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Performance of Private Electricity Distribution Utilities in India: Need for In-depth Review and Benchmarking

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Abstract

For last few years, the debate and action in power sector reforms are rightly focusing on the distribution side. Privatisation of distribution is heralded as the right path of reforms, for which various models are being tried out and large resources are being devoted to work out the necessary details. Unfortunately however, no government agency or international institution has carried out a detailed review of the performance of existing private distribution utilities. Such a study is essential to draw lessons that can greatly help in avoiding structural and contractual inefficiencies in the emerging design of the power sector. This is especially crucial when important features of the sector (like tariff policy) are being redesigned.

As the first step towards bridging this analytical gap, this report compares easily available public data of six private distribution utilities, viz., Tata Power Company, BSES, Calcutta Electricity Supply Company, Surat Electric Company, Ahmedabad Electric Company and NOIDA Power Corporation. As an indicative exercise, comparable data of two public utilities, viz., (BEST, Mumbai) and Pune Urban Zone of MSEB are also presented.

Based on this comparison, 'first-cut' observations about the performance of these utilities are drawn regarding five aspects, namely, T&D losses, receivables, manpower, distribution investments, and distribution cost. It is seen that even private utilities may not be free from the menace of large-scale commercial losses. The capital investments as well as the 'Distribution Costs' of these utilities show a large variation. For example, 'Distribution Cost' in Surat is Rs. 0.56 / U sold, whereas in the case of Mumbai and Kolkatta, it is over Rs. 1 / U sold. The study also identifies important aspects that should be covered in an in-depth performance review of private distribution utilities.

About Prayas, Energy Group

Prayas is a registered charitable trust based in Pune. Prayas's activities cover four substantive areas of Health, Energy, Learning and Parenthood, and Resources and Livelihoods. The Energy Group of Prayas is mainly engaged in policy analysis in the electricity sector and capability building of civil society institutions.

Its past work includes an analysis of the power purchase agreement between Dabhol Power Company (DPC) and the Maharashtra State Electricity Board (MSEB); the development of a least-cost integrated resource plan (IRP) for the state of Maharashtra; an analysis of agricultural power consumption and subsidy; a study of the regulatory aspects of the Orissa model of power sector reforms, and a critique of the activities of, and lending by, multilateral development banks for the energy sector in India.

For the last few years, the Energy Group has focused mainly on issues relating to power sector reforms and regulation. All major publications, presentations, and reports of the Energy Group are available on our website. Prayas's activities are supported through project-based grants from charitable foundations.

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Performance of Private Electricity Distribution Utilities in India: Need for In-depth Review and Benchmarking

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1. Introduction

In the last few years, the focus of the debate and action on power sector reforms has shifted from generation to distribution side. Several committees, policy documents, and reform plans have espoused the need for privatisation of distribution and have suggested several actions in terms of legislative and regulatory changes to make privatisation of distribution successful. Privatized distribution, though limited in scope, is not new in India. Private distribution utilities (licensees) such as Tata Power Company (TPC) and Calcutta Electricity Supply Company (CESC) have been in operation for nearly a century. Detailed performance review of such existing private utilities can offer valuable insights which would be useful while making decisions regarding restructuring of the power sector. Unfortunately, we have not come across any such study either by Ministry of Power (MoP), Planning Commission, or any other government or international funding agency.

The Coelho Committee appointed in 1998 by MoP was one of the first committees to look into the issue of private sector participation in power distribution. It carried out a qualitative evaluation of various options for distribution reforms—from municipal ownership to linking IPPs with distribution circles. However, it did not go into quantitative performance review of the existing private distribution utilities. The situation has not changed since then. The recent report of the "Distribution Policy Committee" (or the Basu Committee) appointed by MoP provides an indication of the apathy to review the performance of existing private distribution utilities. The terms of reference of this committee had mandated the committee to conduct the *"(R)eview of privatisation of distribution in Orissa and experience of other distribution licensees in India".* In spite of such a clear mandate, the report of the committee did not even present a preliminary analysis of performance of private distribution licensees.

2. Objective

With this background, this report aims at compiling and comparing the easily available (public) data of the six old private utilities (which have been in existence before the current phase of reforms). viz., Tata Power Company (TPC), BSES, Calcutta Electricity Supply Company (CESC), Surat Electric Company (SEC), Ahmedabad Electric Company (AEC) and NOIDA Power Corporation (NPC).

The newly formed private utilities in Orissa and Delhi are not included in this analysis, as their period of functioning is thought to be short for such an analysis and would require a significantly different kind of inquiry.

Further, as an '*indicative'* exercise, data for two publicly-owned utilities, viz., Bombay Electricity Supply and Transport Undertaking (BEST) and Pune Urban Zone (PUZ) of the state-owned utility Maharashtra State Electricity Board (MSEB) are also compiled. BEST is an undertaking of Mumbai Municipal Corporation that handles distribution of electricity in Southern Mumbai, while PUZ is a largely urban, non-agricultural distribution zone of MSEB (similar to the service areas of other distribution utilities).

The objective of this report is to draw some 'first-cut' observations about the performance of these utilities, and emphasise the need for a detailed performance review. The report also identifies the possible contours of such a study. The report does not intend to either rank private utilities or to draw universal conclusions regarding the ownership debate.

3. Data sources and organization of the report

All electricity utilities (licensees) in India are required to prepare and publish annual financial statements as per the provisions of Schedule VI of Electricity Supply Act, 1948 (ES Act) and Indian Electricity Rules (IE Rules). These reports are quite exhaustive

and give valuable information about the performance of utilities. Schedule VI reports and the annual reports of these utility companies are the primary sources of data for this report. Another source of data has been the orders of relevant regulatory commissions on the tariff revision application of these utilities. Data for BEST is compiled from the annual reports of BEST[1]. MSEB has a system of preparing separate balance sheets for each of its distribution zones. Data for PUZ is compiled from such a balance sheet. Annexure 1: 'Utilities at a Glance' presents the data for all the utilities.

We are thankful to these utilities, which responded promptly to our request for data. Unfortunately, in spite of repeated requests and legal obligation to make available Schedule VI reports to the public at a cost of five rupees, Ahmedabad Electric Company (AEC) refused to share the full data required under Schedule VI. As a result, data regarding AEC are incomplete and only data available in the annual report of the company could be used for the compilation.

The next section of this report gives an overview of each of these distribution utilities and also touches upon their interactions with the state regulatory commissions. The fifth section compares performance of these utilities on some important parameters and identifies the direction for further in-depth evaluation of their performance and benchmarking. Observations regarding the performance of PUZ are presented in the sixth section.

4. Introduction to Distribution Utilities (licensees)

The Indian Electricity Act, 1910 — nearly a century old legislation —was aimed at regulating the private utilities. At the time, dozens of private utilities were operating in urban areas all over the country. Since early sixties, with the creation of state electricity boards (SEBs) through Electricity Supply Act (ESA), 1948, these utilities were gradually taken over by the SEBs. About five major distribution utilities survived this acquisition and still operate as private utilities. In 1993, distribution in the NOIDA area (adjacent to New Delhi) in Uttar Pradesh was privatized and was handed over to the NOIDA Power Corporation.

The basic parameters of operations of these six distribution utilities are given in Table 1, and a brief introduction to the distribution utilities considered in the analysis is given below.

4.1 Tata Power Company (TPC)

Since the pre-independence days, Tata companies have been supplying power to Mumbai city. Recently, three companies from the Tata group with license to generate and distribute electricity in Mumbai were merged to form a larger Tata Power Company (TPC). At present, TPC has a total installed capacity of 444

Table 1 : Overview of basic features of private distribution utilities in India

Sr. No.	Parameter	TPC	NPC	BSES	CESC	SEC	AEC
1.	Area of Operation	Mumbai	Greater NOIDA	Mumbai	Kolkata	Surat	Ahmedabad and Gandhinagar
2.	Area served (sq. km.)	444#	335	384	567	54	356
3.	Consumers (lakh)	0.1	0.11	20	18	4.7	10.54
4.	Energy Input (MU, at bus-bar)	9000	162	6000	6700	2000	3500
5.	Generation Capacity (MW)	1798	0	500	1065	0	490
6.	Revenue (Rs. Cr.)	3200	50	2000	1800	625	975
7.	Largest shareholder	Tata	RPG	Reliance	RPG	Torrent	Torrent

Notes:

1. *Data for BSES and NOIDA are for the FY 1999-00 and for other utilities for the FY 2000-01*
2. *Energy input figures are rounded off to 100 MU, and revenue figures are rounded off to Rs. 25 Cr. The revenue shown in the table is revenue from sale of power (including miscellaneous income such as meter rent etc.)*
3. 1 Lakh = 100, 000
4. *# Technically, licensed area of TPC is around 2000 km. which includes generation plants located away from Mumbai, but practically TPC's distribution area is equivalent to that of BSES and BEST put together.*

[1] Being a municipal undertaking, Schedule VI is not applicable to BEST.

MW hydro generation and 1,350 MW thermal (coal and gas) generation. TPC has successfully implemented the 'islanding' scheme that has enhanced reliability of power supply in Mumbai. Until recently, nearly all power generated by TPC was sold in bulk to two distribution utilities in Mumbai, viz., BSES and BEST. While TPC has the license to supply power in the entire Mumbai district, BEST has license to supply power only to Greater Mumbai area while BSES supplies power only to suburban Mumbai. Until recently, TPC and BSES did not compete with each other for attracting consumers. With the commissioning of BSES's 500 MW generation plant in 1995 however, the situation has changed. With the demand in Mumbai growing very slowly, TPC has surplus capacity and has started directly approaching consumers in a bid to increase its capacity utilization. Its consumer base now stands around 10,000. TPC is also expanding its utility business outside Mumbai and has recently acquired one distribution company in Delhi.

