CRISIL
INFRASTRUCTURE
ADVISORY

High-Level Panel

Study of Various Power Distribution Models in India

July 2011

CONTENTS

LIST OF TABLES

LIST OF FIGURES

DISCLAIMER

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1 BACKGROUND

1.1 Context

The Electricity Act 2003 and downstream policies have brought about a fundamental change in the power sector with the last decade witnessing a number of headways. Private sector participation and competition are being witnessed across the value chain, albeit of different degrees. Four ultra-mega power projects (UMPP) of 4000 MW capacity each, have been awarded to private entities. A number of distribution licensees have also completed the power procurement process from independent power producers (IPP) under various modes of tariff-based competitive bidding. A number of inter-state transmission projects have been awarded to private entities on an independent power transmission company (IPTC) basis. At the state level too, transmission projects are being commissioned on a competitive bidding basis. Two power exchanges have commenced operations and are offering various day-ahead and term-ahead contracts.

On the distribution side, barring a few states, all the others have unbundled their erstwhile state electricity boards (SEB) and have corporatised their successor entities. The Government of India is facilitating efficiency improvement and expanding distribution networks to rural areas through its flagship programmes of R-APDRP[1] and RGGVY[2] respectively.

However, the financial health of distribution utilities continues to remain critical for the overall success of power sector reforms. The aggregate financial losses of the state utilities were estimated at Rs. 52,623 crores in FY 2008-09 with Aggregate Technical & Commercial (AT&C) losses for the same year being pegged at 28.44%[3]. According to a report released by the 13th Finance Commission, these financial losses may increase to Rs. 116,089 crore by FY 2016-17, assuming tariffs remain at the 2008 level.

[1] R-APDRP (Restructured Accelerated Power Development and Reforms Program) was launched by the Government of India in 2008 to enable distribution utilities to improve efficiency and reduce system losses. The program has two major components: Part A includes projects for establishment of information technology based energy accounting and audit system leading to finalization of verifiable base-line AT&C loss levels in the project areas. Part B envisages distribution network strengthening investments leading to reduction in loss levels.

[2] RGGVY (Rajiv Gandhi Grameen Vidyutikaran Yojana) is a rural electrification scheme of the Government of India. The policy entails electrifying all villages and habitations and providing access to electricity to all rural households.

[3] "Performance of State Power Utilities for the years 2006-07 to 2008-09", Power Finance Corporation.

Private participation in the distribution sector is limited and exists in different forms. While distribution utilities such as Tata Power Company Limited (TPCL) and Calcutta Electricity Supply Company (CESC) are privately owned and have been in operation for nearly a century, distribution utilities such as North Delhi Power Limited (NDPL) and BSES Rajdhani Power Limited (BRPL) have been privatized rather recently (eight years ago) with part ownership (49%) of these companies residing in the state government. Quite recently, private participation in power distribution has assumed another form, viz., the Distribution Franchisee model. As per this model, a certain area of the distribution unit is handed over to a private entity, and the performance of the private entity is regulated through a contract between the private entity and the distribution licensee of that area. For instance, MSEDCL (a state-owned distribution company in Maharashtra) has appointed Torrent Power Bhiwandi Limited as a distribution franchisee for the Bhiwandi circle in Maharashtra.

The High-Level Panel aims to analyse both such emerging and established models of electricity distribution and evaluate their relative strengths and weakness. This assessment will serve as an input for the Panel to evolve feasible models for electricity distribution in India.

1.2 Outline of approach and Data sources used for analysis

While this study analyses different distribution models by selecting a company representing each such model and assessing its performance against select indicators, the objective is not to benchmark the performance of one company against that of another. Rather, it is to identify the factors responsible for the performance or non-performance of the model being represented by the select company. Accordingly, as a first step, distribution companies (discom) representing different power distribution models in India were selected in consultation with the High-Level Panel. Table 1 depicts the list of discoms chosen for this study.

Table 1: List of Discoms selected for the study

Ownership/ PPP	Discom
State-owned Discom	Jaipur Vidyut Vitran Nigam Limited
Private Discom (in joint venture with the state government)	North Delhi Power Limited, Noida Power Company Limited
Private Discom (full ownership with the private entity)	Reliance Infrastructure Limited- Mumbai Distribution Operation
Public-Private Partnership (Distribution franchisee)	Torrent Power Bhiwandi Limited

A list of indicators, covering different facets of distribution performance (financial, technical and customer service-related) was prepared, taking into account the concerns of the Government as well as consumers. Financial parameters include profit after tax, and operational factors such as distribution losses, collection efficiency, and O&M cost. Technical parameters primarily relate to the extent of metering and quality of supply including such indicators as 11 kV feeder-metering, consumer-metering, and distribution transformer failure. Besides, customer service and energy-efficiency initiatives undertaken by the discoms too have been captured. The list of these indicators is enclosed in Annexure 1.

Further, the performance of each discom has been analysed against the identified indicators, and the efficacy of the distribution model represented by the discom has been judged across the following two dimensions:

- Geographical coverage – This pertains to the size of the distribution area and its composition, i.e., if the area is wholly urban or part urban and part rural.
- Ownership – The distribution unit may be state-owned or privately owned.

The reference period considered for analysing the performance indicators is FY 2005-06 to FY 2009-10. A template for the collection of data was prepared, and best attempts were made to obtain this data from the selected companies. Annual reports, tariff orders, true-up orders, and reports available in the public domain have also been considered for the purpose of this study.

1.3 Structure of the Report

The report has been organized along the following lines:

Section 2: Overview of distribution models in India

Section 3: Profiles of companies selected for the study

Section 4: Assessment of distribution models

Section 5: Conclusions

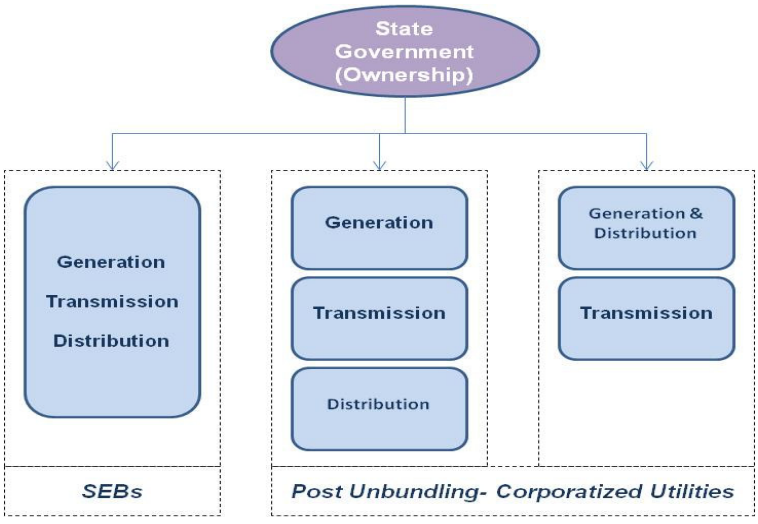
2 OVERVIEW OF DISTRIBUTION MODELS IN INDIA

Power distribution companies (discoms) can be broadly classified into three models, based on their ownership, viz., state-owned discoms, privately owned discoms, and PPP-model based distribution franchisees[4]. An overview of each of these models is presented below.

2.1 Government Ownership

Government-owned distribution utilities can be divided into two categories, viz., state electricity boards (SEB) and unbundled discoms. State electricity boards are bundled entities, which perform all the activities that make the value chain of electricity, including electricity distribution. The ownership of the Boards lies with the state governments. Most of the states are on track in unbundling their respective Boards with few of them following a different approach of unbundling. The SEBs that were unbundled at an early stage of reforms have been segregated into generation, transmission, and distribution companies, and in some cases into multiple distribution companies. Recently, some states have unbundled their Boards into two companies -- one, transmission company, and the other, dedicated to both generation and distribution. A pictorial representation of different forms of government ownership in electricity distribution is presented below.

Figure 1: Forms of government ownership in electricity distribution



[4] Only Input Based Franchisee model has been considered for analysing the Distribution Franchisee Model, as it allows the Franchisee to control the entire gamut of distribution operations on behalf of the distribution licensee.

Barring a few states such as Bihar, Jharkhand and Kerala that are yet to unbundle their SEBs, all other SEBs have been unbundled into separate generation, transmission, and distribution companies. There are exceptions such as Punjab and Tamil Nadu that have restructured their boards into two companies -- one handling generation and power distribution, and the other operating the transmission business.

2.2 Private Ownership

Calcutta Electricity Supply Co. Limited (CESC) and Tata Power Company Limited (TPCL), which are privately held, have been respectively operating in the cities of Kolkata and Mumbai for several decades now. Orissa was the first state to privatise its electricity distribution, disinvesting 51% of the state government's stake in private companies (1999). Subsequently, the Government of National Capital Territory of Delhi (GoNCTD) handed over its distribution business to three private distribution companies, namely North Delhi Power Limited (NDPL), BSES Rajdhani Power Limited (BRPL) and BSES Yamuna Power Limited (BYPL) in July 2002. Like the government in Orissa, GoNCTD too has divested 51% of its stake in these distribution companies. There has been no further privatization in electricity distribution since 2002 in Delhi. Overall, private participation in the distribution business has been limited owing to direct consumer interactions, fixed returns, and high risks entailed by the distribution business. Here is a list of private distribution companies operating in India:

- Calcutta Electricity Supply Co.(CESC) - Kolkata (West Bengal)
- Tata Power Company Limited (TPCL) – Mumbai (Maharashtra)
- Torrent Power Limited - Ahmedabad, Surat (Gujarat)
- Reliance Infrastructure Limited - Mumbai (Maharashtra)
- North-Eastern Electricity Supply Company of Orissa Ltd. (NESCO) – Orissa
- Western Electricity Supply Company of Orissa Ltd. (WESCO) – Orissa
- Southern Electricity Supply Company of Orissa Ltd. (SOUTHCO) – Orissa
- Central Electricity Supply Utility of Orissa (CESU) - Orissa
- Noida Power Co. Ltd (NPCL) - Greater Noida, UP
- North Delhi Power Limited (NDPL) – Delhi
- BSES Yamuna Power Limited (BYPL) - Delhi
- BSES Rajdhani Power Limited (BRPL) - Delhi

2.3 Public-Private Partnership -- Distribution Franchisees

The public-private partnership model has made its way through in the power sector along with other infrastructure segments. Legal and regulatory provisions allow a distribution licensee to authorize a person/entity to distribute electricity on its behalf in a particular area within its area of supply, as a distribution franchisee. The franchisee initiative has enabled private sector participation in the power

distribution sector while continuing with government ownership. This model enables greater private sector participation by reducing regulatory and political risk assumed by investors in a full privatization model.

Distribution franchisee models are structured on the basis of activities that are outsourced. The models vary from each other based on the scope of work outsourced and the payment terms of the franchisees. An outline of the key franchisee models, their compensation structures, and their areas of operation is presented in Table 2.

Table 2: Key Franchisee Models

Franchisee Model	Compensation	Area
Outsourcing Outsourcing of one or more functions of operations such as meter reading, bill distribution or revenue collection	Fixed Fee	Rural
Collection-based Revenue Franchisee Franchisee's responsibility -- Meter reading, bill distribution, and revenue collection	Percentage of collection on achievement of target; penalty for not achieving the target and incentives for exceeding the target	Rural
Revenue Collection with O&M Model similar to collection-based Revenue Franchisee with additional responsibility of operation & maintenance of network	Fixed fee and incentive	Rural
Input-based franchisee Distribution Franchisee operates as a distribution licensee and is responsible for all distribution operations from metering, billing, collection, O&M of network, to capital investment. The franchisee buys electricity from the licensee by paying pre-decided input rates.	Right on revenue	Urban

The selection of the franchisee is highly dependent on the area of distribution operations. In rural areas, individuals, Panchayati Raj institutions, self-help groups, non-governmental organizations (NGOs), and users' associations work as franchisees; their involvement is limited usually to meter reading, billing, bill distribution, and revenue collection.

Input-Based Franchisee Model in Urban Areas

There are different distribution franchisee models, based on the nature of the activities performed by a franchisee. Of these, the input-based franchisee model is increasingly being adopted by many distribution licensees for select urban areas. The franchisee undertakes operations and maintenance of the existing distribution network while carrying out the commercial activities of metering, billing, and collection. Besides, the franchisee is allowed to undertake capital expenditure in the supply area. Further, the franchisee buys electricity from the licensee at defined input points at pre-decided input rates. This input rate is arrived at through a competitive bidding process to seek higher revenue for the licensee. The input rate is based on the AT&C loss reduction trajectory considered during the contract period. The franchisee benefits financially if it is able to reduce losses over and above the trajectory and suffers if it fails to do so. This model is adopted to bring in a certain amount of fixed revenue from urban circle(s), which are otherwise marked by poor collection efficiency. The model ensures that a fixed income is generated for the distribution licensee at no additional cost. In sum, except for the transfer of ownership, the franchisee operates as a distribution licensee in the area.

