

Distribution Sector Reform in India: An Overview

Mehebab Alam¹, Mandela Gain², Sk Mohammad Yasin³, Saifuddin Mondal⁴

¹Damodar Valley Corporation, Assistant Engineer(Electrical), Purulia-723133, West Bengal, India.

³M.N Dastur & Company Private Limited, Engineer(Electrical), Andhra Pradesh-530031, India.

²Damodar Valley Corporation, Assistant Engineer(Electrical), Purulia-723133, West Bengal, India..

⁴WB State Electricity Distribution Company LTD. Assistant Engineer(Electrical), S.Dinajpur-733134, India.

Abstract:- The Indian power sector has been facing serious functional problems and challenges during the past few decades. In order to revitalize the distribution sector and to improve its techno-economic performances, Government of India has initiated restructuring or reform process since 1991. This paper provides a comprehensive idea of the distribution Sector reform issues, its key driver, objective, some recommendations and future scope of the reform. Some case studies have also been presented to analyze the effectiveness and viability of the reform process of distribution sector. This paper will be very much helpful for engineers, researchers, system operators to check and improve the health of distribution sectors in future.

Keywords:- Distribution Sector Reform, APDRP, RGGVY, Electricity Act 2003, MSEDCL.

I. INTRODUCTION

The distribution sector has started receiving greater attention and investment with the restructuring of the State Electricity Boards (SEBs). Distribution and Retail Supply is the most critical link in the electricity market, which interfaces with the end customers and provides revenue for the entire value chain. In India, The consumers are served by around 73 Distribution Companies (DISCOMs) – 13 electricity departments, 17 private distribution companies, 41 corporatized distribution companies and 2 State Electricity Boards. Lack of focus has resulted in poor operational and financial performance of the sector, thereby creating greater need of distribution sector reform or transformation, with high calls for private participation in terms of private franchising, Public-Private-Partnership (PPP), equipment suppliers. To reduce the losses and to improve the system efficiency, a policy has been made [1]. The Policy initiatives for Distribution Reforms are aimed at system up-gradation, loss reduction (aggregate technical and commercial losses), theft control, consumer orientation, commercialization, decentralized distributed generation and supply for rural areas, introducing competition [2].

II. HISTORICAL BACKGROUND OF RESTRUCTURING OR REFORM

Commencing with a meagre installed capacity of 1300 MW during the year of national independence in 1947, the Indian power sector has made substantial growth over decades[3],[4]. During the pre-reform era (1991), Power sector was dominated by the state owned vertically integrated entities called State Electricity Boards (SEBs), responsible for all three functions viz. Generation, Transmission and Distribution of electricity. While Generation segment was the first one to be opened up for private participation, the enactment of the Electricity Act 2003 provided for mandatory unbundling of the state electricity board into separate and independent generation, transmission and distribution companies. Some provisions of the Electricity Act (EA) 2003 [1] like unbundling of the State Electricity Boards (SEB) on the basis of function (Generation, Transmission, Distribution), provision of issuing more than one license for transmission and distribution in the same geographical area, elimination of licensing for setting up a generating station, subject to compliance with technical standards (excluding hydroelectric power station), removing captive power plants from the bound of licensing and other permissions, provision of open access with respect to transmission, introduction of a spot market for bulk electricity etc along with poor quality of supply and services by utilities led to the reform[5],[6],[7] process of distribution sector. In the Distribution sector, most of the SEBs have already unbundled (except for Kerala and Jharkhand).

In addition to the above, new initiatives like introduction of various models of *distribution franchisee* have also been introduced in the distribution segment, both at the rural and urban level.

III. IMPORTANCE AND OBJECTIVE OF REFORM

The various objectives to be achieved by carrying out reform programme is as under-

- To promote the development of an efficient, commercially viable and competitive power sector.
- To provide reliable quality and uninterrupted supply, at reasonable prices, to all consumer categories.