4.2 BSES

BSES, earlier known as Bombay Suburban Electric Supply Company is a distribution licensee supplying power to suburban areas of the city of Mumbai. In the last few years, the Reliance group of companies has increased equity holding in this company and currently holds more than 50% equity of BSES. Till 1995, BSES was a purely distribution utility, purchasing entire power requirement from TPC. In 1995-96, BSES established a 500 MW coal thermal power plant at Dahanu. Currently, the company serves about twenty lakh consumers and purchases less than half of its energy requirement from TPC. BSES is one of the most aggressive power utilities in the country. In 1999, it acquired three (of the four) regional distribution companies in the state of Orissa and, recently, it also acquired two distribution companies in the Delhi state. Apart from this, BSES also has substantial interests in three IPP projects in the country. The 165 MW naptha-based IPP project in Kerala had started commercial operation but the generation was suspended due to payment dispute with the SEB. It recently started generation once again after reaching a compromise agreement with the SEB. The 220 MW CCGT project in Andhra Pradesh has received approval of the APERC for amendment in PPA, whereas there is little progress on the third IPP in Tamilnadu. Additionally, BSES is also operating telecom and coal washery projects. The coal washery is primarily used for its Dahanu plant, and recently it has also started supplying washed coal to other utilities.

For last few years, TPC and BSES have been at loggerheads on several issues and have engaged in several complex legal battles. The issue of payment of stand-by charges to MSEB is illustrative of this conflict. MSEB supplies stand-by power to Mumbai to maintain reliable supply (and charged Rs. 396 Cr. for FY 01-02 as per MERC's order for this facility). Though the validity and amount of such payment to MSEB is not questioned by either TPC or BSES, there is a bitter dispute about sharing of these charges. Initially, the Government of Maharashtra, attempted intervention in the matter, but the outcome was not agreeable to these utilities. The state government decided to hand over the matter to MERC. It enlarged MERC's authority and the matter came up before MERC for dispute resolution. But, even the order of MERC was not accepted by these utilities and interestingly both have filed separate appeals against the MERC order in Mumbai High Court. The High Court's decision is still awaited. Both utilities have filed over half a dozen cases before MERC regarding issues such as interpretation of license in relation to competition for large consumers, duplication of distribution network in Mumbai and discounts in tariff to selected consumers. Hearings on these cases are in progress before MERC for more than six months with several postponements and exchange of bulky legal affidavits.

It is interesting to note that both TPC and BSES revised their tariff in 1997 and since then they have not been revised. However, there has been substantial increase in the 'fuel cost adjustment' component of tariff. In a petition filed before MERC in the month of August 2002, Prayas made a prayer to initiate the review of consumer tariff charged by TPC and BSES, which has not been reviewed by MERC since its inception in 1999. Unfortunately, MERC asked these utilities to submit data only regarding the fuel cost adjustment charges and that also without any fixed time-frame. Though MERC's regulations stipulate that utilities should submit annual financial statements (e.g., revenue requirement), MERC as yet has not specified formats for such statements. Hence, private utilities have not been required to file Annual Revenue Requirement (ARR) and Expected Revenue from Charges (ERC) statements before MERC, and are allowed to evade public scrutiny.

4.3 NOIDA Power Company (NPC)

NPC is a relatively new private utility. It is a joint venture company in which R. P. Goenka (RPG) group holds 74 % equity. In 1993, NPC acquired distribution assets (worth Rs. 10.10 Cr.) and license for distributing electricity in the Greater NOIDA area. NOIDA is primarily an industrial area in the state of Uttar Pradesh (UP), close to New Delhi. The company buys its entire energy requirement (about 160 MU) from the erstwhile SEB in UP. As per the agreement, the tariff to NPC's consumers was to be same as that of UPSEB and the rate of power purchase (payable to UPSEB) was to be adjusted so as to allow the company to earn a reasonable return as per Schedule VI of the ES Act.[2]

However, there has been a dispute between the two parties over the exact cost of power purchase by NPC. Even after study and reports by three different committees (viz., Nair Committee, M. I. Beg Committee and T. George Joseph committee), the dispute continued. Pending the final settlement, NPC was costing its power purchase on the basis of recommendations of Nair Committee, i.e., at Rs. 2.64 /kWh (hereafter termed as unit / U) from 25th January 1999 onwards. As a result, the dispute went to Allahabad High Court. The court directed utilities to approach UP State Electricity Regulatory Commission (UPERC). Accordingly, NPC filed tariff revision petition before UPERC and, on 1st February 2002, UPERC issued its order. Unlike as in the case of Surat Electricity Company before Gujarat ERC, UPERC broadly accepted the earlier established methodology of fixing power purchase price (i.e., back calculating power purchase price on the basis of the revenue realized by charging tariff same as that of UPSEB consumers). Based on this methodology (after evaluating other items such as demand projections, expenses, capital base, and reasonable return), UPERC raised the power purchase cost to Rs. 2.73 /U for FY 00-01. UPERC approved total expenses of Rs. 9.22 Cr. (excluding the cost of power purchase or the cost of T&D loss) and sales of 148 MU, implying NPC's distribution cost to be Rs. 0.62 / U sold[3].

In the meanwhile, the original 1993 agreement for power purchase with duration of five years had expired. The agreement was later extended up to February 2000. Though UP government has assured that the old agreement would continue till new agreement is made, no new power purchase agreement has been entered till now.

One peculiar aspect of NPC's consumer profile is the significant agricultural consumption (around 9 %), which is nearly absent in the case of all other private utilities considered in this report.

4.4 Calcutta Electricity Supply Corporation (CESC)

CESC has been generating and distributing power to Kolkata (earlier Calcutta) for over hundred years. In the late seventies, it became a fully Indian Rupee Company and, in the late eighties, it became a part of the R. P. Goenka group. CESC brought electricity to Kolkata just 11 years after it was introduced in London and just 17 years after it was introduced in New York. Interestingly, during the early years, the company charged a high tariff of Rs. 1 / U (over Rs. 100 / U in today's costs) but still the demand increased rapidly.

Today, the company has installed capacity of 1065 MW, including the recently built 500 MW Budge-Budge coal plant and some old (aged over 50 years) thermal plants. Currently, CESC serves around 17 lakh consumers and purchases about 15 to 20 % of its energy requirement from West Bengal State Electricity Board (WBSEB) and Damodar Valley Corporation (DVC).

In the last few years, the financial health of the company has deteriorated sharply. CESC has been making losses since FY 98-99. In FY 00-01, it suffered a loss of nearly Rs. 450 Cr. The capital cost of the BudgeBudge coal thermal plant has also become a very controversial issue. Though the company claimed a capital cost of Rs. 2681 Cr. for calculating the capital base under Schedule VI of the ES Act, WBSEB capped the capital cost at Rs. 1853 Cr. The matter went to Central Electricity Authority (CEA) for arbitration, which capped the cost at Rs. 2296 Cr. This was again challenged in the Supreme Court. When this dispute was pending in the Supreme Court—while deciding on the tariff revision proposal of CESC—WBERC provisionally fixed the capital cost at Rs. 2075 Cr. for calculation of capital base. Apart from this reduction in capital cost, the WBERC also ordered several other efficiency measures and disallowances

[2] UPSEB later became UP Power Corporation Ltd. (UPPCL).

[3] The distribution cost of Rs. 0.54 / unit shown in Table 8 is for the FY 99-00 and is based on schedule VI reports. Schedule VI report for the next year was not available.

while fixing the tariff (order dated November 7, 2001). These include, improvement in heat rate, reduction in transit loss of coal, and reduction in T & D losses. As a result of these measures, the WBERC ordered an average tariff of Rs. 3.35 / U (for FY 2000-01) and Rs. 3.41 / U (for FY 01-02) against the CESC proposed tariff of Rs. 4.26 / U and Rs. 4.24 / U respectively. CESC appealed against the tariff order in the Calcutta High Court (HC). The HC not only ruled against the order of the WBERC, but also went into the merits of the case and fixed tariff of Rs. 3.96 / U for the year 00-01. The HC also fixed a tariff of Rs. 4.00 / U for the two subsequent years, i.e., FY 01-02 and FY 02-03. In addition, the HC substantially constrained the authority of the WBERC in tariff setting as well as in the matters of bringing in transparency and public participation in the regulatory process by saying that

> *"We are of the final opinion, therefore, that consumers have no right of indiscriminate appearance in the tariff fixation matter before the commission. The advertisement issued in that regard (calling for objections etc.) as per the Commission's Regulations and the advertisement issued by us in the appeal were all on a wrong and erroneous apprehension that the 1998 Act envisages an ordinary adversary proceedings like an ordinary court litigation. …. We are therefore, of the firm opinion and conclusion that the regulations made by the Commission with regard to the giving of indiscriminate notice to the consumers and of hearing consumers indiscriminately, are contrary to the provisions of the Act and those regulations, as well as regulations dependent thereupon or ancillary thereto should be forthwith changed to bring the body of regulations in line with the discussions and conclusions reached herein."* [explanation in bracket added].

The HC also stipulated that even after enactment of the ERC Act, 1998, licensee is the sole authority (under Schedule VI of the ES Act, 1948) to determine the tariff. The only constraint is that it should be in accordance with the principles and guidelines in the Schedule VI and those stipulated by the ERC. It said that the ERC can look into the tariff only after the audited accounts for a particular year are finalized and only on limited grounds of non application of Schedule VI principles and any gross shortcomings in the audited accounts.