Starting with Bhiwandi, a number of circles/areas have been given out to distribution franchisees. Torrent Power Limited has taken over as distribution franchisee for Agra and it has commenced operations from April 2010. Three urban circles in Nagpur and two in Aurangabad too have been outsourced to distribution franchisees. Distribution franchisees in Bhiwandi, Agra, Nagpur, and Aurangabad have been selected based on the competitive bidding process. The bidders were made to bid for year-wise fixed input rate for power injected by the distribution licensee in the franchisee area. Though the basic approach towards the award of franchisees based on the input rate has remained the same, licensees have made significant changes in terms of Distribution Franchisee Agreements. A comparative picture of the Bhiwandi, Agra, and Nagpur models is presented in Table 3.

Table 3: Key terms of recent Distribution Franchisee Agreements

	Bhiwandi	Agra	Nagpur
Input Rate	The bidder is expected to factor in a certain AT&C loss reduction trajectory. The bidder offering the highest input rate, i.e., the maximum loss reduction won the bid.	The licensee explicitly stated the expected minimum input rate and the bidders offering the highest rates above this trajectory won the bid.	The licensee explicitly stated the expected minimum input rate and the bidders offering the highest rates above this trajectory won the bid.
Contract Period	10 Year	20 Years	15 Years
Payment	Franchisee pays fixed Input rates for the	Franchisee pays fixed Input rates for the	Franchisee pays fixed Input rates for the

	Bhiwandi	Agra	Nagpur
	energy injected by the licensee.	energy injected by the licensee.	energy injected by the licensee.
Performance Improvement Target	No loss reduction target has been specified by the licensee, but the franchisee benefits only if it is able to achieve or exceed the loss reduction trajectory assumed to calculate the Input rates.	The franchisee is expected to achieve an AT&C loss level of 15% within 7 years. Failure to realize the loss reduction target invites a penalty of 10% of the revenue loss.	No loss reduction targets have been specified by the licensee. However, the minimum Input rates stated by the licensee in the Request for Proposal (RfP) were based on a loss reduction trajectory.
Investment by DF	Complete autonomy has been given to the franchisee to implement its capital expenditure. No need for any approval from licensee or the regulator.	The franchisee is to undertake capital expenditure, as per the Infrastructure Roll-Out Plan submitted to the licensee, stating the investment to be carried out for loss reduction. Such investments would be subjected to the approval of the State Electricity Regulatory Commission. Licensee would facilitate such approval. Investments to be made from 16th year onwards would require licensee's approval. Distribution franchisee to make a minimum investment of Rs 200 Crore out of	The franchisee is to undertake capital expenditure, as per the Infrastructure Roll-Out Plan submitted to the licensee stating the investment to be carried out for loss reduction. Such investments would be subjected to the approval of the State Electricity Regulatory Commission. Licensee would facilitate such approval.

	Bhiwandi	Agra	Nagpur
		which Rs 150 Crore has to be invested in the first five years and the remaining Rs 50 Crore in the next five years.	
Transfer of Assets created by Distribution Franchisee during its contract period.	Asset will be transferred to the licensee at the depreciated value of the assets at the end of the contract period.	Asset will be transferred to the licensee at the depreciated value of the assets at the end of the contract period.	Asset will be transferred to the licensee at the depreciated value of the assets at the end of the contract period.

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3 PROFILES OF COMPANIES SELECTED FOR THE STUDY

3.1 North Delhi Power Limited (NDPL)

North Delhi Power Limited (NDPL) formally succeeded the erstwhile Delhi Vidhyut Board w.e.f July 2002. NDPL is a 51:49 joint venture (JV) of Tata Power Company Limited (TPCL) and Government of National Capital Territory of Delhi (GoNCTD) and is engaged in the distribution of power in the Northern and North-Western parts of Delhi. A brief company profile of NDPL is presented in Table 4.

Table 4: Company Profile- NDPL (FY 2009-10)

S.No.	Description	Unit	Value
1	No. of customers	No.	1200000
2	Energy Sales	MUs	5800
a	Domestic	%	42.19%
b	Commercial	%	24.98%
c	Industrial	%	32.48%
d	Agriculture	%	0.34%
3	Average Revenue Realization	Rs./kWh	4.47
4	Service Area	sq.km	510
5	Energy Input (at T-D Interface)	MUs	6955.97
6	Length of the Distribution Network	kms	9952
7	Peak Demand	MW	1350
8	HT:LT Mix	%	0.74

NDPL caters to a city area of approximately 510 sq. km., and supplies power mainly to domestic consumers followed by industrial and commercial consumers. Agriculture sales contribute to less than 1% of the total sales.

3.2 Reliance Infrastructure Limited (Reliance-Infra) - Mumbai Distribution Operations

Reliance Infrastructure Ltd. – Mumbai Distribution Operations (formerly known as BSES Ltd.) has been distributing power in Mumbai for over seven decades now. A brief company profile of Reliance Infra - Mumbai Distribution Operations is presented in Table 5.

Table 5: Company Profile - R-Infra (FY 2009-10)

S.No.	Description	Unit	Value
1	No. of customers	No.	2724758
2	Energy Sales	MU	8320
a	Domestic	%	53.35%
b	Commercial	%	32.66%
c	Industrial	%	11.59%
d	Agriculture	%	0.00%
e	Others	%	2.40%
3	Average Revenue Realization	Rs./kWh	7.11
4	Service Area	sq.km	384
5	Energy Input (at T-D Interface)	MU	9265
6	Length of the Distribution Network	kms	7930
7	Peak Demand	MW	1516
8	HT:LT Mix	%	1.08

3.3 Noida Power Company Limited

Noida Power Company Limited distributes power in Greater Noida, near Delhi in Uttar Pradesh, which is being developed as an industrial hub and urban settlement. The company is a joint venture between the RPG Group and Greater Noida Industrial Development Authority (GNIDA). GNIDA is an autonomous body of the U.P. Government, responsible for town planning and infrastructure development and holds 27% stake in the company. The company started its operations in December 1993 under a 30-year license from the U.P. Government.

The company reaches out to a population of about 7 lakhs, spread across hamlets, villages and a new township spanning an area of 335 sq. km. A brief company profile of NPCL is presented in Table 6.

Table 6: Company Profile- NPCL (FY 2009-10)

S.No.	Description	Unit	Value
1	No. of customers	No.	48261
2	Energy Sales	MU	650
a	Domestic	%	17%
b	Industrial	%	63%
c	Agriculture	%	4%
d	Other Categories	%	16%

S.No.	Description	Unit	Value
3	Average Revenue Realization	Rs./kWh	4.22
4	Service Area	sq.km	335
5	Energy Input (at T-D Interface)	MU	707.38
6	Length of the Distribution Network	kms	2859
7	Peak Demand	MW	110
8	HT:LT Mix	%	0.86

3.4 Jaipur Vidyut Vitran Nigam Limited

Jaipur Vidyut Vitran Limited (Jaipur Discom), a public sector undertaking, is engaged in the business of distribution and supply of electricity in 12 districts of Rajasthan, namely Jaipur, Dausa, Alwar, Bharatpur, Dholpur, Kota, Bundi, Baran, Jhalawar, Sawaimadhopur, Tonk, and Karoli. The area of operation of JVVNL is 72,474 sq. km. A brief company profile of JVVNL is presented in Table 7.

Table 7: Company Profile- JVVNL (FY 2009-10)

S.No.	Description	Unit	Value
1	No. of customers	No.	3209593
2	Energy Sales	MU	12486
a	Domestic	%	21.29%
b	Commercial	%	7.19%
c	Industrial	%	31.16%
d	Agriculture	%	31.48%
e	Others	%	8.88%
3	Average Revenue Realization	Rs./kWh	3.2
4	Service Area	sq.km	72474
5	Energy Input (at T-D Interface)	MU	16136
6	Length of Distribution Network	km	134923
7	Peak Demand	MW	6859
8	HT:LT Mix	%	0.72

3.5 Torrent Power Bhiwandi Limited

Torrent Power entered into the country's first distribution franchisee agreement with Maharashtra State Electricity Distribution Company Limited for Bhiwandi Circle in December 2006. The agreement is valid for an initial term of 10 years.

Bhiwandi has a customer base of about 2 lakh in an area spread over 721 sq. km. Bhiwandi is a major textile hub of Western India and houses one-third of the country's power looms. About 60% of Bhiwandi's total sales accrues from the power loom sector.

A brief company profile of Torrent Power Bhiwandi Limited is presented in Table 8.

Table 8: Company Profile- TPBL FY 2009-10

S.No.	Data	Unit	Value
1	No. of customers	No.	194000
2	Energy Sales	MUs	2449
a	Domestic	%	5%
b	Commercial	%	3%
c	Industrial	%	8%
d	Power Loom	%	60%
e	HT Industry	%	24%
3	Average Revenue Realization	Rs/kWh	NA
4	Service Area	sq.kms.	721
5	Energy Input (at T-D Interface)	MU	3037
6	Length of Distribution Network	Km	NA
7	Peak Demand	MW	525
8	HT:LT Mix	%	0.52

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4 ASSESSMENT OF DISTRIBUTION MODELS

The performance of a distribution company is influenced by a number of external business conditions. Factors such as the number of customers, load mix (HT v/s LT), rural coverage, sales mix, and area of supply, have an impact on the cost/efficiency performance of a discom. Accordingly, to understand the performance of a discom against the different identified indicators, a list of density indicators have been computed. The performance of the selected companies needs to be understood in conjunction with these density indicators.

Table 9: Density Indicators of Short-listed Distribution Companies (FY 2009-10)

S.No.	Density Indicator	Unit	NDPL	Reliance-Infra	NPCL	JVVNL	Torrent
1	Sales per square kilometre of the distribution area	MU/sq. km	11.37	21.67	1.94	0.17	3.4
2	Load density - Sales/Customer/Year	Units	4833	3053	13485	3890	12623
3	Customer density - No. of customers per square kilometre of an area	000' Customers /sq. km	2.35	7.10	0.14	0.044	0.27

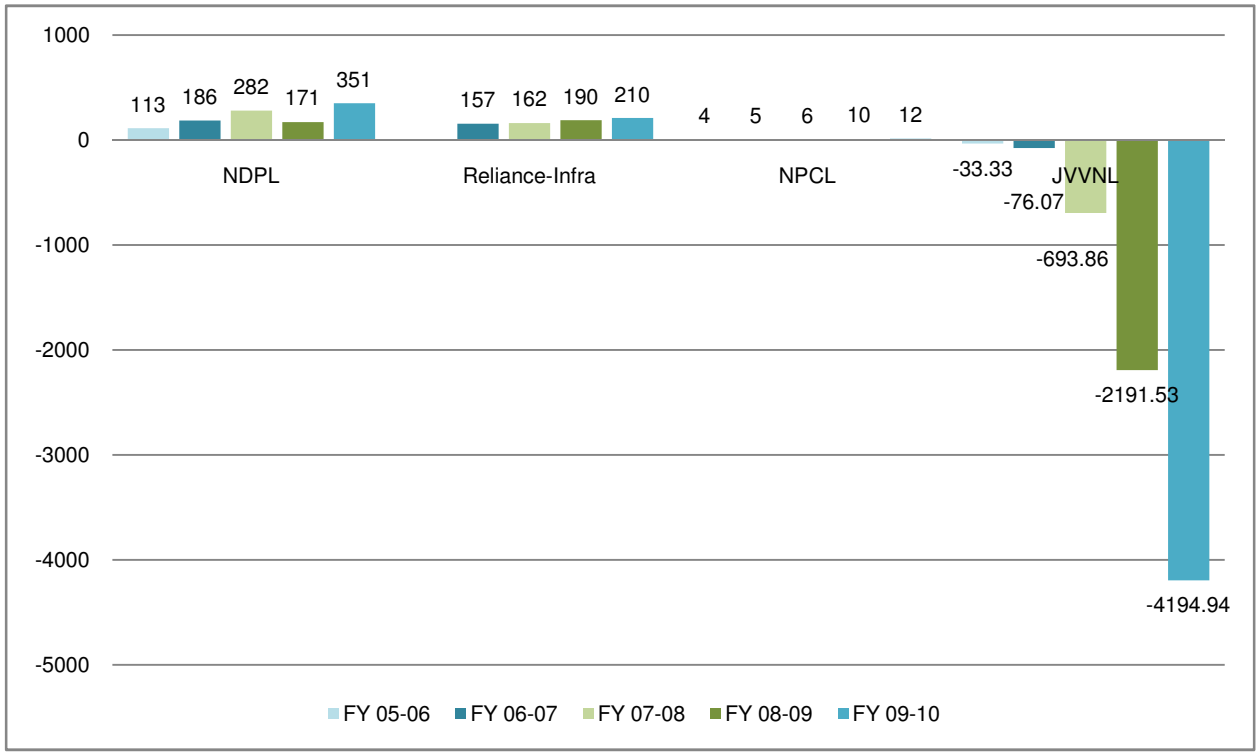
It may be inferred from the higher values for customer density for Reliance-Infra that the company supplies power to a densely populated area in Mumbai. Similarly, higher load density for NPCL and Torrent Power indicates higher weightage of industrial sales in their sales mix; NPCL sells more than 60% of its total power to the High Tension (HT) category and Torrent sells more than 60% of its power to power looms. JVVNL being a state distribution company has a widespread network and a different consumer mix, which is clear from its moderate load density and low customer density.