- To ensure that the social and environmental aspects are fully taken into consideration.
- Reduction of aggregate technical and Commercial (AT & C) losses
- Improvement in customer services
- Reduce outages & interruptions
- Enhancement of competitiveness within power sector and improve financial condition of the DOSCOM utilities.

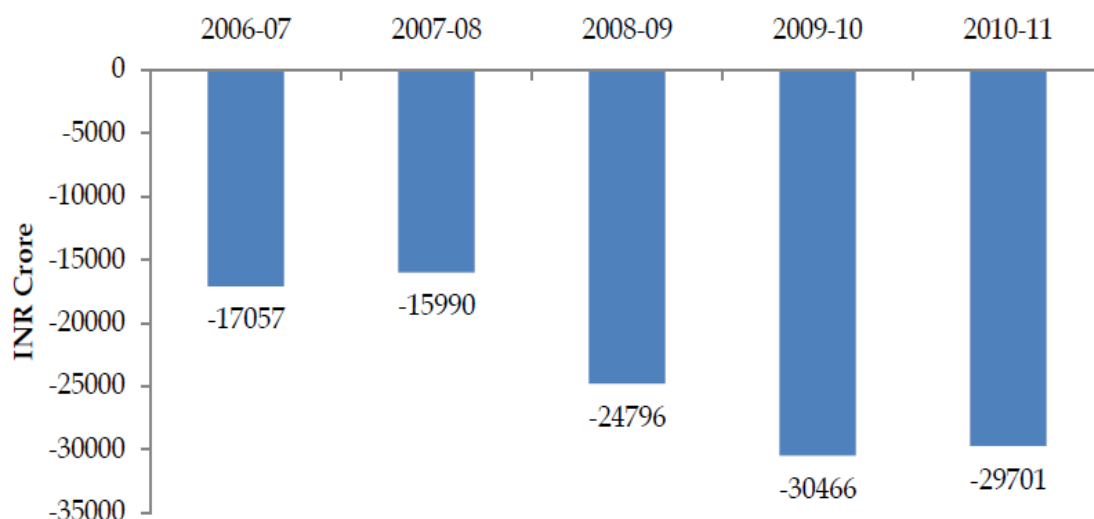


Fig.1: Aggregate book losses of all utilities
(Source: power finance corporation)

The losses (on accrual basis) of all the utilities increased from Rs 24,796 crore in the year 2008-09 to Rs 30,466 crore in 2009-10 (fig). Moreover, the government had to provide huge amount of subsidy for the agriculture sector which is nothing but economy drain and has severe impact (lower investment) on others important sector like health, services sector etc. So, issue of distribution reform is utmost important and very essential.

IV. CASE STUDY AND ANALYSIS

A. MSEDCL

Maharashtra State Electric Distribution Company Ltd (MSEDCL) is a separate distribution company created after the reform of MSEB[9] on June 6, 2005. MSEDCL supplies electricity to a staggering 1.93 crore consumers across the categories all over Maharashtra excluding the island city of Mumbai. When MSEDCL came into existence, a number of problems existed on the consumer front:

- No separate consumer care centres
- No call centre for complaints
- No system to give feedback to consumers
- Delay in supply restoration against complaints
- No system for tracking status of consumer complaints

Due to high level of consumer dissatisfaction caused by low quality of supply and high losses, MSEDCL decided to undertake a number of initiatives. These initiatives were combined under what is called as a "ten-point programme"[10]. The programme is as follows:

- 1) Preventive maintenance
- 2) Distribution network planning
- 3) Consumer grievances redressal systems
- 4) Distribution system loss reduction
- 5) Improvement in collection efficiency
- 6) Circles to act as profit centres
- 7) Efficient use of technology
- 8) Improved services to Agriculture-Consumers
- 9) Improving working conditions of employees
- 10) Demand side management

General steps towards consumers benefits-

- HT consumers are the main source of revenue for MSEDCL. Improvement in Power Factor in the system reduces losses and system loading. Hence HT consumers are encouraged to improve the power factor by offering incentives in their electricity bills which creates positive response from the consumers.
- A prompt payment discount of 1% on the monthly energy bill, excluding taxes and duty, is offered to all consumers if their bill is paid within a period of seven days from the date of issue. Bills are computerized and the billing period has been reduced from two months to one month.
- MSEDCL has implemented a mass media campaign on “Anti- Power Theft Provision and Corruption”. A separate team of officers called the Flying Squad deals with theft of electricity.