WBERC and few consumer / industry organizations appealed against this order in the Supreme Court. The Judgment of the Supreme Court (SC) in this case is very important in the context of regulatory process. The SC not only re-established the authority of the ERCs to determine tariff, it even held that ERCs can depart from the arbitration award of the CEA (in this case regarding the capital cost of the Budge-Budge project) for tariff purposes, if the ERCs provide sufficient reasoning for such departure. As per SC, the CEA is not bound to consider either efficiency of the company or interest of consumers, which are the two crucial factors that ERCs are mandated to consider while fixing tariff. The SC also held that consumers have a right to participate in the proceedings before the ERC and that HC observations limiting / denying that such participation was wrong.

In the same judgment, apart from watering down the efficiency improvement targets set by WBERC, the SC also commented on the issue of cross-subsidy. The Supreme Court dismissed a clarificatory petition filed by consumers' association. The WBERC interpreted the SC order as its directive for abolition of cross-subsidy in one go. Hence, in the subsequent tariff order the WBERC fixed a uniform tariff for all consumers of CESC. This resulted in a lot of public outcry and the state government has recently introduced a state amendment to the ERC Act 1998, permitting continuation of cross subsidy. The WBERC order is not yet implemented due to an HC stay.

4.5 Surat Electric Company (SEC)

Surat Electricity Company, a sanction holder, is an eighty- year old distribution utility supplying power to nearly half of the city of Surat in Gujarat. In the 1990s, the company was taken over by the Torrent group of companies, which currently holds about 45% equity in SEC. SEC buys its entire energy requirement from Gujarat SEB for supplying power to 4.7 lakh consumers. The Gujarat government has asked the company to set up a generation project, and, accordingly, the company has received a No-Objection Certificate from the Gujarat Electricity Board (GEB) under Section 44 of the Electricity Supply Act, 1948. SEC's license was renewed by the Government of Gujarat (GoG) in 1997 for a period of 30 yrs.
There seems to be a strong demand from the people of Surat that tariff in Surat should be equal to that of GEB, as the SEC tariff was higher than the GEB tariff. After strong protests and agitations, in the mid 1990s, the GoG directed SEC to charge all consumers at the same rate as charged by GEB and also agreed to cover the revenue loss of SEC due to this directive. In

1999, after submission of the report by Swaminathan Committee (appointed by the GoG), the GoG capped the "clear profit" of SEC to 80% of "reasonable return" allowed by Schedule VI of the ES Act 1948. Soon after this GoG order, in June 2000, SEC filed tariff revision application before the Gujarat ERC (GERC). About 17,000 consumers filed objections before the GERC during SEC's tariff revision and demanded that tariff parity with GEB should be continued. GERC rejected this demand and fixed tariff on the basis of techno-economic performance of SEC, as envisaged in the ERC Act, 1998. GERC also allowed SEC to recover 100% of "reasonable return" as "clear profit". Overall, GERC reduced SEC's demand for revenue requirement from Rs. 705 Cr. to Rs. 678 Cr. (a reduction of Rs 27 Crore), implying an average cost of supply of Rs. 3.73 / U in FY 2001-02. In the light of the GERC order dated 12th October 2000, (which fixed SEC's cost of power purchase from GEB at Rs. 2.70 / U), SEC's distribution cost is slightly over Rs 1 per unit sold. This includes the cost of T& D losses. The distribution cost would work out to be Rs. 0.60 / U sold if the approved T & D loss of 13.5% are excluded from the calculations.

4.6 Ahmedabad Electricity Company (AEC)

Ahmedabad Electricity Company (AEC) was established in 1913. AEC is a public limited company in which the Torrent group currently holds 37% of equity. The Torrent group acquired the management control of the company in late 1990s. This is an integrated utility with an installed generating capacity of 490 MW, catering to nearly ten lakh consumers in Ahmedabad and Gandhinagar (capital of Gujarat). To supplement its generation capacity, AEC buys about 10 to 15 % of its energy requirement from Gujarat Electricity Board (GEB). In December 2000, AEC filed tariff revision petition before Gujarat Electricity Regulatory Commission (GERC) for the financial year 2000-01. But due to several legal and procedural issues, the case was delayed and finally, the tariff order was issued in September 2002 for the financial year 2002-03. GERC reduced the revenue requirement of Rs. 1188 Cr. projected by AEC to Rs. 1105 Cr., which resulted in a tariff increase of about 1.2%.

Table 2 summarizes tariff orders and tariff details of different utilities.

5. Performance of distribution utilities

Measuring or benchmarking performance and efficiency of a distribution utility is a complex task, as performance depends on several factors. From the viewpoint of the end-consumer, the ultimate indicators of performance of a distribution utility are:
(a) tariff, (b) quality of supply (voltage, frequency, and reliability), and (c) quality of consumer service (such as redressal of grievances and promptness of new connections).

There are however, several factors that are beyond the control of the utility that influence the above-mentioned indicators. For example, if cost of power purchase of a utility were high (and is forced to buy

Table 2. Tariff review of the private utilities by regulatory commissions

Sr. No.	Place & Name of Utility	Date of Tariff Order	Financial Year	Revenue Requirement (Rs. Cr.)		Average Tariff (Rs. / U)
				Proposed	*Approved*	*Approved*
1	Mumbai (TPC)	< - - - - - - No tariff review as yet - - - - - - >			# 3.72	
2	Mumbai (BSES)	< - - - - - - No tariff review as yet - - - - - - >			# 3.97	
3	NOIDA (NPC)	01 Feb. 2002	2000 - 01	@	@	3.54
4	Kolkata (CESC)	$ 07 Nov. 2001	2001 - 02	2310	1960	$ 3.41
5	Surat (SEC)	01 Dec. 2001	2001 - 02	705	678	3.73
6	Ahmedabad (AEC)	05 Sept. 2002	2002 -03	1188	1105	3.77

Notes:

 # Average tariff is for FY 2000-01 and is based on the annual report of the licensee. For other licensees the average tariff is the tariff approved by the RC.

@ Revenue Requirement is an irrelevant concept as consumer tariff is fixed as same as that for UPSEB consumers and the power purchase cost payable to UPSEB is back calculated. The turnover of NPC was Rs 48 Cr. in 1999-00

$ Subsequent to this the WBERC has issued another order taking into consideration the SC judgment discussed earlier. In this, it has fixed the uniform tariff at Rs. 3.9/U – much closer to the tariff proposed by CESC.

power from that source), then however efficient the distribution function may be, the tariff would remain high. Similarly, the frequency control is beyond the purview of an individual distribution utility. Another factor, which makes such a comparison complex, is the lack of systematic data or indicators for judging the quality of supply or quality of consumer service. Although, many SEBs and licensees internally compile data about the interruptions in supply at the level of 11 kV feeders, these data are not standardized and are not compiled in a manner that would allow comparison.

While comparing the utility performance, another significant hurdle is the large difference in the consumer-mix. For example, even though the sq. km area served by NPC and BSES is nearly same, the number of consumers and consumer-mix differs greatly. NPC sells about 71% energy to just about 70 large consumers, whereas BSES sells about 75% energy to 18 lakh domestic consumers. Naturally, the distribution cost as well as other parameters (like capital investments and T&D losses) should be significantly different for these utilities, even if both were operating with high efficiency.

Apart from the consumer-mix, other parameters that would substantially change the distribution cost are the number of consumers, area served and energy sold. Broadly speaking, these parameters could be called "Density Indicators" on which the distribution cost would depend. Table 3 shows three such "Density Indicators" for the utilities under study.

The very high figures of'consumption per consumer' for two utilities (TPC and NPC) indicate that these are primarily bulk distribution utilities, whereas high 'units sold / sq. km' figures for BEST and SEC indicate that these utilities are serving more concentrated loads than those served by say AEC. A rigorous analysis would be needed to account for such differences in composition and density of utilities[4]. However, it is worth noticing that, except for TPC and NPC, the average consumption per consumer (U / consumer / year) shows relatively limited variation, from 2,584 to 3,731 U/consumer. Considering the limited objective and the indicative nature of this study, utility performances in five key areas is compared. These are:

- Transmission and Distribution (T&D) losses
- Receivables / Arrears
- Manpower Performance and Cost
- Capital Investments
- Distribution Cost

These five areas are chosen for comparison because the first three (T&D losses, receivables, and manpower performance and costs) are the much-talked-about weaknesses of SEBs. The last two are related to the key performance of the utility from the consumers' point of view.

5.1 T & D losses

Huge T & D loss is the key area of inefficiency of SEBs. Rapid reduction of T&D losses is expected to be the most important benefit of distribution privatization. It is important to see the performance of these private urban utilities in this light. Table 4 shows the trends of T & D losses for six private urban utilities under study.

CEA's guideline norm for T&D loss is between 8.5% and 15.5 % (CEA as quoted in MSEB, 2000). This

Table 3: Density indicators of urban distribution utilities

No.	Parameter	TPC	BSES	NPC	CESC	SEC	AEC
1	MU (sold) / sq. km.	19.4	13.5	0.4	9.1	32.5	8.0
2	'000 Consumers / sq.km.	N.A.	5.21	0.03	3.17	8.70	2.96
3	Units (sold) / consumer / yr.	0.8#	2,584	13,309	2,869	3,731	2,718

Notes:

1. *Data for BSES and NPC is for FY 1999-00 and for other utilities for FY 2000-01*
2. *# in million units sold / consumer*

[4] Such an analysis can compare utilities with similar network length and composition (HT/LT or underground / overhead lines). Advanced statistical techniques such as DEA could also be used for this. But, the small number of comparable utilities in India is a significant hurdle for such an approach.