4.1 Financial Performance

4.1.1 Profit after Tax

Profit after Tax (PAT) has been selected as an indicator to gauge the financial health of the companies. The intent here is not to compare the magnitude of profit or loss of the different companies, but to gauge the consistency of the companies in maintaining their profitability.

Figure 2: Profit after Tax of the select companies (Rs.Crore)

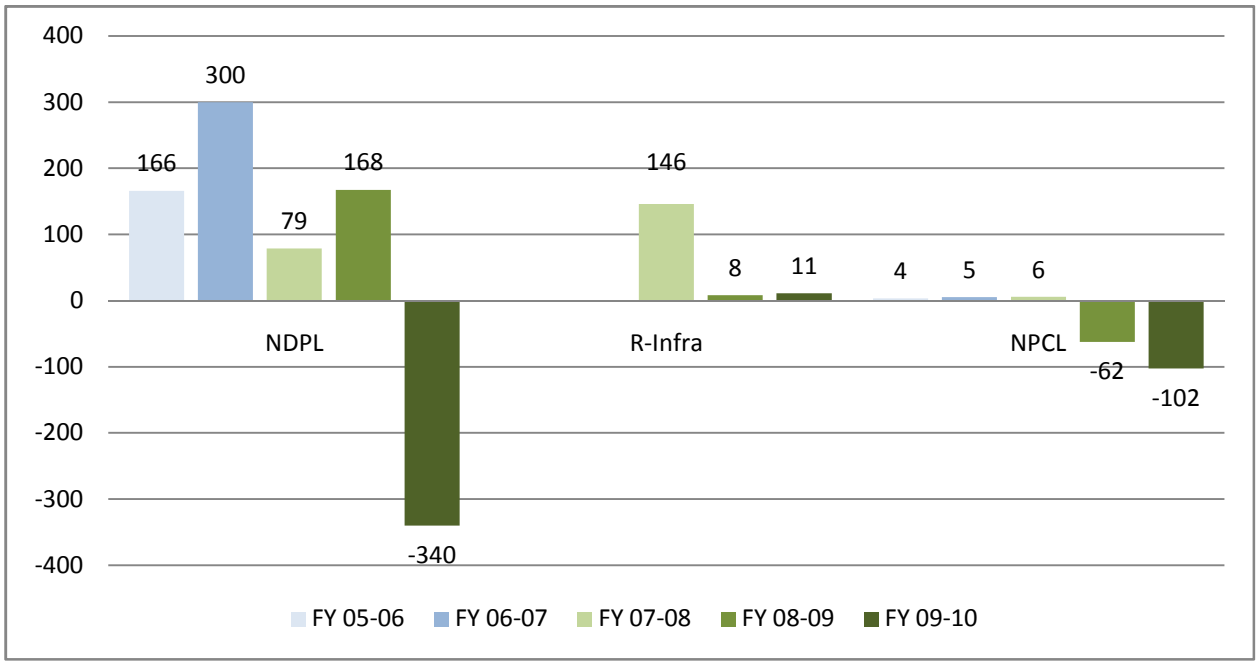


Note: PAT for Reliance-Infra applies to its Mumbai operations only. Further, Torrent Power did not submit any information on its PAT from Bhiwandi Distribution Operations.

While Profit after Tax for NDPL, Reliance-Infra and NPCL[5], as shown above, remained positive, the sales of these companies included the revenue gap/regulatory assets that were expected to be adjusted through future revisions in their tariffs. However, netting the Profit after Tax for such regulatory assets, as may be recovered through future tariff revisions, the resultant profitability of these companies dropped significantly, as presented in Figure 3 below.

[5] Source of PAT: Annual Report of NDPL and NPCL, PAT values provided by JVVNL. In the absence of separate annual accounts for Mumbai distribution operations, RoE value provided by Reliance-Infra has been considered for PAT.

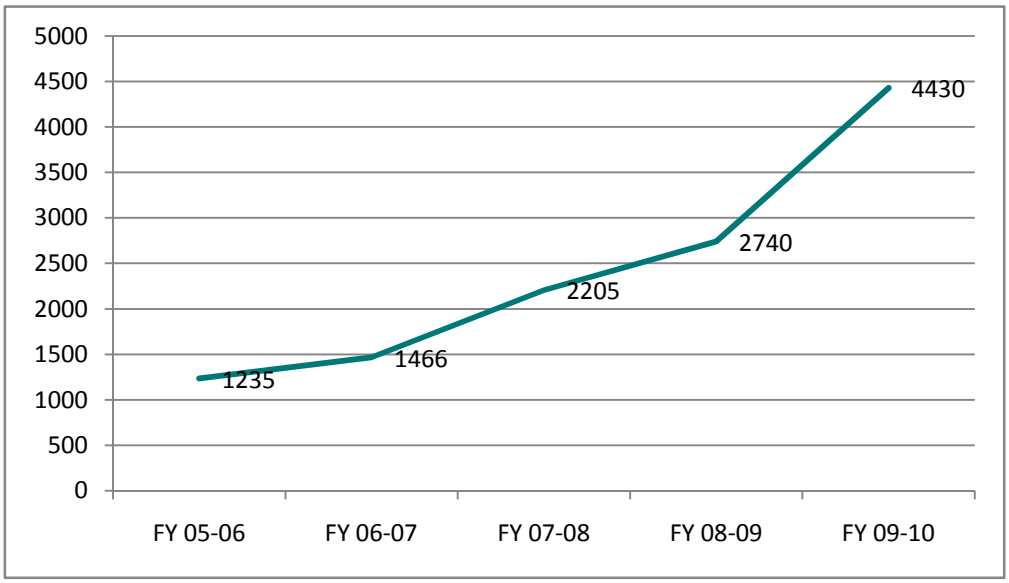
Figure 3: Profit after Tax (Rs. Crore) (Adjusted for Regulatory Assets)



It is clear from the above that the profitability of NDPL and NPCL has turned negative in recent years. Profitability of Reliance-Infra[6] has also reduced considerably in FY 09 and FY 10 adjusting the PAT level for the amount of regulatory assets. This suggests that if private companies have been able to maintain their profitability, it is partly because of the consideration of the regulatory asset/revenue gap as a part of their electricity sales. The foregoing graph shows that JVVNL has been incurring losses, which escalated to Rs. 4194.94 crores in FY 2009-10. One of the key reasons for the financial non-performance of JVVNL is the non-revision of the retail tariff in the state since 2004. JVVNL has been meeting a part of its revenue gap over the years through government subsidy and short-term borrowings. In fact, the amount of short-term loans has grown significantly; this, along with the high cost of short-term borrowings, has led to increasing financial losses of the company.

[6] To adjust PAT against the regulatory assets, PAT/RoE was grossed up by 20% and regulatory assets were deducted to get the revised Profit Before Tax. Tax of 20% was again applied on Profit Before Tax to get the PAT net of regulatory asset.

Figure 4: Increase in short-term loans of JVVNL(Rs. Crore)



Source: JVVNL Budget Estimates FY 2010-11

JVVNL's outstanding short-term loans in FY 2005-06 have increased by 3.5 times to Rs. 4,430 crores in FY 2009-10. Even while JVVNL has been suffering from high financial losses, it did not file any petition for the revision of tariff since 2004. A table depicting the status of the year-wise revision of tariffs, as carried out by the respective State Electricity Regulatory Commissions (SERCs), is presented below.

Table 10: Status of revision of tariffs for the select companies

Tariff Revision	NDPL	Reliance-Infra	NPCL	JVVNL
FY 2005-06	Yes	No	No	No
FY 2006-07	No	Yes	No	No
FY 2007-08	No	Yes	No	No
FY 2008-09	No	Yes	Yes	No
FY 2009-10	No*	Yes	Yes	No

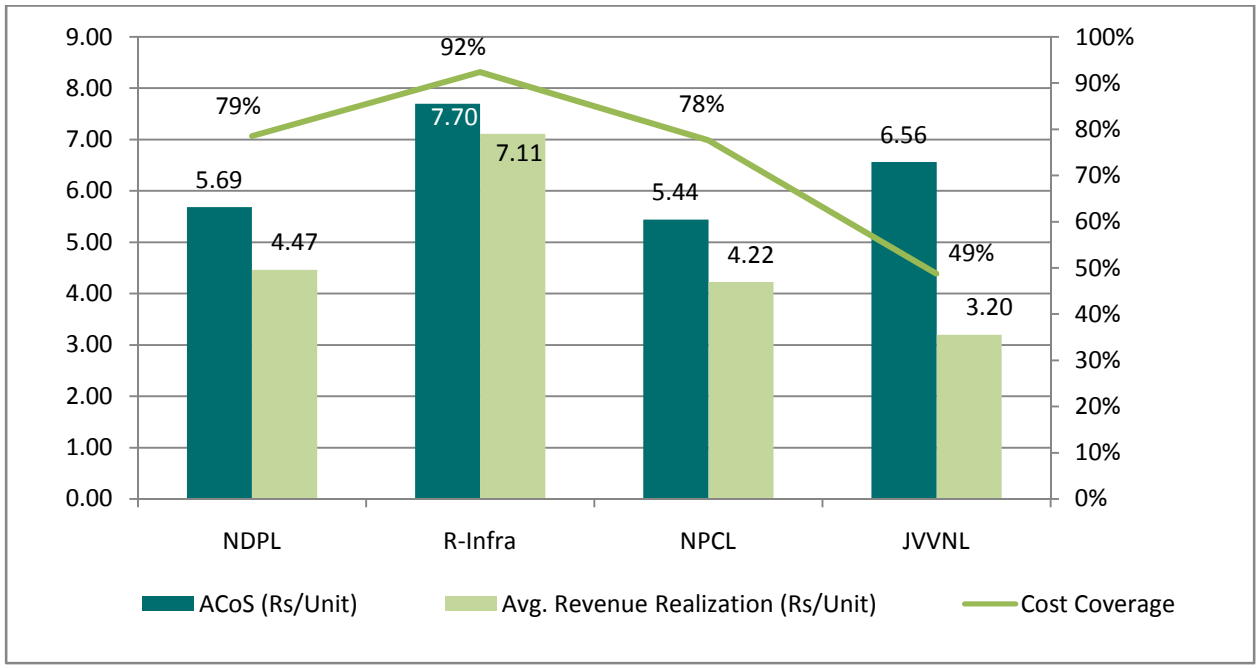
* Seasonal tariff for a certain category of consumers was introduced.

Note: Torrent Power does not file tariff petition. In the case of NPCL, the tariff approved for FY 2009-10 is applicable for FY 2010-11 as well.

In the case of JVVNL, after FY 2004-05, there has been no revision of tariffs. While JVVNL has filed for the approval of Annual Revenue Requirement (ARR), it has not filed any tariff petition towards meeting the revenue gap. The Rajasthan Commission has left the revenue deficit untreated in each of the tariff orders that were issued during these years. As a result of this non-revision of tariffs, JVVNL's average

revenue realization[7] from the sale of power per unit as a percentage of the average cost of supply per unit is low. A comparison of the cost recovery ratios of the selected companies in FY 2009-10 is given in Figure 5.

Figure 5: Average Cost of Supply vs. Average Revenue Realisation from sale of power (FY 10)[8]



Note: Average Cost of Supply includes Return on Equity claimed by the companies.

