realization and reduction of outages. In the long term attention is to be given to reduction of technical losses, improvement in quality and reliability of supply, strengthening of the system to meet the growth in demand and upgradation and modernization of Sub-transmission and Distribution Systems. The works proposed under short term plan should be executed within 1-2 year, while the works proposed under long term plan should be completed in 5 years.

The Strengthening of Sub-transmission & distribution network would involve three broad areas of action viz. commercial, technical and manpower restructuring :

- (a) Commercial action includes tamper proof metering at all level of transformation and for all the consumers; operationalising energy accounting up to feeder level; de-centralised computerised billing & collection; development of MIS and proper duties & responsibilities upto the line man. Commercial activities target reduction of commercial losses and improvement of revenue.
- (b) Technical action involves conversion of the existing distribution network into a high voltage distribution system (HVDS) which covers reduction of LT lines; taking high voltage line up to the load centre and supplying power through smaller capacity energy efficient distribution transformation; re-conductoring of over loaded lines; power factor correction; Geographic Information System (GIS) mapping; polewise consumer information etc. This requires detailed energy audit & accounting studies, analysis of the data using software for developing component aided network model.
- (c) Restructuring the manpower involves review of the manpower right from the Superintending Engineer to line man and fixing proper duties, responsibilities and accountability at each level.

4. Circle concept

Formulation of ST&D development schemes for the entire state as a whole, as is done for generation and transmission facilities as a model, would not be feasible given the different specific requirements various geographical areas, scattered works, nature and volume of field level data required etc. The basic approach therefore requires identification and demarcation of limits of the areas within the state wherein the developmental activities in ST&D are to be carried out and energy accounting and profit centre concept (initially in terms of reduction of losses, improved billing and revenue collection and ultimately in financial terms also) could be implemented. This demarcation in consonance with responsibility and network

structure in the field covering both urban and rural areas correspond to a Circle which is headed by a Superintending Engineer and generally covers 66 kV/33 kV/11 kV/0.4 kV radial network. This concept of circle as a basic unit for planning and implementation is being adopted for APDRP schemes.

There are about 436 circles in the country and a list indicating state-wise no. of circles is given in Annex-I.

5. Accelerated Power Development & Reform Programme

The initiatives of Government of India hitherto were confined to setting up of SERC, tariff rationalization, unbundling of SEBs and private participation in generation, transmission & distribution enforced through Memorandum of Understanding (MoUs) with the State Governments. These initiatives were made as preconditions for release of Central Government funds. However, these steps that are predominantly fiscal, financial and policy oriented alone could not make much effect in bringing about commercial viability of SEBs, which is the main factor that has stymied power sector reforms. These initiatives on tariff rationalization and removal of subsidies have resulted in tariff increases without any improvement in quality, reliability and availability of power supply. This led to increased consumer resistance apart from lack of sustained investments in the Sector.

Non-viability of the State Electricity Board/Utilities on account of inadequacies of distribution sector, wherein the maximum losses occur, has not allowed for the desired results in the power sector reform initiatives and there was a need to integrate the various measures and initiatives and provide for a focused approach towards improving the sustainability and financial viability of the SEBs/Utilities.

A national programme has been launched that covers the entire country in the next three to five years to strengthen the sub-transmission and distribution network, restructures the utilities at the distribution circle level, adopts project mode and which seeks in the first instance to reduce outages and interruptions and reduce Aggregate Technical & Commercial (AT&C) losses to fifteen percent. Therefore, a nationwide programme called Accelerated Power Development Programme (APDP) was launched in February, 2001.

The scheme on APDP (now renamed as APDRP) was formulated to finance specific projects relating to :

- Renovation & Modernization/Life extension/Uprating of old power plants (Thermal & hydel) and
- Upgradation and strengthening of sub-transmission and Distribution network (below 33 kV or 66 kV) including energy accounting & metering in the distribution circles in a phased manner.

An amount of Rs.1000 crores was released as APDP fund among the States in FY 2000-01 for various schemes under above categories. Similarly, APDP fund of Rs.426 crores was released in FY 2001-02.

However, for quick turnaround of the power sector, a need was felt to restructure the concept of APDP from merely an investment window to also a mechanism for supporting power sector reforms in the States linked to the fulfillment of certain performance criteria by way of benchmarks. This was necessary to reduce the burden of transition and to ensure that the reform is sustainable and irreversible. To further incentivize the reform process, it is proposed to reward the actual improvements in the performance of the utilities by way of reduction in commercial losses and increased revenue realization. For this purpose, the reduction in the gap between cost of supply (on accrual basis) and revenue (on realization basis) would be criterion for reward. The Ministry of Power proposes to match, by way of grant, the actual reduction in cash losses by the state utility net of increases attributable to tariff revision by way of Additional Central Plan Assistance. This incentive will be provided only to such of those States, which achieve minimum eligibility criteria, i.e.