Table 4: T&D losses in private urban distribution utilities (% of bus-bar energy)

Year	TPC	NPC	BSES	CESC	SEC	AEC
1996-97		7.4	9.7	19.6	16.5	17.5
1997-98	3.0	6.6	10.7	18.6	16.7	17.2
1998-99	2.6	8.9	13.5	20.1	15.6	19.0
1999-00	2.5	9.5	13.6	22.9	14.6	18.8
2000-01	2.5	8.4	-N.A-	23.4	14.2	18.1

Notes:

1. *All data are from Schedule VI reports, except that for AEC, which are taken from annual reports of the company.*
2. *In the case of BSES, losses shown above are from the Schedule VI report. These figures are in excess of those reported in the annual report of the company. This is because the losses reported in the annual report do not include the losses in transmitting power from its Dahanu plant to Mumbai.*

norm is however for SEBs having too widespread T&D network and much different consumer-mix. Unfortunately, neither the MoP nor CEA has developed any standards or benchmarks for acceptable T&D losses under Indian conditions for concentrated urban utilities. Many countries with efficient power sectors have managed to limit losses between the 8% and 12% range even at the national level. Considering this, the performance of urban utilities (with losses of 14 to 23%) can be further improved.

TPC's T&D loss of around 2.5% appear very reasonable even considering predominantly the bulk supply nature of the utility. The T&D losses for NPC appear somewhat high considering its bulk supply nature. In addition, the quoted numbers need to be seen with caution. Unlike other utilities, NPC has about 9% agricultural consumption, which is un-metered. This is estimated based on the consumption norm adopted for UPSEB in 1994 (of 170 U/hp/ month). The consumption norm adopted for UPSEB has been revised downwards leading to increasing its T&D losses from 23% to around 40%. In light of this, the recent tariff order of UPERC (dt. February 1, 2002) comments that a realistic assessment of agricultural consumption would result in a much higher figure for T&D losses of NPC and has directed NPC to conduct a study by independent agency for estimating consumption by the un-metered consumers and also to meter such consumers.

Though the losses of BSES came down significantly between 1994 and 2000, in the recent years they seem to have slightly increased. For example, as per the annual report data, this increase seems to be from 11.6% to 13.6% between FY 2000-01 to FY 02-03.

T&D losses of CESC, at 23%, are far higher than other utilities or even the CEA norm for SEBs. The WBERC tariff order shows that commercial losses in CESE's area are as much as 11% (of energy available for sale) (WBERC 2001). It is unfortunate to know that the urban private utilities are not free from the menace of power theft.

5.2 Receivables or Arrears

Large amount of receivables is another major weakness in the functioning of SEBs. Several regulatory commissions (RCs) as well as the World Bank loan conditions have indicated that receivables should be equivalent to the billing of 2 to 2.5 months. Except BSES and CESC, all other utilities have managed to limit receivables within this range and even in case of BSES and CESC receivables do not appear to be very high.

Table 5: Receivables of urban distribution utilities (in Months of revenue)

BSES	3.2
NPC	1.7
CESC	3.1
SEC	1.8
AEC	2.6

5.3 Manpower Performance and Cost

The manpower employed and manpower cost are considered to be important aspects of utility performance. Schedule VI reports show manpower cost for different functions such as generation, transmission, distribution, and consumer servicing. For the present analysis, the manpower cost is segregated as generation and non-generation cost. Table 6 shows the basic information and the parameters analyzed using this information. The number of employees shown in Table 6 represents total employees in the electricity license business.

The analysis presented in Table 6 clearly indicates that performance of TPC and CESC is highly unsatisfactory in terms of manpower costs. It is surprising that a predominantly generation utility like

TPC has a high (distribution) employee cost of Rs 0.1/U sold, when retail distribution utilities like SEC and BSES manage to limit this between Rs 0.05 to Rs 0.09 per unit. The main reason for this high cost seems to be the very high average manpower cost (Rs 38,700 per man-month)[5]. This is especially striking when utility like BEST or SEC has an average cost of just Rs 5700/man-month.

In the case of CESC, the large number of employees is the primary reason for its high (distribution) employee cost of Rs 0.21/U sold. This is also reflected in very low MU sold per employee.

5.4 Capital Investments

The quality and quantum of capital investment done by a distribution utility affects the quality of supply as well as distribution cost (tariff). The tariff impact of capital investments comes through several components. According to Schedule VI, the reasonable return (or allowed profit) of the utility is dependent on the capital investments. In addition, recovery of the capital investment (depreciation and interest on loans) is a major component of the distribution cost.

To compare the capital investments (to be precise, gross fixed assets) of different utilities, two parameters are considered here. The first parameter is the total (historical) capital investment made by the utility. The second parameter is the average capital investment made in the last three years. For comparison, both these parameters are worked out on the basis of Rupees invested per unit sold (in the last year). These parameters give an idea of the extent of the capital intensity of the utility as well as its current trend of investments.

Table 7 presents the analysis on these two parameters. All capital investments that are not related to power generation — such as those in T&D, general equipment, and consumer servicing — are considered together for the purpose of this analysis and it is called "Distribution Capital Investment".

Four of the six utilities under study are integrated utilities (TPC, BSES, CESC and AEC). For these utilities, the transmission cost would also include the cost of power evacuation from generation plant. The Schedule VI data does not show the investments (and operating costs) separately for this component. For a proper comparison between all utilities, only half of the investments (and operating costs) of transmission are allocated to 'distribution capital investment' (or the 'distribution cost' considered in the next section).[6]

A more rigorous analysis of capital investments would require consideration of aspects such as timing of investments, sufficiency of investments to meet future

Table 6: Manpower performance and cost

No.		TPC	NPC	BSES	CESC	SEC	AEC
1	Number of Employees ('000)	3.0	0.1	5.3	14.4	1.2	4.3
2	Employee cost (generation) Rs Cr	40	0	17	29	0	
3	Employee cost (non-generation) Rs Cr	98	1	44	107	8	
4	Employee cost / Distribution cost (%)	21	9	11	19	9	
5	Employee Cost / Consumer (Rs/consumer/Yr)	-NA-	635	221	594	179	
6	Employee Cost / U sold (Rs/U)	0.11	0.05	0.09	0.21	0.05	
7	MU sold / Employee	-NA-	2.6	1.1	0.5	1.4	0.7
8	Consumers / Employee	-NA-	193	427	158	384	245
9	Average cost (Rs / Man-month)	38,700	10,200	9,700	7,900	5,700	

Notes:

1. *Employee cost considered in row 4 to 6 refer to non-generation employee costs.*
2. *Distribution cost refers to all non-generation costs (refer section 5.5 for details)*
3. *Number of employees in row 7 and 8 represents non-generation employees (BSES and CESC have about 600 and 3000 employees respectively in generation)*
4. *Average cost (row 9) is based on all employees and all manpower costs. The figure is rounded off to nearest hundred Rupees.*

[5] Considering the significantly large manpower costs of TPC, attempt was made to seek clarification from TPC. But we failed to get a reply.

[6] Even distribution utilities have some investment that would appear under the heading of 'Transmission' in the Schedule VI data formats. This is because the definition of transmission covers all lines (and sub-stations / switchyards) above 13.2 kV.

Table 7: Distribution capital investments by urban distribution utilities

No.	Parameter	TPC	NPC	BSES	CESC	SEC	AEC	MDU
1	Total Distribution Capital Investments (TDCI) (in Rs. Cr.)	700	30	1093	1438	341	- NA -	2529
2	TDCI / U sold (Rs/ U)	0.81	2.05	2.11	2.78	1.95	- NA -	2.27
3	3 Year Average Distribution Capital Investment (3YADCI) (Rs. Cr. / Yr.)	55	4	146	188	50	- NA -	272
4	3YADCI / U sold (Rs. / Yr. / U)	0.06	0.26	0.28	0.36	0.28	- NA -	0.24
5	Growth rate of energy handled (% p.a.)	0 %	4.5%	4 %	1%	5.6%	1.1%	~1%

Notes:

1. *Data for BSES and NOIDA is for FY 99-00 and for others it is for FY 00-01*
2. *3 Year Average Capital Investment is the average of investment in the base year mentioned above and two preceding years.*
3. *The 3YADCI for TPC is under-represented as the data for previous two years pertains only to the pre-merged TPC. During the base year (FY 00-01), the merged TPC invested Rs 90 crore in 'distribution assets'.*
4. *Demand growth (sr. no. 5) of BSES represents growth in the licensed area and has been calculated without considering substantial bulk sales (outside licensed area) in FY 1997-98.*

power demand, and considerations of quality of supply. These aspects are not covered in this report due to unavailability of data and the limited resources as well as objective of the report.

Mumbai has a special arrangement for power supply, whereby TPC generates and sells power to two bulk licensees, BEST and BSES, at a number of 11 kV and 22 kV interconnections and the 220 kV ring network interconnection. As such, the total distribution cost in Mumbai gets divided between these three utilities. To understand the capital investments made in Mumbai (and to make data comparable with other utilities), distribution investments by these three utilities are clubbed, to represent a hypothetical "Mumbai Distribution Utility" (MDU).

The above table shows a significant difference in capital investments by different utilities[7]. For example, capital investment (Rs /U sold) by CESC is the highest amongst the distribution licensees, both in terms of total investments as well as investments in the recent times. CESC's investments are nearly 30% to 50% higher than that of SEC, which has the lowest capital investments amongst the utilities. A more striking fact is that CESE's current rate of investment (3YADCI/U), amounts to doing equivalent investment to that of total historical investments of PUZ (TDCI/ U) in less than four years! This is interesting, especially as the CESC has been claiming large losses in the past few years.

As shown in Table 7, the distribution utilities are making large investments. Just the Mumbai utilities are investing about Rs 270 Cr. every year in distribution assets. Detailed breakup of these distribution investments as available in the Schedule VI reports is given in Annexure 2. These details reveal some interesting aspects. For example, even though TPC is predominantly a bulk supplier, its investments in HV distribution is higher than that of BSES. This may be an issue related to the alleged duplication of the T&D network. Another point that attracts attention is the investments by TPC of Rs 25 Cr. in FY 2000-01 under the head of Transportation Equipment. The annual report of TPC for the FY 00-01 indicates that this expenditure is for purchasing helicopters.