The foregoing figure shows that none of the select companies has 100% realization of cost of supply through their existing tariff. Thus, while private companies have remained profitable, even their profitability is subject to timely and prudent revision of tariff as is clear from the increase in the revenue gap/regulatory assets of NDPL, Reliance-Infra, and NPCL.

4.1.2 Distribution Losses and Collection Efficiency

The extent of distribution losses[9] in a distribution system indicates the operational efficiency of the company. Similarly, higher collection efficiency of the company against the amount billed to the

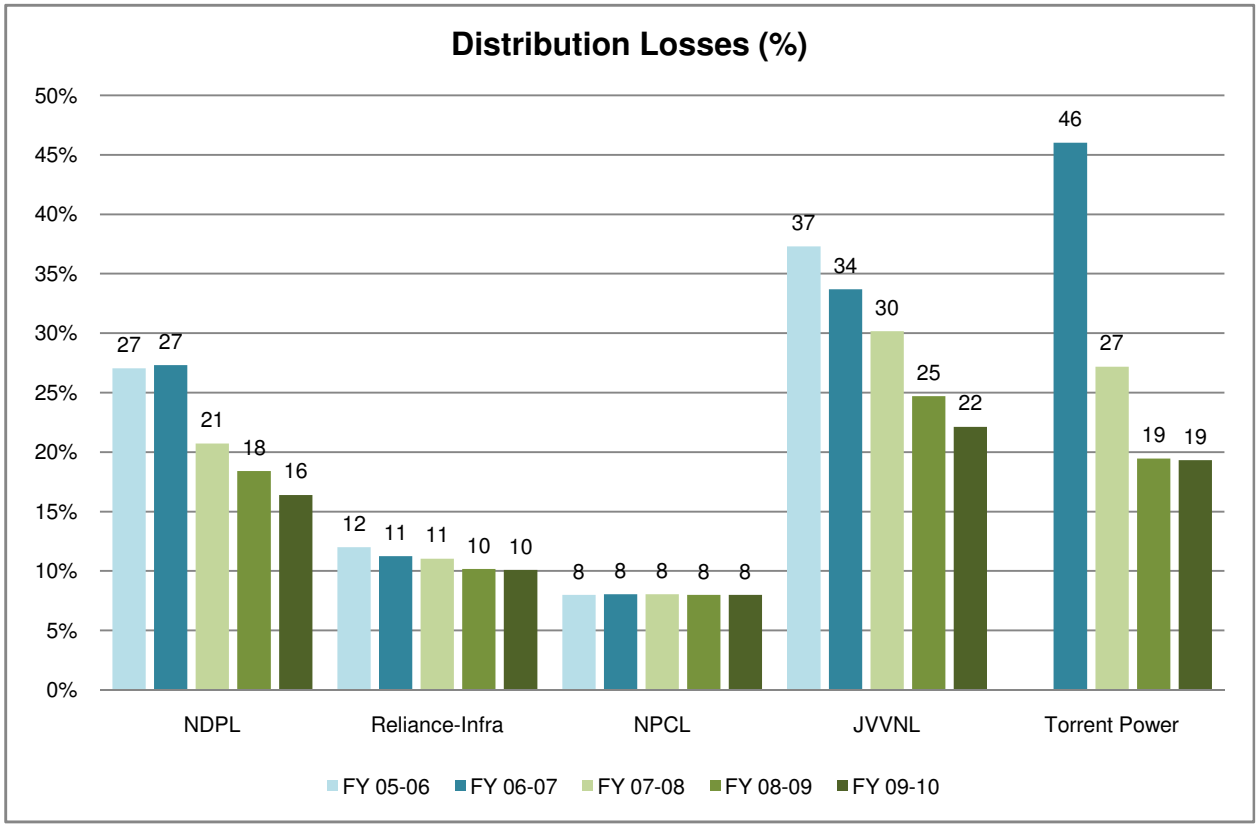
[7] Average Revenue Realization from sale of Power is Average Billing Rate for the company.

[8] Source: NDPL True-up Petition for FY 10, Reliance-Infra Tariff Order for FY 2009-10, NPCL Tariff Order for FY 2009-10, JVVNL revised Budget Estimates for FY 2009-10.

[9] Distribution Losses= (Net Energy Input-Net Energy Billed)/Net Energy Input

consumers is also essential to maintain a company's financial liquidity. The distribution losses incurred by the companies under consideration are captured in Figure 6.

Figure 6: Distribution losses of the select companies (%)



At the time of privatization, NDPL had certain loss reduction target for the first five years by virtue of which the company had an incentive to over achieve the loss reduction target, on the other hand it had to bear losses in case it fails to achieve the loss reduction targets,[10] NDPL was able to bring down its distribution losses by 40% from 27% in FY 2005-06 to 16.4% in FY 2009-10. It undertook a series of measures including an energy audit up to the Distribution Transformer (DT) level; installation of High Voltage Distribution System (HVDS) and Low Tension Aerial Bunched Cables in theft-prone areas; replacement of old erroneous electromechanical meters with accurate electronic meters; Automatic Meter Reading (AMR), public participation through social audit; automation initiatives; and GIS.

Reliance-Infra and NPCL's distribution losses lowered to 10.08% and 8% in FY 2009-10 respectively. Reliance-Infra has achieved lower loss levels due to an underground distribution network, high degree of

[10] It was estimated during the bid process that the cost of under achievement in loss reduction would have amounted to Rs. 20 to 30 Crore for each percentage point of target missed by the discom. Source: A Critical Review of the Performance of Delhi's Privatized Distribution Companies and the Regulatory Process - Prayas (Energy Group)

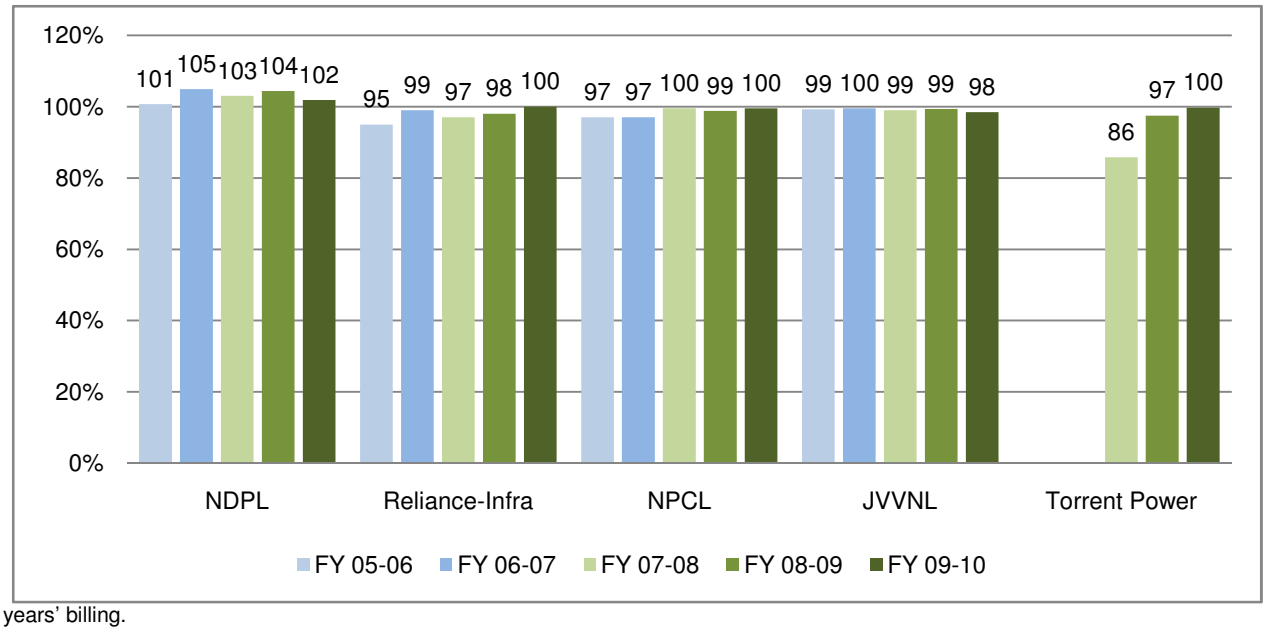
technology intervention, and automation. The company identifies theft through structure analytics of data generated from meter downloads, billing data, customer survey data, and Energy Accounting System. Low levels of distribution losses (at about 8%) may be attributed to high industrial sales in its sales mix and the smaller service area of NPCL. Moreover, 85% of the tube well connections for agriculture used under NPCL have been covered under HVDS. Increased vigilance drives, periodical inspection, testing of meters, up-gradation of distribution networks, and sub-station automation are some of the initiatives that have been undertaken by NPCL to control distribution losses.

JVVNL has been able to bring down its distribution losses from 37% in FY 06 to 22% in FY 10. However, the loss level of 22% may be viewed as higher considering the fact that JVVNL has achieved about 98% consumer metering. The measures adopted towards loss reduction by JVVNL were initiation of a Feeder Renovation Programme; installation of single-phase transformers for rural domestic consumers; installation of 16/25 kVA transformers for agriculture consumers; segregation of rural and urban feeders; replacement of overhead bare conductors by insulated wires in theft-prone areas; replacement of obsolete service lines with armoured cables; and undertaking of vigilance and anti-theft measures.

Torrent Power managed to bring down the distribution loss level to 19% from a high of 46% when it took over the Bhiwandi circle in 2007. The franchisee launched a number of initiatives including laying down of new distribution lines and improving metering infrastructure; augmentation of the existing system; and investing in repair and maintenance. Torrent Power undertook a capital investment of about Rs. 391 crores from January 2007 to March 2010 towards repair and maintenance, and augmentation of the network.

The collection efficiency is the total amount collected against the total amount billed to the consumers. The company may have a high billing efficiency but it has to be well-supported by high collection efficiency. The collection efficiency of the select companies is represented in Figure 7.

Figure 7: Collection Efficiency of the select companies (%)



Note: The collection efficiency percentages shown above include the amount collected on account of arrears pertaining to previous years' billing.

All the companies have maintained high collection efficiency, close to 100% by FY 2009-10. Torrent Power also improved the collection efficiency in the Bhiwandi circle to 95% by November 2008. Since collection efficiency also includes collection of arrears for previous years, it has to be observed cautiously. Higher collection of arrears could also result in high collection efficiency. Therefore, a proxy indicator of debtors is selected to get a true picture of the increase or decrease in receivables/arrears of the company.

Table 11: Debtors' level for the select companies (Rs. Crore)

Company	FY 05-06	FY 06-07	FY 07-08	FY 08-09	FY 09-10
NDPL	255	280	258	240	227
Reliance-Infra	NA	NA	NA	NA	NA
NPCL	19	23	24	26	26
JVVNL	675	703	724	854	1028
Torrent Power	NA	NA	NA	NA	NA

Source: Company Annual Reports

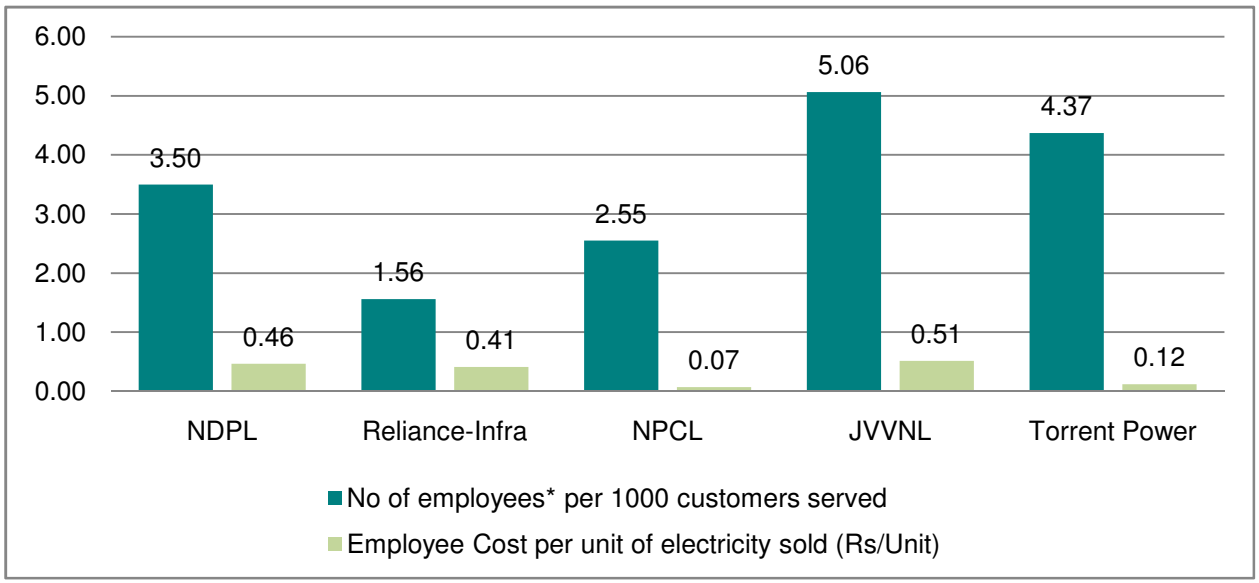
Note: Data for Reliance – Infra and Torrent Power for Bhiwandi not available.