Outcome:

- Distribution losses were reduced by three percent and revenue collection increased by 15 percent in 2005-06, from Rs 12,105 crores in 2004-05.
- In 2004-05 the MSEDCL saved Rs 19 crore on account of controlling power theft. By December 2005, this rose to Rs 40 crores.
- Between 2008-09 and 2011-2, the power deficit has fallen from 21.4 percent to 16.7 percent.
- After subsidies, Maharashtra had a profit of Rs 150 crores in 2010-11[11].

B. Gujarat SEB

Gujarat's electricity sector was also unbundled in 2005 into seven companies: Gujarat Urja Vikas Nigam Limited (GUVNL) - the holding company; Gujarat State Electricity Corporation Limited (GSECL) – the generation company; Gujarat Energy Transmission Corporation Limited (GETCO)– the transmission company; and four power distribution companies - Dakshin Gujarat Vij Company Ltd (DGVCL), Uttar Gujarat Vij Company Ltd (UGVCL), Paschim Gujarat Vij Company Ltd (PGVCL), and Madhya Gujarat Vij Company Ltd (MGVCL)[11],[12]. Some of the efforts made by the Gujarat government for bringing in efficiencies include the following:

- Feeder bifurcation (*Jyoti Gram Yojana*)[11]- where feeders for rural and agriculture consumptions have been separated
- Improving customer services, curbing theft, IT initiatives
- T&D loss reduction, introducing High Voltage Distribution System (HVDC)
- Adoption of *Kisan Hit Urja Shakti Yojana* (KHUSHY) has played a key role resulting in the introduction of smaller size distribution transformers for individual consumers and reduction in burning of motors

The state is one of the first to allow Open Access as per the Electricity Act of 2003. The state has also implemented an intra-state Availability Based Tariff (ABT), a pre-requisite for commercial/energy settlement of Open Access consumers. At present, 183 consumers are availing of short-term Open Access, apart from medium- and long-term consumers.

Outcome:

- AT&C losses for the state were reported at 22.6% in the year 2007-08 by GUVNL from 35.2% in the year 2004-05. AT&C losses reported by individual distribution companies have also reduced.
- Subsidy received by GSEB was Rs 1527 Crores in 2003-04. The total subsidy received by four distribution companies for the year 2007-08 was Rs 1182 Crores.
- The Collection efficiency of GSEB in Gujarat has been high at about 97% in 2003-04 and 2004-05. Post reforms collection efficiency has improved and was reported around 98.6% for the year 2006-07.
- Gap in ACS and ARR has reduced from Rs 0.51/KWh in 2002-03 to Rs 0.24/KWh in 2007-08.
- The transmission and distribution losses fell to about 20 percent in 2010-11.
- Between 2008-09 and 2011-2, the power deficit has fallen from 9.8 percent to 0.4 percent.
- In 2005-06 the SEB posted a net profit of about Rs 200 crore. Net profit further rose to Rs 533 crore in 2010-11. After subsidies, Gujarat had a profit of Rs 642 crore [11] in 2010-11.