Regarding the capital investments by regulated utilities, the 'Averch Johnson Effect' (formulated in the their paper 'Behavior of the firm under regulatory constraint' in American Economic Review, 1962) is significant. This effect relates to the behavior of utilities, which are under rate of return regulation (like in India). RoR regulation creates unique incentives for utilities. The 'Averch Johnson Effect' describes the bias of such utilities toward over investing capital. As Edward Kahn says *'these utilities which earn more than the cost of capital have an incentive (and in fact do) expand capital beyond its socially productive point, some times known as 'gold plating'* (Kahn 1991). Hence, one of the significant tasks before the regulatory commissions would be to evaluate

[7] The ratio of depreciated assets to gross assets is in the range of 60% to 75 % for these utilities.

reasonableness of capital investments. Reluctance of utilities to allow proper scrutiny of their capital investments by regulatory commissions becomes serious in this context (Prayas, 2003).

5.5 Distribution Cost

Parameters discussed earlier, such as receivables, manpower, and capital investments are no doubt important indicators of the efficiency of a distribution utility, but the most crucial parameter (apart from supply and service quality) is the cost of distribution. This parameter is crucial because it captures the various trade-offs made by the utility. For example, a utility may have made large capital investments but as a result of these investments, its manpower costs may be less. Similarly, the manpower cost could vary significantly depending on the labor practices and contracting / outsourcing strategies. The indicator of 'Distribution Cost', being considered here captures the combined effect of such differences in operations of utilities.

As mentioned earlier, operating distribution cost (i.e., non-generation costs) is calculated using the cost break-up in the Schedule VI reports. Unfortunately, Schedule VI reports do not give break-up of interest payments for each activity. Similarly, clear profit or surplus is also not apportioned for different functions. Hence, to calculate the approximate Distribution Cost of each utility, we have apportioned these two costs (interest and profits) in proportion to the depreciated assets in use for different functions, i.e., generation, transmission and distribution functions. Even here, only half of the transmission operating costs of integrated utilities is considered in the distribution cost. The Distribution Cost is also calculated for the hypothetical Mumbai Distribution Utility (MDU). Table 8 shows the Distribution Cost for utilities under study. Table 8 also shows the contribution of allowed Reasonable Return (RR) or allowed profit to the distribution cost.[8]

Table 8: 'Distribution Cost' (DC) of urban utilities

Utility	DC (Rs./U)	RR as % of DC
TPC	0.54	18%
NPC	0.54	33%
BSES	0.75	20%
SEC	0.56	20%
Mumbai DU	1.04	22%
CESC	1.07	4%

Notes:

1. *RR is the Reasonable Return Allowed to the utility (attributed to the distribution function)*
2. *The data for BSES and NPC are for the FY 99-00 and for others they are for the FY 00-01*

Similar to the capital investments, the figures for

Box 1: Performance of BEST – A Municipal Undertaking in Mumbai

BEST is a distribution utility operating in Southern Mumbai. Its operating area is a highly dense business district in Mumbai, with over 14,000 consumers / sq. km. and comprising of a significantly large number of commercial consumers. In FY 2000-01, it sold about 3,500 MUs (purchased entirely from TPC) and earned a revenue of about Rs. 1500 Cr. Anecdotal experience indicates that the quality of power and quality of consumer service in BEST area is equivalent to that of the other distribution utilities, viz., BSES and TPC. BEST's performance in terms of T&D losses, capital investments, and distribution costs is similar to that of the other utilities in Mumbai (refer Annexure 1: Utilities at a Glance). T&D losses are around 10 % for the last few years. BEST also compares well with other utilities in terms of the manpower cost. It has a large number of employees (6,200) but at a low average cost (Rs. 5,650/ person / month). As a result, the cost of manpower constitutes about 11% of total distribution cost – which is nearly the same as that of BSES. The manpower cost per kWh sold is Rs 0.13 per unit, which is higher than BSES but much lower than CESC.

Being a municipal undertaking, BEST is not governed by Schedule VI, both in terms of cap on reasonable return / clear profit or in terms of reporting requirements. As such, the financial data about BEST is not strictly comparable with other Schedule VI licensees. BEST also has a transport division and profit from its electricity business is used to cross-subsidize the transport division. In FY 00-01, BEST's distribution cost was Rs. 1.18 / U sold, that included a profit of about Rs. 0.50 / U sold (i.e. Rs. 156 Cr.), which was used for subsidizing the public bus transport in Mumbai.

[8] The total Reasona ble Return (in Rs Cr) is allocated to distribution business in proportion to the depreciated assets (adding only half of transmission assets for integrated utilities).

Distribution Cost also show large variation amongst different utilities. The Distribution Cost for SEC is the lowest amongst the utilities under study. Considering the bulk-supply nature of TPC and NPC, the Distribution Cost of Rs. 0.54 unit appears high. Similarly, it is interesting to note that the Distribution costs of CESC and MDU are nearly the same but are nearly double that of SEC. Though no concrete data about power quality as well as service quality in Kolkata and Mumbai are available, anecdotal evidence indicates that the situation is much better in Mumbai. This demonstrates that high Distribution Cost may not always lead to better service quality. To decide whether the Distribution Cost of over Rs. 1/U sold in the case of Mumbai is justifiable in terms of the quality of service provided, far in-depth evaluation is necessary and is beyond the scope of this report[9].
It is worth noticing that the contribution of reasonable return to the distribution cost varies significantly. It is as low as 4% for CESC, about 20% for Mumbai utilities and high 33% for NPC. The RR depends on the capital structure of the utility as well as the quantum of investments. For better understanding of operation of private utilities, in-depth analysis of this aspect would be useful.

6. MSEB's Pune Urban Zone

The focus of this report is performance of private distribution utilities. As an indicative exercise, however, this section presents similar performance indicators for Pune Urban zone (PUZ) of Maharashtra State Electricity Board (MSEB), the state-owned utility. PUZ is a predominantly urban distribution zone of MSEB, which is similar in many respects to the private distribution utilities considered in this report. PUZ is chosen for this exercise, primarily due to the easy availability of data and also because of its noteworthy performance especially in terms of the rapid reduction of T&D losses.

Key data about PUZ are presented in Annexure 1 along with similar data for other distribution utilities[10]. MSEB prepares separate balance sheets for each zone, which are merged to get MSEB's balance sheet. The balance sheet of the head office accounts for heads such as power purchase (that are not reflected in individual zone's balance sheet). The zonal balance sheets indicate items such as manpower and O&M costs related to the particular zone. Items related to the capital utilized in the particular zone, (e.g., capital investments, depreciation, interest etc.) are also included in the zonal balance sheets, even if the head office incurs the actual expenditure. Thus, to a large extent, the zonal balance sheets depict the performance of the zone as if it is a separate company. Certain items such as the head office expenses on manpower, consultancy and profit are not included in the zonal balance sheets. To make the Distribution Cost of PUZ comparable to the other utilities, head office expenses (as per the budget for the FY 00-01) and allowable profits are proportionately allocated to PUZ costs. Assets and costs relating to 220 kV transmission network around Pune are also included in PUZ balance sheet. Table 9 shows the performance parameters of PUZ for FY 2000–01.

It is interesting to note that, except for few parameters, for most performance parameters considered in this report, the performance of PUZ is comparable or better than the performance of private distribution utilities. For example, in the case of PUZ, capital investment /U sold is Rs. 1.34 /U, whereas the figure for BSES is Rs. 2.1 /U and a high of Rs. 2.8 for CESC. In the case of manpower, PUZ's performance is comparable to that of better performing BSES or SEC in terms of consumers / employee or MU sold / employees. However, PUZ's manpower cost is highest (except that of TPC) in terms of average cost per man-month. Again, as discussed earlier, capital investments and manpower costs involve certain trade-offs and it is important to see the total distribution cost. PUZ distribution cost is Rs. 0.57/U sold. This is nearly half of MDU or CESC.

In other words, if the Distribution Cost of Mumbai is considered as reasonable or necessary for providing good quality service (as in Mumbai), then to get that quality, either Pune consumers should be charged a surcharge of about Rs. 0.45 /U (about Rs. 130 Cr. /yr) or the cross-subsidy extended by PUZ to rural sections of MSEB (surplus revenue from PUZ) should be reduced to this extent.

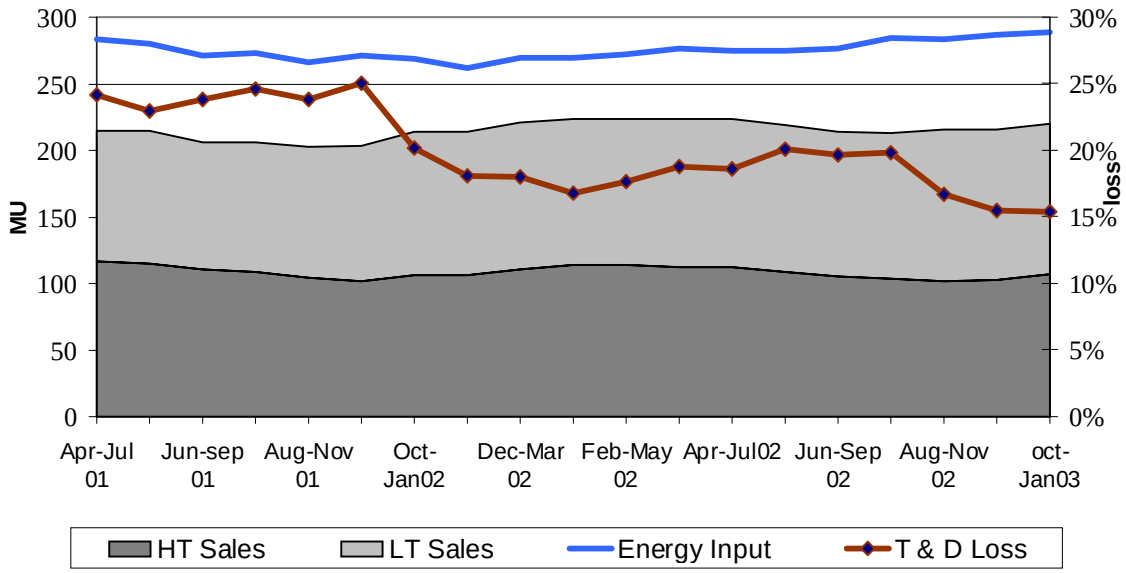
[9] It can be argued that the high cost of distribution in Mumbai is a result of factors such as extensive underground cabling, periodic replacement of aged assets, and modern control systems. The necessity of these investments and their contribution to better service quality needs to be analyzed.