Table 11 highlights that NDPL and NPCL have been able to manage their debtors' level without any consistent increase in the same. However, the debtors for JVVNL have been increasing consistently, which implies that its higher collection efficiency is on account of its collection of arrears.

4.1.3 Employee Productivity/ Costs

Employee productivity/costs have been analyzed on the basis of the number of employees required per 1000 customers served and employee cost per unit of electricity. A comparison of these two parameters across the select companies in FY 2009-10 is presented in Figure 8.

Figure 8: Employee Productivity/Cost Indicators FY 2009-10



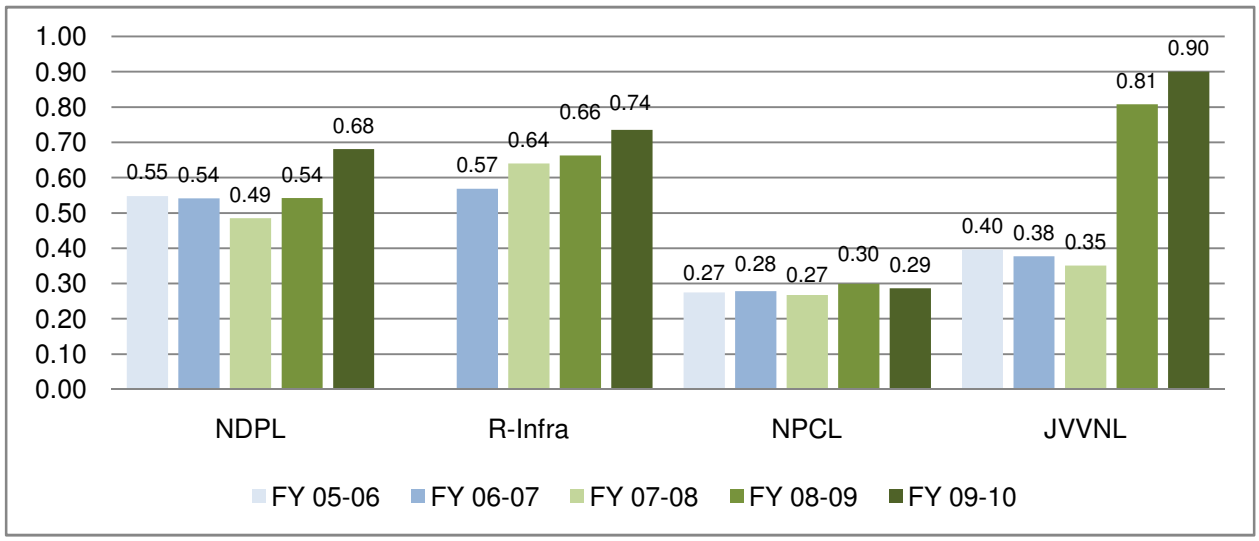
Note: Number of employees, as on payroll of the company

The number of employees required for 1000 customers served is the lowest for Reliance-Infra as it supplies power to highly concentrated areas and has the highest value of 7.1 for the density indicator " '000 customers served/sq km" among the selected utilities. Moreover, an underground distribution network and high automation have reduced the manpower requirement for Reliance-Infra. The case of JVVNL is altogether different. Being a government entity with a large area under its control and a different consumer mix, JVVNL has the highest number of employees and registers the highest employee cost per unit of electricity sold. Although Torrent Power has a high load density with the bulk of its sales going to industrial consumers, its number of employees per 1000 customers served is relatively higher, as compared to NPCL, which has a similar sales mix.

4.1.4 O&M Cost

The O&M cost, which includes repair and maintenance expenses, administrative and general expenses, and employee costs for the select companies is presented in the figure below.

Figure 9: O&M Cost per unit (Rs./Unit)

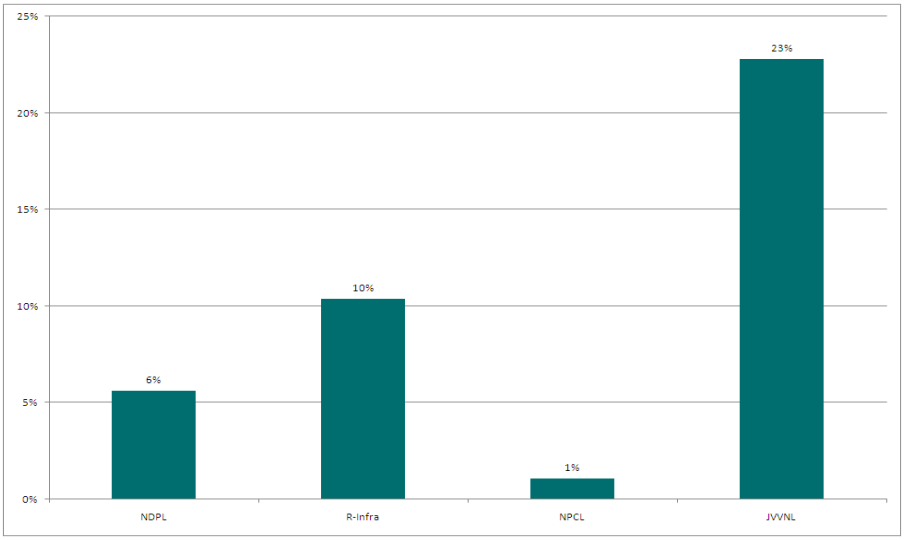


Source: Annual Reports. Data for Torrent Power is not available.

The lowest value for NPCL may be attributed to its high load density. While O&M cost per unit for Reliance-Infra has been increasing over the years, it has not varied significantly for NDPL and JVVNL except in the later years, which is primarily due to the increase in employee cost owing to revisions effected as per the Sixth Pay Commission's dictates. A high level of 'Super Annuation Board's Contribution' also contributed to a significant jump in JVVNL's employee cost.

Notwithstanding the per unit O&M cost, which amongst others, would be reflective of the density factors, it is pertinent to contemplate the increase in the O&M cost per unit, of the select companies over time.

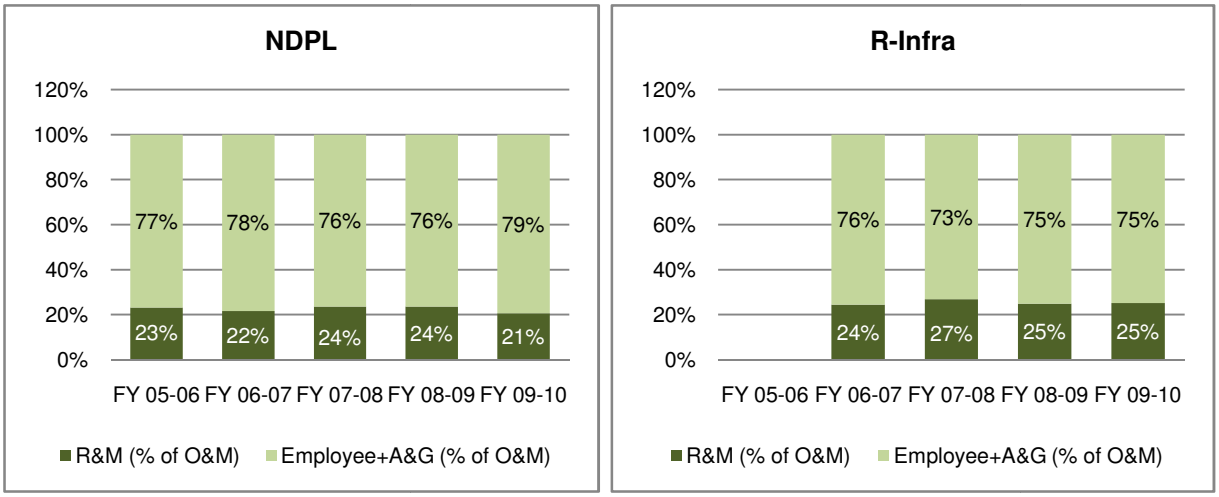
Figure 10: Increase/ (Decrease) in O&M Cost per unit over time (%)

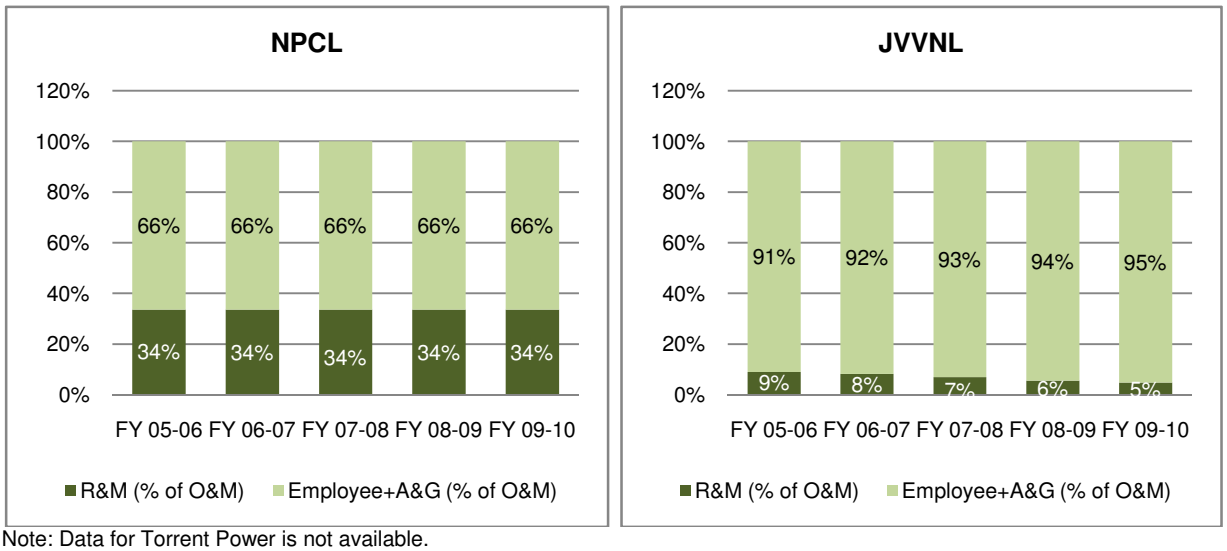


It is clear from the above that the year-on-year increase in O&M cost has been the highest in the case of JVVNL.

A break-up of the contribution of the individual components -- employee cost, Repair & Maintenance (R&M) cost, and Administrative & General (A&G) cost – to the overall O&M cost is presented in Figure 11.

Figure 11: O&M Cost Break-up (%)





Note: Data for Torrent Power is not available.

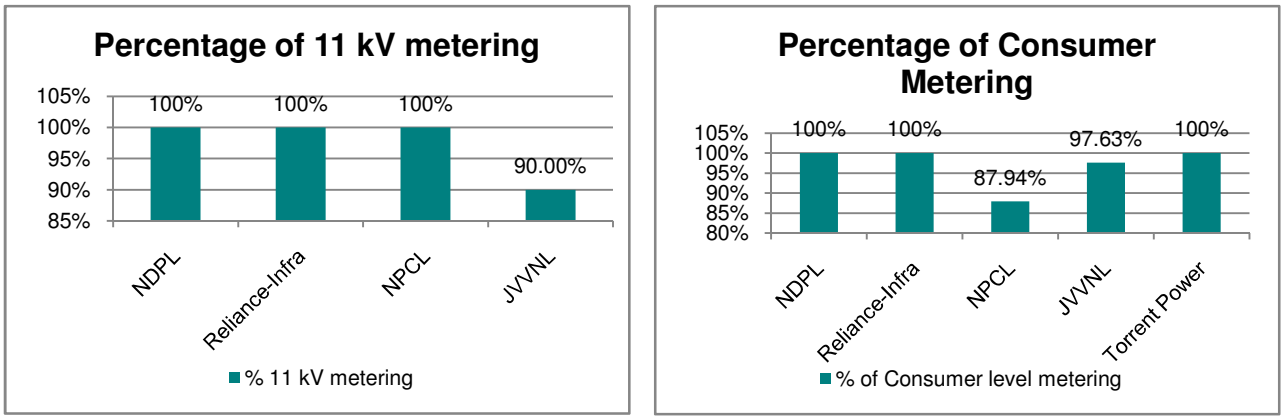
While private discoms have been spending about 25 to 35% of their O&M expense on repair and maintenance of their network, the majority of JVVNL's O&M costs are directed towards employees and administration.