C. NDPL (North Delhi Power Limited)

By 2001, Transmission & Distribution losses in New Delhi had reached 53%. A large part of these losses was due to theft. The *Delhi Vidyut Board* had run heavy losses for a long time, and only survived due to fiscal support. Delhi's government invited bids for the purchase of a 51% stake in the utility. These bids were not to be based on the utility's asset levels, but rather electricity loss reduction targets, which would form the basis for tariff determination. Tata Power, one of India's largest private sector utility companies, won the

auction and took a 51% stake in the company. The remaining ownership was retained by the Government of Delhi. Tata subsequently employed professionals at top-level management; empowered use of IT enabled services; and cracked down on electricity theft by installing meters and tracking consumption trends. As a result, Tata Power brought down transmission and distribution losses from 52% in 2002 to 18.5% in 2008[13]. In Delhi, all three distribution companies have shown good results, with an average 10.63% reduction in losses in the first three years. In fact, one of the three distribution companies was able to reduce its losses beyond the set target and hence reduced the tariff.

D. CESC

These case study Surveys actions of CESC, a privately held company that owns utilities in Kolkata and Noida. The owner Of CESC, RPG Group, undertook a series of measures[13] to reduce electricity theft that can be replicated in the rest of the Country. The measures include the following:

- The first thing is installation of 100% metering ,even in hut
- Replacement of all faulty meters with new ones
- Rotation of meter readers in order to avoid rent seeking and bribery
- Random checking at large consumption centre
- Setting up two group-assessor group(responsible for collecting information and reports abnormal consumption) and disconnection group(replaces faulty meters ,regularise illegal connections and disconnections)
- Setting up rewarding scheme for division managers with predefined low theft level Assigning unique identification number for each customer and billing record through management information system(MIS)

These measures were instrumental in bringing down electricity losses in both Noida and Kolkata stand at 7%and 13.2%, respectively[13].

E. The Bihar State Electricity Board (BSEB)

The SEB continued to portray a dismal picture with coverage costs through revenue at less than 80 percent, high AT&C losses, inefficiencies, poor management and a large dependence on funding through debt. It was only in November 2012 that the Bihar State Electricity Board (BSEB) was unbundled into five companies (Two distribution ,one generation, one transmission, one holding company named Bihar State Power Holding Company Ltd -BSPHL). Both Maharashtra and Gujarat are reaping benefits of unbundling since 2005. Bihar, which finished unbundling in 2012, lags behind in terms of performance [11].

V. GOVERNMENT INITIATIVES

A. Accelerated Power Development Reform Program (APDRP)

The APDRP [3],[14] scheme was launched in 2002-03 as Additional Central Assistance to the States for strengthening and up-gradation of sub-Transmission and Distribution systems. 50% incentives were given to SEBs / Utilities to reduce their financial losses for actual cash loss reduction.The programme aims at :

- Reduction of AT&C losses
- Bring about Commercial viability
- Reduce outages & interruptions
- Increase consumer satisfaction

The programme has two components:

Investment component covers strengthening and up-gradation of sub-transmission & distribution.

Incentive component is a grant for states / Utilities towards reduction of cash losses with 2000-01 as the base year.

Achievements:

- 571 projects were sanctioned under APDRP covering Distribution network of approx. 906 towns in the country. AT&C losses have been brought down below 20% in 215 APDRP towns in the country, of which 163 towns have been brought below 15%.
- The billing efficiency at national level has improved from 68.37% during 2002- 03 to 71.04% during 2006 07.The national average collection efficiency has also improved from 92.68% during 2002-03 to 94.02 % during 2006-07. With this improvement in billing and collection efficiency, the national average AT&C loss of the distribution companies have reduced from 36.64% in the year 2002- 03 to 33.07% in year 2006-07.

- 100% feeder metering has been completed in 23 states. Overall 98% feeder metering and 88% consumer metering has been achieved at national level.
- The overall commercial loss (without subsidy) of the utilities has reduced from Rs. 29,331 Crores during 2001-02 to Rs. 27,446 Crores during 2006-07.
- Loss of utilities with respect to turnover has reduced from 36.55% in year 2001- 02 to 16.45% in year 2005-06.