- a) The State should have set up a State Electricity Regulatory Commission (SERC).
- b) SEB/Utility should have filed its first tariff petition with the SERC.
- c) SEB/Utility should have achieved a minimum specified reduction in cash losses compared to the previous year

With the above modifications the scheme is now known as Accelerated Power Development and Reform Programme (APDRP).

Accelerated Power Development and Reform Programme (APDRP) is aimed to achieve AT&C losses to around 15% as against existing over 50% and ensure reliability and quality of power supply with adequate customer satisfaction. To begin with, the activities will concentrate in high-density networks where investments could lead to substantial, quick and demonstrable results. During the period of implementation of projects aimed at upgradation of Sub-Transmission & Distribution network in the high density areas, the State utilities will be urged to :-

- a) Meter all the consumers.
- b) Rationalize tariff by removing cross subsidies
- c) Develop local bodies & local institutions to take up electricity distribution to develop a large number of bulk & retail consumers.

While releasing the fund for FY 2001-02, Ministry of Finance put following two conditions for further release of funds under the scheme :

- The States shall have to sign a memorandum of understanding with Ministry of Power and ·
The schemes shall be prioritized by advisor cum consultants.

The memorandum of agreement (MOA) has been drawn up by MOP keeping the overall objective of reforms in the distribution sector. SEBs/Utilities have to commit the targets to be achieved by them in next three years against set benchmarks. SEBs of Karnataka, Andhra Pradesh, Maharashtra, Gujarat, Tamil Nadu, Rajasthan and Mizoram have already signed the MOAs. Other States shall be signing the MOA shortly.

Status of APDRP Schemes

Accelerated Power Development Programme (APDP) was introduced in Feb. 2001. Total schemes costing Rs.1990.2 crores were sanctioned in FY 2000-01 and APDP funds of Rs.977.3 crores were released among various States for Sub-Transmission and R&M/R&U schemes.

Sub-Transmission & Distribution

In FY 2000-01, out of total schemes of Rs.1990.2 crores, schemes for sub-transmission & distribution (ST&D) were for 1215.47 crores and APDP fund of Rs.625 crores was released among the States. The schemes mainly covered metering down upto consumer level, replacement/augmentation of Distribution Transformers, replacement of conductors, installation of capacitors etc. An amount of Rs.324.5 Crores, out of the above disbursement has been utilized.

Further, ST&D schemes costing Rs.4125.33 crores were sanctioned in FY 2001-02 and APDP fund of Rs.425.94 crores was released.

R&M/R&U Schemes

In FY 2000-01 schemes costing Rs.774.33 crores were sanctioned for R&M of Thermal Power Plants and R&U of Hydro Power Plants and APDP fund of Rs.362.33 crores was released. The States has utilized an amount of Rs.153.1 crores so far.

Further, R&M/R&U schemes for Rs.115.87 crores were sanctioned in FY 2001-02. However, no fund was released for these schemes.

6. Formulation of guidelines by Committee of Experts

The Ministry of Power has constituted a Steering Committee of Experts under the chairmanship of Member (PS), Central Electricity Authority, Govt. of India for formulating guidelines for improvement of Sub-Transmission and Distribution Systems. The Steering Committee of Experts alongwith Central Electricity Authority has formulated the following Guidelines :

- (a) Guidelines for formulation of project report on upgradation of sub-transmission and distribution system;
- (b) Guidelines for energy accounting and audit in power systems;
- (c) Guidelines for project management & performance evaluation of sub-transmission and distribution project;

- (d) Manual of training of personnel deployed on sub-transmission and distribution; and
- (e) Guidelines for framing Technical specification, Shunt capacitor, Distribution Transformers, AC Electrical meters, ACSR Conductors and XLPE cables.

The Guidelines have been circulated to all the power utilities in the country for their guidance and implementation.

7. Formulation of schemes for improvement of Sub-Transmission and Distribution systems

The schemes for improvement of Sub-Transmission and distribution systems based on physical survey, study and analysis of the power distribution network and should cover the following major areas :

- (i) Requirements for achieving 100% feeder metering as well as consumer metering
- (ii) R&M of grid sub-stations to minimize failure rate of transformers with increase in reliability of power supply.
- (iii) Addition/Augmentation of transformation capacity at sub-transmission and distribution level.
- (iv) Reconductoring /bifurcation/addition of 66 kV, 33 kV, 11 kV & LT lines.
- (v) Installation of 11 kV and LT capacitors
- (vi) Technology Options including Modernization works.
 - Less LT system – High Voltage Distribution System (HVDS)
 - Technology option for containing theft such as Aerial Bunched Cables (ABC), Automatic Meter Reading (AMR), etc.
 - Customer indexing Systems
 - Demand Side Management (DSM)
 - Communication facilities
 - Management Information Systems (MIS)
 - Consumer Interface Automation
 - Distribution Automation
- Customer relationship management systems.