[10] The PUZ data used in this report is for FY 00-01. Since April 2003, for operational simplicity, jurisdiction of PUZ has been extended with inclusion of a few semi-urban / rural divisions close to Pune. Hence, data (such as balance sheet and T&D losses) for this extended PUZ will not be comparable.

Table 9 – Performance of pune urban zone (FY 2000-01)

No.	Parameter	PUZ
A	**Density Indicators**	
1	MU sold / sq. km.	4.2
2	'000 consumers / sq. km.	1.39
3	Units sold / consumer	3,252
B 4	**Receivables (no.of months)**	3.9
C	**Capital Investments**	
5	Total Distribution Capital Investment (TDCI) Rs. Cr.	393
6	TDCI / U sold (Rs. / u)	1.34
7	3 year average distribution capital investment (3 YADCI) Rs. Cr./ yr.	42
8	3 YADCI / U sold (Rs. / year / U)	0.14
D 9	**Distribution cost (Rs. / U sold)**	0.57
E 10	**T & D loss (%)**	20 %
F	**Manpower**	
11	Number of Employees ('000)	2.5
12	Employee cost (non-generation) Rs Cr	39
13	Employee cost / Distribution cost (%)	26%
14	Employee Cost / Consumer (Rs/consumer)	402
15	Employee Cost / U sold (Rs/U)	0.13
16	MU sold / Employee	1.17
17	Consumers / Employee	388
18	Average cost (Rs / Man-month)	13,005

Figure 1 – Significant reduction in T& D loses in pune urban zone



Note: The graph depicts HT and LT sales in PUZ as well as losses in the PUZ. To account for different billing cycles, data is presented as four month moving averages.

Another and a very significant observation about the PUZ is the rapid reduction in T&D losses. Maharashtra Electricity Regulatory Commission, through its tariff orders, has directed MSEB to submit monthly zone-wise energy audit reports. These reports show that, over the last few months, T& D losses in PUZ have reduced sharply. Figure 1 shows this significant achievement. In about a year's time, losses in PUZ have come down by over 7% from about 25%! In Delhi, TPC and BSES have promised a reduction of about 3.5% p.a. from the opening level of over 50% (in terms of aggregate technical and commercial losses (ATC)).[11] Considering this, the performance by PUZ is certainly remarkable. Moreover, this has been achieved without any major capital investment. Such a level of reduction in losses has been possible mainly by improvement in metering (meter replacement, proper route sequence etc.) and similar administrative measures. PUZ is also involving local engineering college staff and students for undertaking micro-level energy audits and door-to-door surveys. It is worth noticing that PUZ is not an isolated case that has achieved such major reduction in the T&D losses. The story of Nagpur Urban Zone of MSEB is equally remarkable (please refer Power Line, Volume 7, No. 6, March 2003 for more details).

7. Concluding Comments

Privatisation of distribution is being heralded as the key component of power sector reforms. Orissa and Delhi have already completed privatisation of distribution and few other states such as Karnataka are also considering the same. Significant structural, legislative and regulatory changes are being worked out to facilitate this. However, no detailed performance review of existing private utilities (which have been operating for over half a century) has been carried out as yet. Such a study is essential to draw lessons that can greatly help us in avoiding structural and contractual inefficiencies in the emerging power sector. This is unfortunate, considering the enormous resources being devoted (in the form of committees and consultants) to work out the details of new models. Just a small fraction of the money spent on consultants in any one states (e.g., Rs 300 crore were spent in Orissa) could have achieved this task.

On this background, as a first step, this report has compiled easily available public data about existing distribution utilities and first-cut observations are drawn. Key parameters worked out for all utilities covered in this report are represented in the graphical form in Box 2.

Important observations:

- Even private urban utilities are not free from the menace of large commercial losses, which are as high as 11% for CESC. Considering the international experience, there is significant scope for reducing the T&D losses of these urban utilities.
- In terms of receivables, the performance of these utilities appear reasonable, with receivables in the range of 1.7 to 3 months of billing.
- There is a large variation in the manpower efficiency of the utilities. The SEC and NPC have the lowest distribution manpower cost (at Rs 0.05/ U sold), whereas in the case of CESC, it is highest at Rs 0.21/ U sold. The average man-month cost of TPC (at Rs 38,700/ man-month) is 4 to 6 times that of other utilities.
- The utilities are making significant investments in distribution assets. For example, utilities in Mumbai are investing about Rs 270 Cr per year in distribution. The highest investments in distribution (on per unit sold basis) have occurred in CESC, both in terms of historical and current rate of investment. This is higher than the combined investments for Mumbai utilities. Anecdotal experience indicates that power quality in Mumbai is better than that in CESC area.
- 'Distribution Cost', another important parameter studied in the report, shows a large variation in between utilities. At about Rs.1 /U sold, 'Distribution Cost' of CESC and Mumbai utilities are nearly 90% higher than that of SEC or that of Pune Urban Zone (PUZ). The distribution cost of Rs 0.54/U of TPC and NPC is large, considering their bulk-supply nature.
- Performance of the two public utilities namely, PUZ of MSEB and BEST, is comparable to that of private utilities on many parameters, such as distribution cost, T&D losses etc. The performance of PUZ in terms of rapid reduction in T&D losses is significant (over 7 % reduction within one year).
- The 'Distribution Cost' of PUZ is Rs 0.57/U, i.e., Rs.0.475/u less than that of Mumbai utilities. If this entire difference is considered reasonable on account of better power quality in Mumbai, then

[11] Reduction in ATC includes reduction in T&D losses as well as reduction in receivables.

Box 2: Some key performance parameters of urban distribution utilities

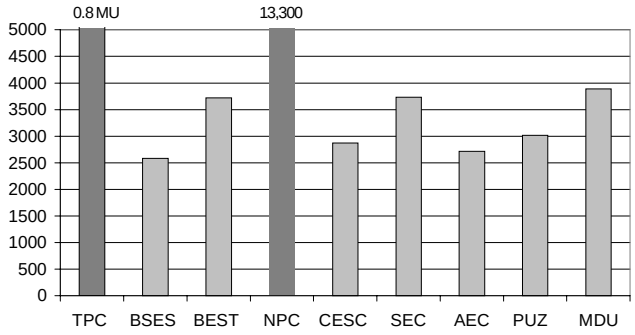


Figure 1 : Consumption(u) / Consumer / Yr.

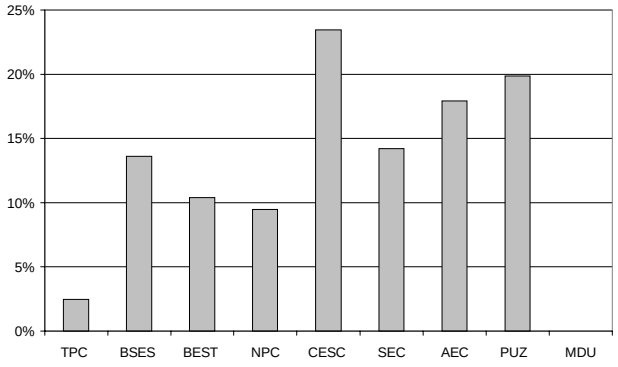


Figure 2 : T & D Loss

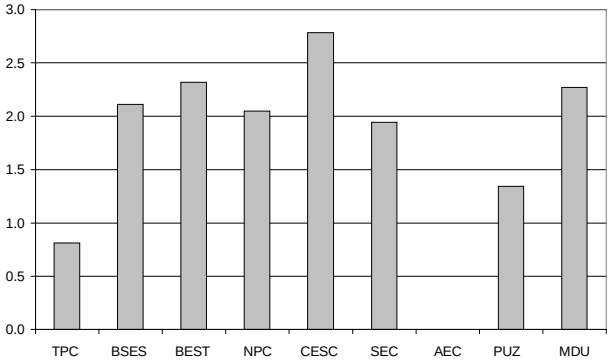


Figure 3 : Total Distribution Capital Investment (Rs. / U sold)

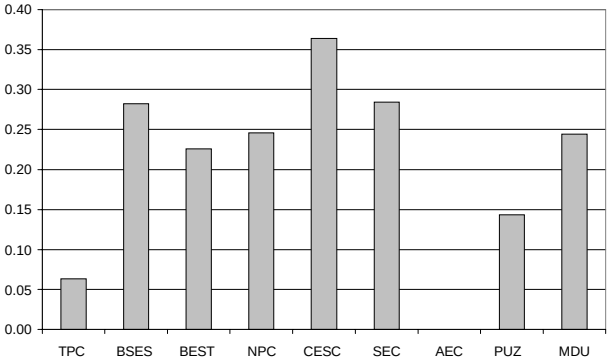


Figure 4 : Three Year Annual Average Distribution Capital Investment (Rs. / Yr. / U sold)