B. Restructured APDRP (Eleventh Five Year Plan)

The focus of recently approved Restructured APDRP (R-APDRP) [3],[14],[15] in 11th Plan and beyond is on actual, demonstrable performance in terms of loss reduction. State Power Utilities are expected to reduce AT&C losses to 15%. The Utilities are also to achieve the following target of AT&C loss reduction for the Utility as a whole:

- Utilities having AT&C loss above 30%: Reduction by 3% per year
- Utilities having AT&C loss below 30%: Reduction by 1.5% per year

Projects under this scheme are proposed to be taken up in **Two Parts**.

Part – A

Preparation of Base-line data for the project area covering Consumer Indexing, GIS Mapping, Metering of Distribution Transformers and Feeders, and Automatic Data Logging for all Distribution Transformers and Feeders and SCADA / DMS system for big cities only. Expected investment shall be Rs. 10,000 crores.

Part – B

Renovation, Modernization and strengthening of 11 kV level Substations, Transformers /Transformer Centers, Re-conductoring of lines at 11kV level and below, Load Bifurcation, Load Balancing, HVDS, installation of capacitor banks and mobile service centers etc. In exceptional cases, where sub-Transmission system is weak, strengthening at 33 kV or 66 kV levels may also be considered. Expected investment shall be Rs. 40,000 crores.

C. Rajiv Gandhi Grameen Vidyutikaran Yojna (RGGVY)

RGGVY [3],[14],[15] aims at electrification of 125,000 un-electrified villages and un-electrified hamlets and electrification of 7.8 crore households. The estimated cost of the scheme (including 11th Plan) was Rs.16,000 crores approximately and Rs.5000 crores were earmarked for capital subsidy in phase- I during the 10th Plan Period. Electrification of un-electrified Below Poverty Line (BPL) households will be financed with 100% capital subsidy as per norms of Kutir Jyoti Programme in all rural habitations. Households above poverty line will be paying for their connections at prescribed connection charges and no subsidy will be available for this purpose. 10% of the project cost will be provided by REC as soft loan @ 5%.

Achievement

558 projects have been sanctioned with an outlay of Rs. 25,679.64 crores for providing electricity to 1,16,124 un-electrified villages, intensive electrification of 3,49,853 already electrified villages, releasing electricity connections to 4.09 crore rural households including 2.43 crore Below Poverty Line (BPL) households. The cumulative achievement is the electrification of 53,048 hitherto un-electrified villages, intensive electrification of 66,808 already electrified villages and provision of electricity connections to 48.18 lakh rural households including 40.76 lakh BPL households. Govt. of India has approved the continuation of the scheme in 11th Plan for attaining the goal for providing access to electricity to all households by 2009 with a capital subsidy of Rs. 28000 crores. Under the scheme, Ninety per cent capital subsidy would be provided towards overall cost of the projects.

D. Concessional Financing by PFC (Power Finance Corporation)

PFC provides loan to utilities with low interest rate for up gradation and renovation.

E. Policies

Different policy[3] and schemes like Rural Electricity Distribution Backbone (REDB), Village Electrification Infrastructure (VEI), Decentralised Distributed Generation (DDG) , National Electricity policy (2005), National Electricity Fund(NEF)[3] etc have been adopted by GOI to promote distribution as well as whole power sector. The amount of Rs. 22,000 crore has been estimated for 12th Plan under NEF, assuming an average interest subsidy of 5% per annum which is expected to be provided from the funds allocated for distribution.

VI. KEY ISSUES AND CHALLENGES WITH DISTRIBUTION SECTORS

A. AT&C losses remain woefully high though the Restructured APDRP is aiming to bring it to 15 percent by 2012

AT&C losses are coming down only in the case of a few reforming. Utilities/SEBs while the national average continues to remain high. There are several Pockets of excellence but overall state wide reduction in AT&C loss remains and a consistent downward trend is not yet visible. Power theft is rampant in some of these states and some also have a high rate of equipment theft, particularly in the rural areas. This has resulted in high non-technical losses. Other causes include faulty meters and unmetered supply. The T&D losses have been consistently high. Overall AT&C loss was 38.86% in 2001-02. In 2012- the all-India T&D losses are 24.15%.