Centres of Excellence-63 Distribution Circles under APDRP

With the objective of achieving contemplated benefits in term of reduction of T&D losses through investments made in upgradation of sub-transmission & distribution network, the Ministry of Power decided to focus the attention to few areas and in consultation with the State Governments have identified 63 distribution circles in different States in the first phase, to be developed into Centre of Excellence under APDRP. The list of circles state-wise taken up under the first phase of this programme is given in Annex-II.

Capacity Building

- (i) For the 63 circles covered under first phase of APDRP

Systematic development of the distribution systems requires integrating IT enabling mapping, computerized data acquisition, system analysis and developing a MIS system integrating the Techno-commercial functions. To hand hold the states and bring in uniformity of approach in formulation of schemes for improvement of ST&D systems and assist in their implementation Advisors-cum-Consultants AcCs have been positioned in the 63 circles. The lead AcC's are Power Grid Corporation of India Ltd. and National Thermal Power Corporation. and the other AcCs are WAPCOS, NPC, CPRI, MECON and ERDA.

- (ii) For the balance Circles

The improvement of distribution systems in the remaining 380 circles in the country is also to be taken up in a phased manner. This task can best be taken up by fully associating the respective SEBs and their staff in each circle. The intention is that instead of deploying persons from other organizations the work could be taken up by the SEBs personnel on their own.

In order to adopt uniformity of approach and standardization in the formulation of project reports for improvement of Sub-transmission and Distribution systems in these circles, it has been decided to conduct a training programme for the officers/engineers at the circle level. The Central Electricity Authority in association with Power Grid Corporation of India Ltd., National Thermal Power Corporation and Power Finance Corporation is conducting the capacity building exercise for circle level officers during September, 2002 through regional workshops at Delhi/Chandigarh, Mumbai, Bangalore, Guwahati & Kolkata.

ANNEX-I

STATEWISE NUMBER OF DISTRICTS & CIRCLES

REGION		STATES/UTs	No. of Districts	No. of Circles
NORTHERN REGION	1	HARYANA	19	13
	2	HIMACHAL PRADESH	12	12
	3	JAMMU & KASHMIR	14	7
	4	PUNJAB	17	17
	5	RAJASTHAN	32	24
	6	UTTAR PRADESH	70	49
	7	CHANDIGARH	1	1
	8	DELHI	9	6
	9	UTTARANCHAL	13	6
WESTERN REGION	1	GUJARAT	25	19
	2	MADHYA PRADESH	45	35
	3	MAHARASHTRA	35	36
	4	CHATTISGARH	16	8
	5	D & N HAVELI	1	1
	6	GOA	2	2
	7	DAMAN & DIU	2	2
SOUTHERN REGION	1	ANDHRA PRADESH	23	25
	2	KARNATAKA	27	15
	3	KERALA	14	19
	4	TAMILNADU	30	37
	5	LAKSHADWEEP	1	1
	6	PONDICHERRY	4	3
EASTERN REGION	1	BIHAR	37	17
	2	ORISSA	30	11
	3	SIKKIM	4	6
	4	WEST BENGAL	18	17
	5	A & N ISLS.	2	1
	6	JHARKHAND	18	11
NORTH-EASTERN REGION	1	ASSAM	23	14
	2	MANIPUR	9	4
	3	MEGHALAYA	7	3
	4	NAGALAND	8	2
	5	TRIPURA	4	3
	6	ARUNACHAL PRADESH	13	4
	7	MIZORAM	8	5
		TOTAL	593	436

DISTRIBUTION CIRCLES IN DIFFERENT STATES SELECTED UNDER APDRP

Sl. No.	States	Distribution Circles
1.	Andhra Pradesh	Eluru, Warangal, Tirupati
2.	Assam	Dibrugarh, Jorhat, Guwahati
3.	Bihar	PESU(Patna), Patna(Central), Muzzafarpur
4.	Chhattisgarh	Raipur, Bilaspur, Rajanandgaon
5.	Delhi(DVB)	East, West, North-West
6.	Goa	Goa North
7.	Gujarat	Sabarmati, Himatnagar, Jam Nagar, Kutch
8.	Haryana	Karnal, Sonapat, Hissar, Faridabad
9.	Himachal Pradesh	Solan, Nahan, Simla
10.	Jharkhand	Hazaribagh, Loyabad, Ranchi
11.	Karnataka	Belgaum, Bijapur, Mysore
12.	Kerala	Manjeri, Pathanemthita, Kasargode
13.	Madhya Pradesh	Ujjain, Indore, Gwalior
14.	Maharashtra	Osmanabad, Jalgaon, Ratnagiri, Sholapur, Sindudurg, Aurangabad
15.	Punjab	Khanna, Patiala, Mohali
16.	Rajasthan	Jhunjhunu, Alwar, Jodhpur
17.	Tamil Nadu	Thiruvanamalai, Villupuram, Cuddalore
18.	Uttar Pradesh	Moradabad, Bareilly, Gorakhpur
19.	Uttaranchal	Roorkee, Rudrapur, Dehradun
20.	West Bengal	24 Paragana, Howrah, Bidhannagar