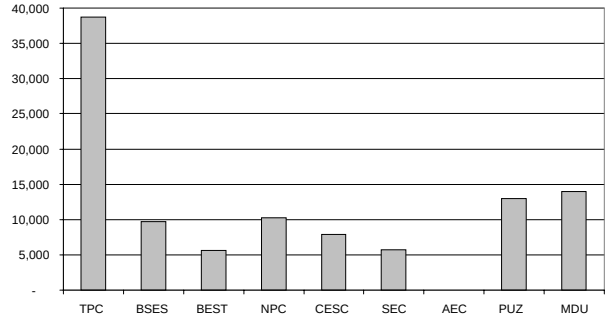


Figure 5 : Average Manpower Cost (Rs. / person / month)

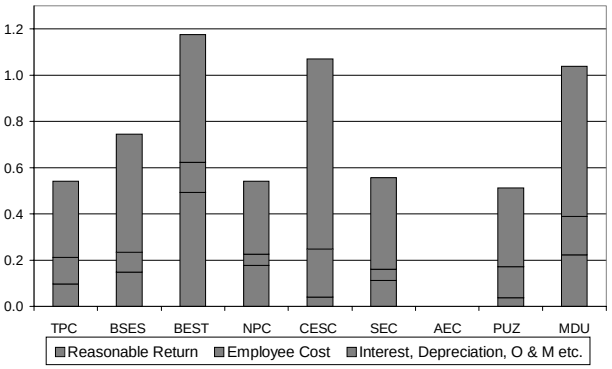


Figure 6 : Distribution Cost (Rs. / U sold)

For detailed explanation and methodology refer section 5.

cost of power sold in Pune would increase by about Rs. 0.47 / U (i.e. Rs. 130 Cr. / yr). Alternatively, the revenue surplus from PUZ towards other areas of MSEB would reduce by this quantum.

Significance for the regulatory process:

It is generally expected that the regulatory commissions would evaluate performance of the licensees and would take adequate actions on the basis of these findings. Though true to a certain extent, regulatory evaluation during the tariff revision process is likely to be of limited nature. The tariff process has to be completed within 3 to 4 months, leaving little scope for in-depth evaluation of these complex issues. From the example of MERC, in the case of Mumbai utilities, it is pertinent to note that even this limited evaluation may not take place – or may be delayed substantially.

Even when the commission is carrying out periodic review of utilities, a detailed study as mentioned below would be of enormous value.

Key aspects for further study:

A rigorous and in-depth study of performance of private distribution utilities in India is long overdue. Some of the key aspects that such a study should cover are as follows. (i) Evaluation of reasonableness of capital investments made/ planned. This should consider parameters such as the historical level of capital investments, nature of license area, consumer-mix, load growth, current and expected quality of supply, and quality of service. (ii) Establishing benchmarks for performance parameters such as T&D losses, cost of capital, capital structure, and most importantly, quality of service and supply; (iii) Incentives and disincentives necessary for improvement in performance while optimizing distribution cost; (iv) Developing a proper information reporting system to enhance transparency and to enable easy comparison of performance. (v) Current performance of utilities in promoting public benefits (such as access and promoting energy efficiency) and evolving mechanisms to promote the same.

Further, the study should also look at the time series data for these important parameters and evaluate whether the trends are in favor of the consumer or not. Such a study should also consider international experience from both developed and developing countries, in terms of such performance parameters for urban utilities.

Such an analysis would offer valuable lessons to ensure that the new structure being adopted is better than the regulatory and legislative framework designed a few decades back. It would also help understand better the issues likely to be faced by regulators and consumers in future. Simultaneously, efforts need to be made to develop capabilities of SERCs to be able to evaluate utilities' investment proposals and other costs in a more rigorous manner. Even if one wishes to move towards power sector design oriented to market and competition, the issues of distribution efficiency (in wires business) and regulation of wires business remain of crucial importance. Without such comprehensive spadework, there is a danger of getting locked in various structural and contractual obligations, which could prove very detrimental for the development of the sector and consumers.

8. Acknowledgement

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References

1. MSEB 2000 – Tariff revision proposal submitted to MERC (by MSEB), March 2000, pg. 515
2. WBERC 2001 – Order of West Bengal Electricity Regulatory Commission (WBERC) in Case no.. T.P. –1 of 2000-01 and Case no. T.P. 1 of 2001-02 (Tariff petition of CESC) dt. 7th November 2001 pg. 84
3. UPERC 2002 – Order by UPERC on Tariff Revision Proposal by Noida Power Company (NPC), February 1, 2002
4. MERC 2000 – Maharashtra Electricity Regulatory Commission, MSEB Tariff Order dt. May 5, 2000
5. GERC Order in case no. 21 / 2000, "Determination of tariff for Surat Electricity Company" Dt. December 1, 2001
6. Report of The Committee on Private Sector Participation in Power Distribution (Coelho Committee), Ministry of Power, March 1998
7. 'Electric Utility Planning and Regulation'. Edward Kahn, American Council for an Energy-Efficient Economy, 1991
8. Prayas, 2003 – 'A Good Beginning But Challenges Galore – A survey based study of resources, transparency, and public participation in electricity regulatory commissions in India', Prayas Occasional Report 1/2003. www.prayaspune.org

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Annexure 1: Utilities at a Glance: Important Statistics of Urban Distribution Utilities ... 1

		TPC	BSES	BEST	NPC	CESC	SEC	AEC	PUZ
A]	**General Parameters**								
1	Years of operation	82	70	54	10	102	18	80	44
2	Licensed service area (sq. km.)	444	384	60	335	567	54	356	700
3	No. of consumers (Lakh, i.e. '00,000)	0.1	20	8.54	0.11	18	4.7	10.54	9.7
4	No. of employees ('000)	3.0	5.3	6.2	0.1	14.4	1.2	4.3	2.5
B]	**Energy Balance (MU)**								
1	Energy generated	9250	3895	0	0	6146	0	3361	0
2	Auxillary consumption	378	274	0	0	578	0	308	0
3	Energy purchase	51	2362	3545	162	1196	2044	437	3652
4	Energy sold free (staff, works etc.)		1			19			
5	Energy available for sale	8923	5982	3545	162	6745	2044	3490	3652
6	Energy sales	8605	5168	3176	146	5165	1754	2865	2927
7	T& D losses	219	814	369	15	1581	290	625	725
8	T&D losses (%)	2.5%	13.6%	10.4%	9.5%	23.4%	14.2%	17.9%	19.9%
9	Demand growth % per year (past 3 yr)	0.2%	4.0%	2.5%	4.5%	1.0%	5.6%	1.1%	5.0%
C]	**Consumer Category wise sale (%)**								
1	Domestic		55%	44%	14%	40%	19%	31%	31%
2	Commercial		22%	44%	1%	18%	13%	13%	10%
3	Industry - LT and MV	1%	11%	6%	4%	7%	57%	22%	7%
4	Industry HT and EHT	16%	11%	3%	71%	27%	9%	29%	46%
5	Public lighting		1%	1%	1%	2%	1%		2%
6	Traction	8%				2%			
7	Irrigation				9%				
8	Public Water Works			1%		5%	1%		4%
9	To dist. Lics. / other	75%		3%				6%	
10	**TOTAL**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
D]	**Revenue (%)**								
1	Domestic		37%	16%	2%	30%	15%		
2	Commercial		32%	43%	1%	22%	15%		
3	Industry - LT and MV	1%	16%	5%	6%	7%	56%		
4	Industry Ht and EHT	17%	12%	1%	89%	32%	11%		
5	Public lighting		2%	1%	1%	1%			
6	Traction	8%				2%			
7	Irrigation				1%				
8	Public Water Works			1%		4%	1%		
9	To dist. Lics.	72%		2%					
10	Sub-Total	99%	98%	68%	99%	97%	99%		98%
11	Other (supply related) revenue	1%	2%	32%	1%	3%	1%		2%
12	**TOTAL**	100%	100%	100%	100%	100%	100%		100%
12a	TOTAL Revenue (Rs. Cr.)	3206	1978	1538	48	1805	621	976	972

Annexure 1: Utilities at a Glance: Important Statistics of Urban Distribution Utilities ... 2

		TPC	BSES	BEST	NPC	CESC	SEC	AEC	PUZ
E]	**Operating Expenses**								
1	**Power Purchase (Rs. Cr.)**	**401**	**703**	**1164**	**43**	**305**	**527**		
2	**Generation (Rs. Cr.)**	**1949**	**540**			**903**			
	% of generation expense on								
	a Manpower	2%	3%			3%			
	b Fuel	85%	77%			65%			
	c Depreciation	6%	17%			23%			
	d Other (O&M etc.)	7%	2%			8%			
3	**Transmission & Distribution (Rs. Cr.)**	**109**	**177**	**149**	**3**	**211**	**45**		**130**
	% of T & D expense on								
	a Manpower	29%	12%	15%	13%	35%	3%		30%
	b Depreciation	49%	46%	25%	54%	40%	51%		17%
	c Other (O&M etc.)	22%	42%	60%	34%	25%	45%		53%
4	**Consumer Servicing and General Est. (Rs. Cr.)**	**147**	**78**	**32**	**2**	**161**	**21**		
	% of CS & GE expense on								
	a Manpower	45%	29%	61%	18%	21%	34%		
	b Depreciation	2%	7%	0%	3%	7%	7%		
	c Other (O&M etc.)	53%	64%	39%	79%	72%	59%		
5	**Other Expenses (Rs.Cr.)**	**111**	**42**	**0**	**0**	**63**	**8**		**0**
6	**Total (Rs. Cr.)**	**2717**	**1541**	**1345**	**48**	**1642**	**601**	**- N. A.-**	**130**
7	Interest and Finance Charges (Rs. Cr.)	231	86	36	0.3	428	4		9
F]	**Fixed Assets (Gross Block) Rs Cr**								
1	Intangible Assets				1	13			
2	Hydraulic Power Plant	360							
3	Steam power plant	1953	1281			2879			
4	IC power plant								
5	Transmission (HT and EHT)	559	494	737		660	63		393
6	Distribution (HV)	301	210		21	280	128		
7	Distribution (MV and LV)		519		8	660	139		
8	Public Lighting		41			1			
9	General Equipment	119	75		1	167	13		
10	**TOTAL (Rs. Cr.)**	**3292**	**2621**	**737**	**31**	**4660**	**341**	**-N. A.-**	**393**
G]	**Depreciation (Accumulated) Rs Cr**								
1	Intangible Assets								
2	Hydraulic Power Plant	47							
3	Steam power plant	915	424			680			
4	IC power plant								
5	Transmission (HT and EHT	259	115	542		166	23		165
6	Distribution (HV)	85	51		6	67	37		
7	Distribution (MV and LV)		173		1	226	60		
8	Public Lighting		19						
9	General Equipment	23	11			47	7		
10	**TOTAL**	**1329**	**791**	**542**	**7**	**1185**	**128**	**-N. A.-**	**165**