4.2 Technical Performance

4.2.1 Consumer Metering

One of the key factors for reducing distribution losses is ensuring proper metering at different levels of the network as well as at the consumer end. A graphical representation of metering at the 11 kV feeder level and at the consumer level for FY 2009-10 is given in Figure 12.

Figure 12: 11 kV Feeder and Consumer Metering FY 2009-10



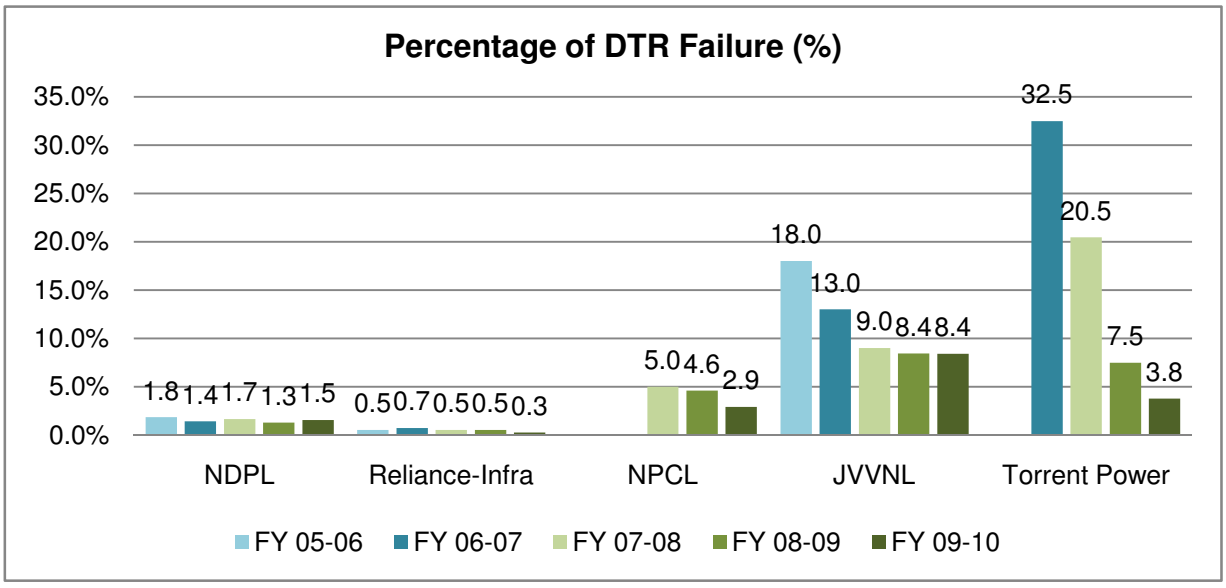
NDPL, Reliance-Infra and NPCL have 100% metering at the 11 kV feeder level whereas JVVNL still has about 10% 11 kV feeders that are not metered. NDPL, Reliance-Infra, and Torrent Power have 100%

metering at the consumer level; JVVNL too belongs to the same bracket with 98% metering at the consumer level; NPCL is yet to achieve 100% consumer metering.

4.2.2 Distribution Transformer Failure

Distribution transformer failure is an indicator of the quality of network maintenance and network reliability. Accordingly, higher the distribution transformer failure rate, lower is the quality of network maintenance and reliability. The performance of discoms with regard to DTR failure is captured in Figure 13.

Figure 13: Percentage of DTR Failure

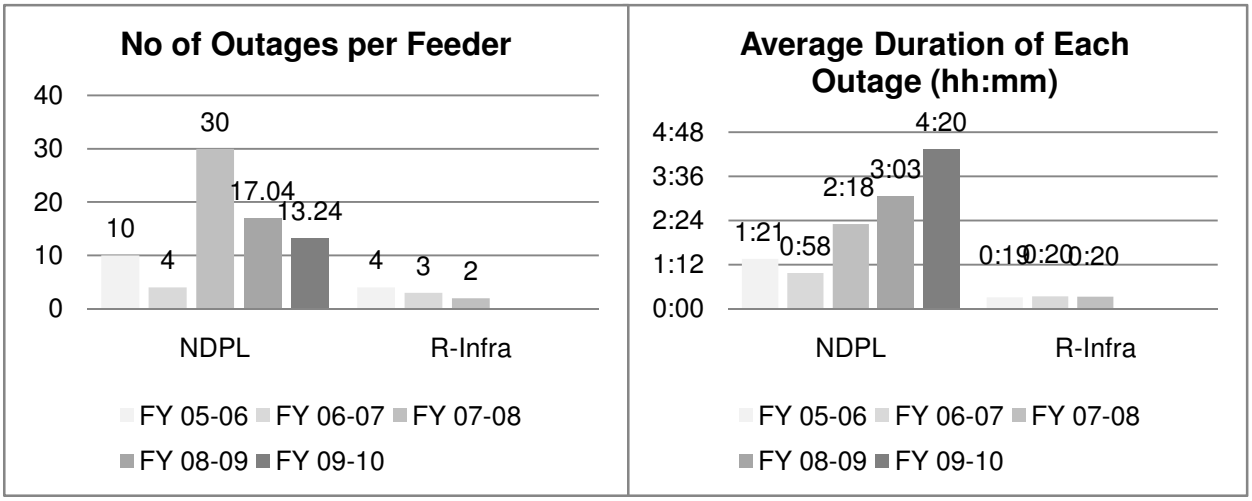


JVVNL recorded the highest DTR failure rate in FY 2009-10 at 8.4%, while Reliance-Infra reduced its DTR failure rate to about 0.3% by FY 2009-10. NDPL has maintained a DTR failure rate of around 1.5% in the past five years and NPCL has reduced DTR failure rate from 5% in FY 2007-08 to 2.9% in FY 2009-10. The Bhiwandi circle actuated a significant lowering of DTR failure rate, from 32.5% in 2006-07 to 3.8% in FY 2009-10. Torrent Power achieved the reduced DTR failure rate by augmenting the capacity of the existing transformers and adding new transformers, as per requirement.

4.2.3 Outage duration per feeder

The number of outages indicates the reliability of supply that a company is providing to its customers. The number of outages per feeder and their duration in the case of NDPL and Reliance-Infra are recorded in Figure 14.

Figure 14: No of Outages and Duration



Note: Data for NPCL, JVVNL, TPBL; and for FY 09 and FY 10 for Reliance-Infra is not available

With a higher level of IT implementation, Reliance-Infra has been able to achieve higher reliability of 99.9%. It is observed that the number of outages per feeder in Reliance-Infra's supply area went down to the level of 2 per feeder in FY 2007-08. Moreover, the average duration of an outage is also in the range of 20 minutes. Reliance-Infra has been able to achieve this feat by implementing a ring-fencing arrangement in its underground network. For instance, if any kind of digging activity is being undertaken by any government or private entity, the company channels the power through a different route to its customers. Some spare capacity is maintained by each transformer for such loading. In the area of supply of NDPL, the number of outages has come down from 30 outages per feeder in FY 2007-08 to about 13 outages per feeder in FY 2009-10. However, the average duration of these outages increased to 4 hours and 20 minutes, which was primarily due to the unprecedented increase in ambient temperatures during the summers of FY10; this led to a sharp hike in energy drawals and severe loading of the network.

The average duration of NPCL's scheduled outages is three to five hours. However, this figure applies to the summer season only. NPCL has a long-term power supply arrangement of only 45 MW from UPPCL; for the remaining demand, it has to purchase short-term power at higher rates from various sources. During FY 2008-09, NPCL experienced a shortfall of 15 MW in meeting its peak demand, which resulted in a higher number of scheduled outages in its supply area in the summer.

4.2.4 Key technological interventions

Key technological interventions undertaken by the companies have been compared in light of the following IT interventions:

- Supervisory Control and Data Acquisition (SCADA),
- Automated Meter Reading Systems (AMR),
- Enterprise Resource Planning (ERP), and
- Common Billing System in the distribution operations.

A snapshot of the implementation of the foregoing systems in the selected companies is presented below.

Company	SCADA	ERP	AMR*	Common Billing System
NDPL	√	√	100%	√
Reliance-Infra	√	√	97%	√
NPCL	√	√	100%	√
JVVNL	√ (Jaipur City only)	×	Under Implementation	√
TPBL	×	×	Nil	×

* AMR column shows the % of Industrial Consumers that are covered by AMR

NDPL, Reliance-Infra, and NPCL have implemented both the SCADA and ERP systems, while Torrent Power has neither implemented SCADA nor ERP for its Bhiwandi operations. NDPL installed the SCADA system for operating and controlling the entire power system network which got operationalized in FY 2006-07. With the implementation of SCADA, Reliance-Infra claims to have reduced its manpower cost and also power interruption time by 60%, thereby ensuring a better quality of supply. JVVNL has implemented SCADA in Jaipur city and is in the process of awarding a contract for the implementation of an ERP system. The SCADA system in Jaipur city covers about twenty-two 33 kV substations.

Reliance-Infra has covered 97% of its industrial customers with AMR, while NDPL and NPCL have covered all their industrial consumers with AMR. NPCL has installed AMR for all customers with a contractual load of more than 15 HP/15 kW. JVVNL is in process of covering all the large industries through AMR under the R-APDRP scheme. Torrent Power has not covered any of its industrial customers in Bhiwandi with AMR.

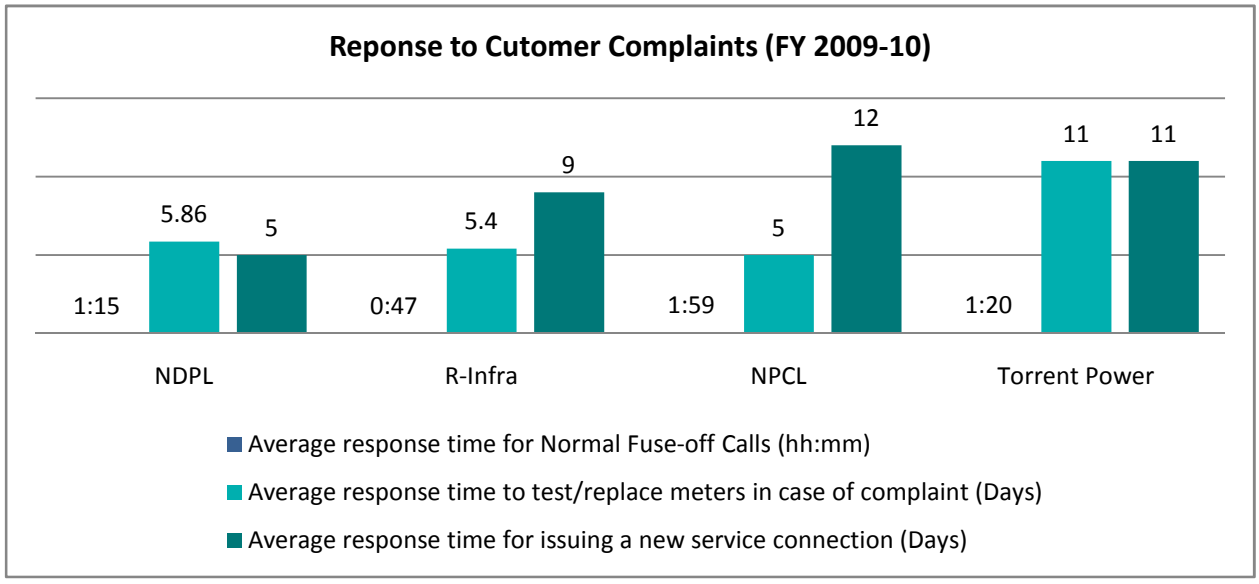
Excepting Torrent Power in Bhiwandi, all the selected companies have implemented common billing systems for their consumers.

4.3 Benefits to Customers

4.3.1 Customer Service

Response to customer complaints/requests/applications for the select companies has been assessed and presented in Figure 15.

Figure 15: Response to Customer Complaints FY 2009-10



Source: NDPL, Reliance-Infra, NPCL and Torrent Power. No data is available from JVVNL.