Annexure 1: Utilities at a Glance: Important Statistics of Urban Distribution Utilities ... 3

		TPC	BSES	BEST	NPC	CESC	SEC	AEC	PUZ
H]	**Capital Expenditure (last 3 yr. average) Rs Cr**								
1	Intangible Assets								
2	Hydraulic Power Plant	64							
3	Steam power plant	85	15			407			
4	IC power plant								
5	Transmission (HT and EHT	3	47	72		66	10		42
6	Distribution (HV)	36	30		2	51	21		
7	Distribution (MV and LV)		68		2	85	18		
8	Public Lighting		3						
9	General Equipment	17	21			20	2		
10	**TOTAL (Rs. Cr.)**	**206**	**185**	**72**	**4**	**628**	**50**	**-N. A.-**	**42**
I]	**Other Parameters Rs. Cr.**								
1	Gross surplus	684	436	193	1	194	27	- N.A.-	0
2	Clear profit	355	173	156	0.3	-267	16	- N.A.-	- N.A.-
3	Reasonable return	355	180	- N.A.-	3	71	20	- N.A.-	11
4	Reasonable Return / U sold (Rs. / U)	0.41	0.35	0.49	0.18	0.14	0.11	- N.A.-	0.04

Notes:

1. *Data for BSES and NPC is for FY 99-00 and for other utilities for FY 00-01.*
2. *Technically, licensed area of TPC is around 2000 km. which includes generation plants located away from Mumbai, but practically TPC's distribution area is equivalent to that of BSES and BEST put together.*
3. *Schedule VI reports give operating expenses in much more detail, but for convenience these are regrouped in only few categories shown in E - Operating expenses.*
4. *As per schedule VI reports, interest and finance charges are not included in the operating expenses statement, hence the operating expenses shown under E, operating expenses do not include these charges and are shown separately at E - 7 - Interest. Interest on security deposits from consumers is included in "E - 5 - other expenses"*
5. *PUZ: Operating expenses are not available separately for activities such as consumer servicing etc. and hence all expenses are shown under T&D activity. Consumer category wise revenue is also not available. Reasonable return for PUZ is worked out as 4.5% of the net fixed assets*
6. *Break-up of Fixed Assets, Depreciation and Capital Expenditure of BEST and PUZ was not available; hence, are shown under Transmission (HT & EHT) category for convenience.*
7. *Other revenue for BEST appears very high, as unlike other utilities, this include FCA revenue. For other utilities FCA revenue is included in respective consumer categories.*

Annexure 2: Distribution capital investments by private utilities (Rs. Cr.)

	Category	BSES	TPC	SEC	CESC	NPC
A	**Transmission (HT and EHT)**					
1	Land & Rights	4.8			0.1	
2	Building & Roads	7.6	0.2	1.2	0.3	
3	Substation Transformers, Transformers Kiosks	5.7	4.1	2.9	5.7	
4	Switchgear including cable connections	4.1	6.6	3.0	4.7	
5	Towers, Poles, Fixtures, Overhead Conductors and services		2.7		0.2	
6	Underground & Cable Devises	11.1			12.7	
7	Miscellaneous equipment	0.7	7.5			
8	Metering Equipments		1.6			
	Sub Total	33.8	22.7	7.1	23.8	
B	**Distribution (HV)**					
1	Land & Rights					
2	Building & Structures	1.1	0.7	0.5		0.1
3	Substation Transformers, Transformers Kiosks		8.2	4.4		0.3
4	Switchgear including cable connections	6.1	7.0	3.2	16.0	0.5
5	Towers, Poles, Fixtures, Overhead Conductors and services	0.0	0.5	0.8	0.0	0.8
6	Underground & Cable Devices	22.3	36.0	12.0	41.9	1.4
7	Service Lines			0.2		0.6
8	Metering Equipments		0.0		0.0	0.1
9	Miscellaneous equipment	0.4	9.7			
	Sub Total	29.9	62.2	21.1	58.0	3.7
C	**Distribution (MV and LV)**					
1	Land & Rights					
2	Building & Structures				0.04	
3	Substation Transformers, Transformers Kiosks	5.8		0.3	19.4	0.4
4	Distribution Plant - Medium and Low Voltage	0.8				
5	Towers, Poles, Fixtures, Overhead Conductors and services			0.7	18.9	0.2
6	Underground & Cable Devises	10.9		4.0	30.8	0.1
7	Service Lines	11.3		5.3	28.2	0.8
8	Metering Equipments	21.7		12.4	20.6	0.1
9	Communication Equipments	0.0				
10	Miscellaneous Equipment	1.0				
11	Switchgear including cable connections			0.7		
	Sub Total	51.6		23.4	118.0	1.6
D	**Public Lighting**	2.7			0.0	
	Sub Total	2.7			0.0	
E	**General Equipment**					
1	Land & Rights		6.2			
2	Building & Structures	37.9	0.5		2.7	
3	Office Furniture and Equipment	6.6	0.8	0.4	5.8	0.3
4	Motor Cars and motor cycles / Transportation Equipment	0.0	25.4	0.2	0.4	
5	Laboratory and Water Testing Equipments			0.1		0.2
6	Workshop Plant and Equipment					
7	Tools and Work Equipment			0.1		
8	Communication Equipments	0.2		0.2	1.4	
9	Miscellaneous Equipments	2.3	0.9	0.0	3.5	
10	Contract & computer Division					
	Sub Total	47.1	33.8	1.1	13.8	0.5
	TOTAL	**165.1**	**118.8**	**52.6**	**213.6**	**5.8**

Notes:

1. *Data for BSES and NPC is for Fy 99-00 and for TPC, SEC and CESC is for FY 00-01*
2. *This table shows the gross investments made (i.e. without considering retirements), where as data in Annexure 1 shows net investments (i.e. considering retirements) and hence is somewhat less than what is shown in this table.*

Some Important Publications of Prayas, Energy Group

1. “Least-Cost Power Planning: Case Study of Maharashtra State” - Energy For Sustainable Development, The Journal of International Energy Initiative, Vol. IV, No 1, June 2000.
2. “Power from Sardar Sarovar: An Inefficient Plan” - Amulya Kumar N. Reddy and Girish Sant, The Hindu Survey of the Environment 1994.
3. “Power Purchase Agreement (PPA) Between Dabhol Power Company and Maharashtra State Electricity Board: Structure and Implications” - Economic and Political Weekly, June 17, 1995.
4. “The Enron Controversy: Techno-Economic Analysis and Policy Implications” - Prayas Monograph
5. “Beneficiaries of IPS Subsidy and Impact of Tariff Hike” - Economic and Political Weekly, December 21, 1996.
6. “How Reliable are Agricultural Power Use Data?” - Economic and Political Weekly, April 12, 1997.
7. “Agricultural Pumping Efficiency in India: The Role of Standards” - Energy for Sustainable Development, the Journal of the International Energy initiative, Volume III, No.1, May 1996.
8. “The Enron Story: Controversial Issues and the Struggle” - Prayas Monograph
9. “WB-Orissa Model of Power Sector Reforms: Cure Worse Than Disease” - Economic and Political Weekly, April 25-May 1, 1998.
10. “Regaining Rationality through Democratisation: A Critical Review of Multilateral Development Banks’ (MDBs’) Power Sector Activities in India” - May 1999.
11. “The Real Challenge in Power Sector Restructuring: Instilling Public Control through TAP” - Prayas Energy Group, Energy for Sustainable Development, September 2001.
12. “Questionable Economics of LNG-based Power Generation: Need for Rigorous Analysis” - Economic and Political Weekly Vol. XXXVI, No. 20, May 19, 2001.
13. “Lessons of the Enron Disaster: Democratization through TAPing of Governance as the Remedy” - (An edited version of this article has been published in Infrastructure Report 2002, 3i Network)
14. “The Reforms Process and Regulatory Commissions in the Electricity Sector: Developments in Different States of India” - A Compilation of selected papers on status of reforms in different states, presented during a workshop organised by Prayas in December 2000.
15. “India Power Sector Reforms Update- various issues “ Update of power sector reforms in Andhra Pradesh, Uttar Pradesh and Orissa
16. “HT Energy Audit: The Crucial Starting Point for Curbing Revenue Loss” - Prayas Occasional Report 1/2002, February 2002.
17. Privatisation or Democratisation - The Key to the Crises in the Electricity Sector; The Case of Maharashtra - March 2001.
18. Bujagali Power Purchase Agreement -An Independent Review - A study of techno-economic aspects of power purchase agreement of the Bujagali project in Uganda - November 2002.
19. “A Good Beginning But Challenges Galore – A survey based study of resources, transparency and public participation in electricity regulatory commissions in India”, Prayas Occasional Report 1/2003, February 2003

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