Reliance-Infra addresses the normal fuse-off calls the quickest, in about 45 minutes, while NPCL takes about two hours to do the same. Except for Torrent Power, which takes about 11 days to test/replace meters, all the discoms take on an average five days to test/replace meters in case of complaints. The companies have improved considerably on account of the response time needed to provide new service connections. While Reliance-Infra would provide a new connection in 31 days in FY 2005-06, it took only nine days to do the same in FY 2009-10. NDPL too has reduced its response time for new service connections from 12 days to 5 days, in the last five years. However, NPCL and Torrent Power, which have more industrial consumers, take on an average 11 to 12 days to provide new service connections to their consumers.

The percentage of consumers covered through spot-billing, hand-held computers, and Meter Reading Instrument (MRI), and availability of online payment options in selected companies is shown below.

Company	Percentage of complaints responded to in a year	Consumers covered through Spot Billing, Hand held computers	Online Payment

Company	Percentage of complaints responded to in a year	Consumers covered through Spot Billing, Hand held computers	Online Payment
NDPL	100%	90%	√
Reliance-Infra	100%	100% (MRI)	√
NPCL	100%	NA	√
JVVNL*	NA	NA	NA
TPBL	100%	NIL	√

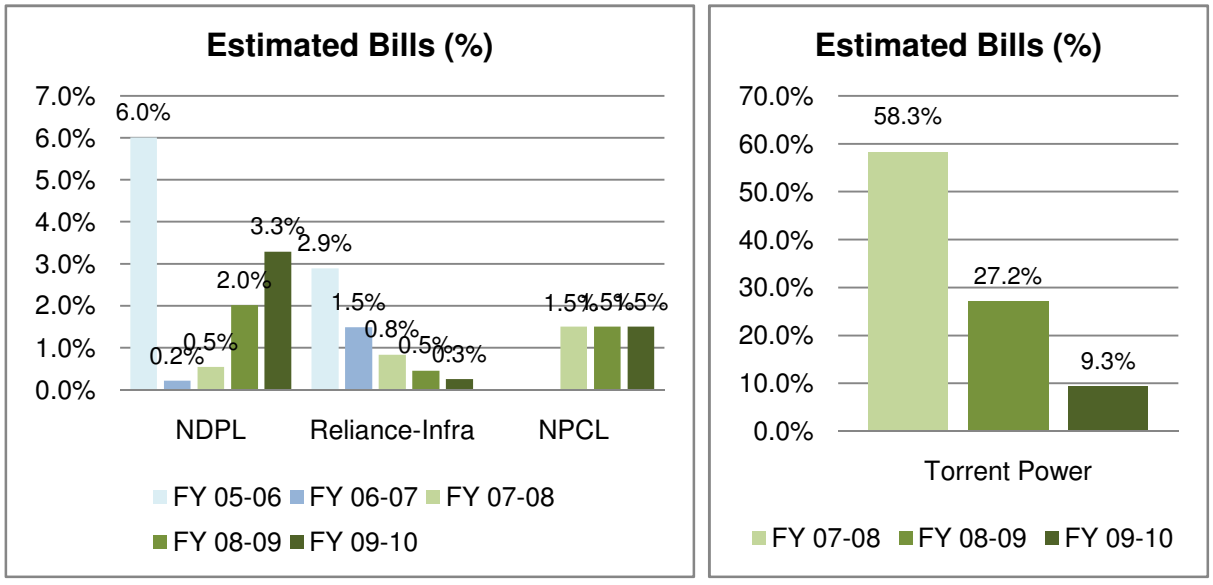
*Data from JVVNL not available

NDPL, Reliance-Infra, NPCL, and TPBL are proactively responding to all consumer complaints received in a year. To improve metering efficiency and avoid human errors, 90% of the consumers in NDPL are covered by spot-billing, hand-held computers, etc. Similarly, all the consumers in Reliance-Infra are covered by MRI. All the companies have provided online payment facility to their consumers.

4.3.2 Estimated Bills

Bills estimated refer to bill generation without meter reading. This is on account of a number of reasons including lack of adequate number of meter readers, faulty meters, and locked premises. The following metric captures the percentage of total bills that are estimated by the companies.

Figure 16: Estimated Bills



Note: Data for JVVNL not available

Reliance-Infra has been able to bring down the percentage of bills estimated to 0.3% in the last five years. Similarly, the percentage of estimated bills has been maintained at 1.5% by NPCL in the last three years. NDPL reported that one of the factors responsible for an increase in the percentage of estimated bills in its service area is resumption in the billing of locked premises, which was discontinued earlier. Torrent Power reduced its percentage of estimated bills from 58.3% to 9.3% in the last three years.

4.4 Demand Side Management

Higher short-term power purchase cost during peak hours has compelled distribution companies to plan their energy requirement effectively and undertake various Demand Side Management (DSM) programmes to minimize the peak and base load gap. Introduction of Time of Day (ToD) tariff and energy efficiency initiatives are some of the key measures adopted by utilities to reduce peak demand and reduce power purchase cost during peak hours.

4.4.1 Time of Day Tariff

Time-of-Day is an important Demand Side Management tool which is being widely used by different states to flatten their load curve. Time-of-Day (ToD) tariff enables shifting load from peak demand period to off-peak hours. ToD is used to provide incentives for consumption during off-peak hours and penalize consumption during peak hours. Table 12 contains the details of customer classes covered under ToD tariff, time slots, and surcharges/rebates applicable to the selected companies.

Table 12: ToD tariff applicable for selected companies

ToD Tariff	Customer Class Covered	Time Slot	**Surcharge/ (Rebate) in Energy Charges**
NDPL	Industrial Consumers	Seasonal	Reduction of 10-30 paise in tariff during October to March i.e. winter season.
Reliance-Infra	Select Industrial and Commercial customer categories	0900 to 1200 hours 1800 to 2200 hours 2200 to 0600 hours	Additional 0.50 Rs/kWh Additional 1.00 Rs/kWh Rebate of 0.75 Rs/kWh
NPCL	Small and Medium Power (Connected load ≥ 20 BHP) Large and Heavy consumers	1700-2300 hrs 2300-0600 hrs 1700-2200 hrs	(+) 30% on Base Rate (-) 10% on Base Rate (+) 25% on Base Rate

ToD Tariff	Customer Class Covered	Time Slot	**Surcharge/ (Rebate) in Energy Charges**
JVVNL (Proposed)	HT consumers having contracted demand above 50 KVA except HT domestic, HT agriculture consumers and supply used for Railway Traction	18:00 Hours to 23:00 Hours (throughout the year) 06 Hours to 09 Hours (October to March) Off-peak Hours	+10% (Surcharge) -10% (Rebate)

JVVNL does not levy ToD tariff as of now. However, the company has filed a supplementary petition with a tariff petition for FY 2011-12 to introduce ToD tariff during peak hours. The discom has proposed to implement the ToD tariff for all HT consumers with a contracted demand above 50 KVA, excepting HT domestic and HT agriculture consumers, and supply used for Railway traction. No ToD tariffs are levied in Delhi. However, in FY 10, the Delhi Electricity Regulatory Commission (DERC) introduced a concept of seasonal tariffs and reduced the tariff of industrial consumers by 10-30 paise during winters between October to March.

The measurable impact of ToD tariffs has not been assessed by the companies to whom it is applicable.

4.4.2 Energy Efficiency Initiatives

With demand outreaching supply in most of the states, distribution licensees have recognized the importance of energy efficiency. The key initiatives undertaken by distribution licensees to reduce peak load are to promote the usage of CFL/LED lighting in the place of the highly inefficient incandescent bulb. Similarly, licensees are also promoting the usage of solar water heaters amongst domestic consumers to reduce peak demand. Initiatives taken by the selected companies for the promotion of CFL/LED lighting and the usage of solar water heaters are presented in the table below.

Table 13: Energy Efficiency Initiatives -- CFL/LED/Solar Water

ToD Tariff	CFL/LED/Solar Water Heating	Benefit
NDPL	➢ Bachat Lamp Yojana (BLY) ➢ Pilot Project: Replacement of metal halide Fixtures (750W/Hoarding) with LED fixtures (140W/ Hoarding) for two of its advertising hoarding.	Pilot Project- Savings of 764.21 kW. 80% energy savings

ToD Tariff	CFL/LED/Solar Water Heating	Benefit
	➢ Pilot Project: Replacement of 250W HPSV lamps with 100W LED fixtures for 18 streetlights.	65% energy savings
Reliance-Infra	➢ CFL distribution programme ➢ Streetlight Retrofit project	Savings- 16.8 MUs in FY 2007-08, additional 15.8 MUs in FY 2008-09 and 4.83 MUs in FY 2009-10. 2696 units in FY 2007-08, additional 3.28 MUs in FY 2008-09 and 4.35 MUs in FY 2009-10.
NPCL	No initiative towards promotion of CFL/LED lighting or solar water heaters	NA
JVVNL	No initiative towards promotion of CFL/LED lighting ➢ Incentive on usage of Solar Water Heater by domestic consumer.	Existing Rebate- 5 paise per unit
TPBL	No initiative towards promotion of CFL/LED lighting or Solar water heater.	

Annexure 2 contains details of DSM and energy efficiency initiatives undertaken by NDPL, Reliance-Infra, NPCL, and JVVNL.

5 CONCLUSIONS

It is apparent from the performance analysis of the companies selected under various distribution models that while Reliance-Infra and NPCL have been able to maintain their technical and financial performance, NDPL and Torrent Power have been able to turn around the distribution business in urban areas in a short span of time. NDPL, especially, has undertaken a number of IT interventions and infrastructure improvement initiatives to bring down its distribution losses and improve its collection efficiency. Overall, the key factors related to the performance of these companies include high levels of consumer metering, system automation, and augmentation of the existing network. Their efforts in the direction of technical efficiency and customer services also resulted in low distribution transformer failure, high reliability, and reduced response time in addressing complaints. Even though JVVNL has been able to perform well on the front of distribution loss reduction, their financial viability is an issue as they face different kinds of challenges on account of ownership, consumer mix, and area of supply which leads to its financial non-performance. However, a common thread across all the select companies is that their financial sustainability, irrespective of their ownership or area of supply, hinges on timely and prudent revision of tariffs by the regulatory commissions.

A snapshot of the relative strengths and weakness of the various distribution models, as represented by the select companies, is presented in Table 14.

Table 14: Relative Strengths and Weaknesses of Distribution Models

	Strengths	Weaknesses
JVVNL	➢ Subsidy support from the State Government ➢ Financial support through Government grants and low-cost loans under various Central Government schemes ➢ Recourse to Government guarantee for mobilizing loans/ finances	➢ Larger area of operations: ▪ Including both urban as well as rural areas ▪ Lower levels of customer and load densities ▪ Significant agriculture consumption ➢ Cost recovery from tariffs low ➢ Higher levels of cross-subsidies in tariffs ➢ Typically longer paybacks for investments made in system improvement/ network expansion

	Strengths	Weaknesses
NDPL, Reliance-Infra and NPCL	➢ Smaller areas of operation ▪ Primarily urban agglomerations ▪ Higher levels of customer and load densities ▪ Minimal agriculture consumption ➢ Cost recovery from tariffs high ➢ Lower levels of cross-subsidies in tariffs ➢ Being a small area, better feasibility for IT implementation with faster paybacks for investments made in system improvement	➢ Non-availability of Government grants or low-cost loans .
Torrent Power Bhiwandi Limited	➢ Smaller area of operation ▪ Primarily urban agglomeration ▪ Higher levels of customer and load densities ▪ Minimal agriculture consumption ➢ Low regulatory risk including no risks related to non-revision of tariffs, as is the case with the other two models	➢ High risk of financial losses in case of non-performance in terms of loss reduction ➢ Risk of termination of contract by the distribution licensee in the event of non-performance

JVVNL

Strengths

Ownership

The strength of a JVVNL lies in its backing by the state government. Despite its financial losses, the company enjoys the state government's support in the form of subsidy to cover a part of its revenue gap

and may raise short and long-term debts from the market on government guarantee. Moreover, the company also avails of grants and low-cost loans under a number of Central Government schemes.

Weaknesses

Area of Supply

One of the potential factors affecting the performance of JVVNL is its large area of supply with significant agriculture consumption. A large area of supply and disperse load results in low customer and load densities, which increase the per unit cost of supply. Also, the large number of rural and agriculture consumers with poor paying capacity that the utility needs to serve results in relatively higher cross-subsidization in tariffs as compared to those prevailing in urban areas. Presence of rural areas and agriculture loads render reduction in distribution losses a significant challenge.

Ownership

Being a government-owned company, JVVNL has the universal service obligation to connect rural and agriculture consumers, and supply power to them even though this may be a loss-making proposition. Due to uniform responsibility towards all its consumers, JVVNL is unable to turn around such potential urban areas that are making losses currently.

Private Companies

Strengths

Urban Area of Supply

A key facilitator for performance improvement of NDPL, Reliance-Infra and NPCL is that all of them are operating in urban areas. Such urban pockets are relatively smaller in area, more densely populated, and have high load densities. As compared to rural areas, urban areas have the potential to become financially sustainable in a relatively short span of time and accordingly possess higher potential to attract private ownership. Another significant factor that makes urban areas attractive is better revenue realization against the cost of supply, and relatively lower cross-subsidy prevailing in the tariff.

Ownership

Being private companies, NDPL, Reliance-Infra and NPCL enjoy more managerial autonomy to run their distribution businesses with minimal political interference, and are also more accountable.

Weaknesses

One of the minor drawbacks that NDPL, Reliance-Infra or NPCL face is that they are generally kept out of the ambit of government schemes that provide grants or low-cost loans to public utilities.

Distribution Franchisee

Strengths

Area of Supply

Torrent Power has the same benefit of serving in urban areas as other private companies (NDPL or Reliance-Infra or NPCL) have – high customer and load densities with no agriculture consumption. In addition, being a franchisee, it faces lower regulatory risks like revision or non-revision of tariff, which tends to affect a distribution licensee -- the franchisee generates profit only through improved technical performance in terms of loss reduction and improved collection efficiency.

Weakness

As revenue generation, and therefore, the profitability of a distribution franchisee is linked to the performance efficiency of an operation, the franchisee may have to bear financial losses or a penalty as per the contract in case it fails to achieve the targeted loss level. The franchisee also faces the risk of termination of contract by the distribution licensee.

Way Forward

This analysis brings out the marked difference in performance between privately managed entities and those owned and controlled by the Government against all selected parameters. This difference is not only in absolute values but also in trends in the same over the period of study. The privately owned utilities have continuously improved their position which cannot be said of the Government-owned ones. An obvious explanation for this situation is the difference in the managerial and work cultures of these entities. The Government-owned and controlled distribution utilities have to perform within a rigid framework coupled with low levels of accountability. On the other hand, privately-owned distribution utilities enjoy greater flexibility in their operations, are more focused on their actual business, and have greater individual accountability at all levels.

Another crucial difference is in the nature of their business. All the private entities covered in this study are operating in compact areas with a concentration of consumers and substantial loads and consumption. The Government-owned utilities operate over much larger areas comprising urban/semi urban centres in addition to huge rural areas. The consumer profiles of these utilities are totally different. Private utilities operating only in urban and semi-urban areas have higher customer and load densities. However, Government-owned utilities typically have low customer and load densities because of their spatial distribution coupled with relatively lower per capita consumption. This is a crucial difference between these two categories of distribution utilities and explains to a large extent their relatively poor performance.

However, this situation also provides the Government distribution utilities a cover for their below par performance even in high concentration urban and semi-urban areas. Consequently, such utilities aim at and are satisfied to perform at lower than optimum levels of efficiency even in their high-density areas marked by similar characteristics as the areas of operations of private utilities. It needs to be recognized and accepted that distribution of electricity in urban/semi-urban areas and that in rural areas are substantially different businesses. One has the potential for efficient performance against technical as well as financial parameters; the same cannot be said of the rural business with inherent drawbacks like sparse distribution of consumers, vastly spread distribution network, low demand, etc. These are further accentuated by problems like low metering, meter reading, and related billing and collection issues. These factors are a drain on the financial viability of the distribution business and result in unavoidable but non-transparent cross-subsidization.

To raise the high-density areas to the optimum levels of efficiency and performance, these should be identified and carved out into separate entities. The potential of such areas could then be fully exploited as their characteristics are likely to be similar to those which are serviced by the private distribution utilities covered in the study, and which have shown substantial and continuing improvement. These areas need not be identified on the basis of existing classification norms like into municipal and non-municipal areas; these can be categorized based on their electricity distribution characteristics and potential. A parameter could be the total electricity load of that area and its spatial distribution. These areas should then be privatized for focused attention and a concerted effort made to pull them up to the optimum performance levels. The model of privatization or public-private partnership (PPP) arrangement will depend on the prevailing conditions of each such area. Recently, some states have adopted the input-based franchisee model for this purpose.

An obvious argument against the above proposition is that the residual areas with poor potential will remain with the existing licensee and add to its existing woes. For this, it is proposed that a cess or surcharge be imposed on consumers in the high-density areas. The revenue from such cess should go into a separate fund like the Universal Service Obligation Fund and utilized for subsidizing the operations in these residual areas. This will bring about transparency in cross-subsidy, which exists even today, and will create conditions for the realization of the full potential of the high-density areas. These potential areas could be managed in a way that attracts benefits of managerial efficiency found in private entities.

Annexure 1

List of Indicators

List of performance parameters for study and comparison of various distribution models

1. **Financial Efficiency (From FY 2005-06 to FY 2009-10)**
    a. Turnover
    b. Profit After Tax
    c. Distribution Losses
    d. Collection Efficiency (Total)
        i. Domestic
        ii. Commercial
        iii. Industrial
        iv. Agriculture
    e. Capital Investments (Capitalized per year) per unit of electricity sold
    (Please also provide break-up of capitalization per year and unit of electricity sold.)
    f. Employee Performance and Costs
        i. No. of employees per 1000 customers served (with break-up of No. of employees and No of customers)
        ii. Employee Costs per unit of electricity sold (with break-up)
    g. Total Distribution Cost per unit of electricity sold (with break-up of distribution cost)

2. **Technical Performance (From FY 2005-06 to FY 2009-10)**
    a. % of Metering
        i. 11 kV level
        ii. Consumer level
    b. Peak and Energy Shortage
    c. Out duration per feeder
    d. No. of Outages per feeder
    e. Percentage of failure of Distribution Transformers
    f. Percentage of customers covered under HVDS
    g. IT Interventions
        i. Supervisory Control and Data Acquisition (SCADA) (Y/N)
        ii. Percentage of Industrial Customers covered by Automated Meter Reading (AMR)
        iii. Enterprise Resource Planning (Y/N)

iv. Common Billing System (Y/N)

3. Demand Management (From FY 2005-06 to FY 2009-10)

a. ToD tariffs
   i. Introduction of ToD tariffs (Y/N)
   ii. Customer classes covered by ToD tariffs
   iii. Reduction in Peaking Load due to ToD tariffs (if ToD tariffs have been around for at least two years)

b. Energy Efficiency Initiatives (Description about the initiatives, if any, undertaken)
   i. CFLs/ LED lighting systems
   ii. Solar Water Heating

c. Harnessing of captive generation to avoid expensive power purchases, especially during peaking hours
   i. Penalty applied on exceeding the Contract Demand
   ii. Purchase of surplus power from CPPs

4. Benefit to consumers (From FY 2005-06 to FY 2009-10)

a. Percentage of complaints responded to in a year
b. Average response time for Normal Fuse-Off calls
c. Average response time to test/ replace meters in case of complaint
d. % of bills that are estimated
e. Average time for issuing a new service connection
f. % of customers covered by Spot billing, hand-held computers
g. No. of Customer care personnel per 100 customers
h. Availability of online payment facility (Y/N)

Annexure 2

NDPL- DSM & Energy Efficiency Initiatives

Major initiatives undertaken by NDPL with respect to DSM and energy efficiency are described below.

LED for Advertising Hoardings, Street Lights

Description: NDPL has replaced metal halide fixtures (750W/Hoarding) with LED fixtures (140W/hoarding) for two of its advertising hoardings. The pilot has resulted in 80% energy savings. NDPL has also replaced 250W HPSV lamps with 100W LED fixtures for 18 streetlights on a pilot basis. The performance of these fixtures was analyzed on various aspects like power consumption, harmonics, power factor and illumination level. The energy savings were seen to be to the tune of 65% and illumination level of LEDs was also comparable to HPSV. The results achieved by this project were submitted to the Ministry of Environment & Forest (MoEF); as an outcome, MoEF has issued directives to all the discoms in Delhi to switch over from the existing HPSV lamps to LED fixtures.

Strategic awareness on Enhanced Energy Efficiency

Description: NDPL has prepared energy conservation booklets and leaflets for kids, offices, colleges, and homes, and distributed these amongst its internal and external stakeholders. Consumer outreach programmes on enhanced energy efficiency have been organized at various forums -- RWA, consumer forums, etc.

Energy Efficiency for Large Hospitals, Educational Institutions in NDPL Areas

Description: NDPL has covered 17 large-scale private hospitals through one-to-one interactive sessions where consumers were sensitized about the best energy efficiency practices for hospitals. NDPL also organized a workshop on “Energy Efficiency opportunities for Hospitals.” NDPL sensitized three colleges of the Delhi University on switching over to energy-efficient technologies like T5 tubelights and LEDs.

Bachat Lamp Yojana (BLY)

BLY aims at the large-scale replacement of incandescent bulbs in households by quality long-life CFLs. The scheme seeks to leverage the high cost of the CFLs through the CERs generated out of the project. It seeks to utilize the Clean Development Mechanism (CDM) of the Kyoto Protocol to recover the cost differential between the market price of the CFLs and the price at which they are sold to households. NDPL has signed a tripartite agreement with BEE and C Quest Capital to implement BLY in its service territory on 29th June 2010. As per the scheme, all grid-connected households in the license area of

NDPL will get up to a maximum of four compact fluorescent lamps (CFLs) at Rs. 15 in exchange for equal number of working incandescent lamps (ICLs). A pilot was conducted in September 2010 in Shalimar Bagh District in which 10473 CFLs (11 W & 18 W) were distributed to 4,186 households.

Reliance-Infra- DSM & Energy Efficiency Initiatives

CFL Distribution Program:

Reliance-Infra carried out the 'CFL Distribution Scheme' during April to May 2006 and in January 2007. This scheme was initiated mainly to promote the use of energy-efficient CFL lamps in place of conventional incandescent bulbs. Under this scheme, CFLs were made available to Reliance Infra customers at a discounted price Rs. 82 against the market price of Rs. 165 and the customers were allowed to purchase these on instalment basis, payable through their electricity bills. Around 6.5 lakh lamps were purchased by 2.5 lakh customers under this scheme.

Considering the encouraging response to this scheme, Reliance-Infra decided to take it further with Phase – II of this programme under the 'Bachat Lamp Yojana'.

Streetlights Retrofit Project (HPMV to HPSV)

Reliance Infra has undertaken replacing of HPMV lamps by HPSVs for streetlights in its supply area. Around 37,000 125 W and 80 W HPMV lamps were replaced by 70 W HPSV lamps with higher lumens.

Energy Audit Scheme for Commercial and Industrial Customers

Reliance Infra has established an energy audit scheme for its commercial and industrial customers. Through this scheme, Reliance Infra has tied up with renowned energy auditing firms to carry out energy audits for its customers at competitive rates. Under this scheme, energy auditing companies are selected through the competitive bidding process upon technical and commercial evaluation. These rates are offered to the customers of Reliance Infra opting for energy audit through this scheme.

Customer Awareness Campaign

Reliance Infra, along with other two utilities in the Mumbai region, has carried out a massive consumer awareness campaign. This campaign was targeted to spread awareness regarding the power shortage scenario in Mumbai and all over India, the need for energy conservation, and the measures for energy conservation.

NPCL – DSM & Energy Efficiency Initiatives

NPCL undertook the following energy conservation measures:

- NPCL has installed CFL in all its offices and sub-station buildings.
- NPCL has installed the BEE compliant “Star Rating Transformers” to reduce technical losses.

JVVNL – DSM and Energy-Efficiency Initiatives

Energy conservation measures taken by JVVNL:

- JVVNL spreads the message of energy conservation among its consumers by conducting seminars; persuading the public to save electricity through advertisements; distributing brochures, pamphlets, and slogans; and arranging for demonstrations of energy-saving devices.
- JVVNL officials visit industries and commercial establishments to share with the consumers the benefits of energy conservation and reduction of electricity bills.
- JVVNL has filed a petition with the Regulatory Commission to increase the incentive on solar water heaters for its domestic customers from the earlier rebate of 5 paise per unit to 25 paise per unit with a view to encourage the usage of solar water heaters.