B. Poor recoveries hamper

Another problem is poor billing and collection. Of the total electricity generated, less than 50 per cent is paid for. Electricity is stolen or not billed or electricity bills are not paid at all or not paid on time. The anti-theft legislation passed by the Parliament in June 2007 provides a more stringent framework to check electricity theft and non-payment of bills.

C. Tariffs continue to suffer from lack of commercial principles in most cases

Most of the problems arise from incorrect pricing of power. Large cross subsidies built into tariff structures which provide incorrect economic signals to the consumers. While the Act provides for reduction in cross subsidy to +/-20%, given the political and socioeconomic structure of the country, not much has been done by the regulators in reducing the cross subsidies or in laying down a framework for reduction of the same.

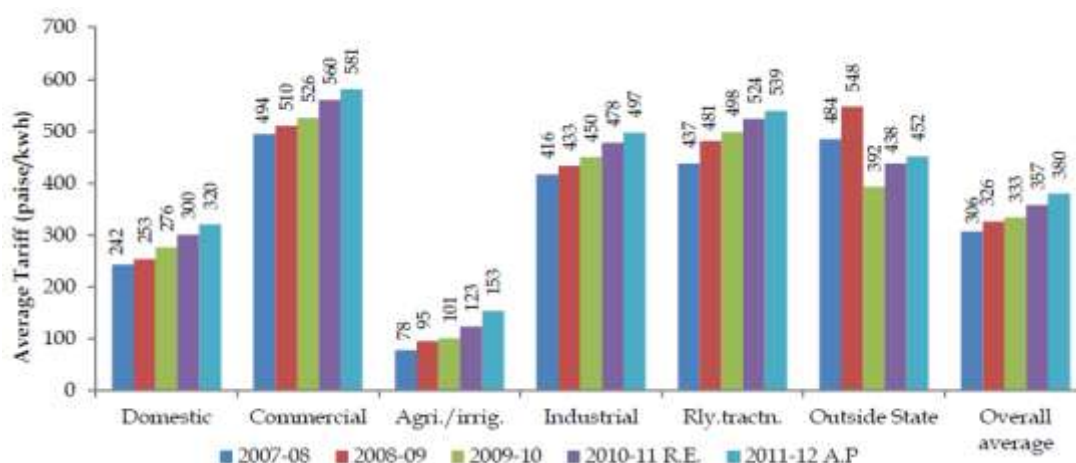


Fig.2: Consumer category wise tariff for electricity
(Source: annual report-2012, planning commission)

D. Subsidy dependence

Another problem for DISCOMs is subsidy dependence. Most of the SEB's are dependent on the Government's subsidy. Any delay in getting the subsidy does impact the financial and liquidity position of these companies. Overall subsidy dependence for DISCOMs on an all-India basis is about Rs. 43,000 Crores in FY 2012, which represents an increase of 13% from FY 2010.

E. Distribution Open Access Still in Nascent Stage

According to the mandate of the EA2003, open access in transmission was operational with immediate effect, and that in distribution was to be implemented in phases. All the 23 SERCs have passed final regulations for implementation of open access in distribution in phases (1 MW and above by Dec 2008), however, the actual implementation of open access is still very nascent. Open Access in concept is welcome for the distribution sector; however, the same shall only take off when there is adequate power in the country and the cross subsidies are reduced to reasonable levels so as to provide a level playing field to incumbent utility and open access provider.

F. Low investment and Inadequate Tariff hike

Investment in the distribution sector has not kept pace with investment in generation, which has led to high transmission and distribution (T&D) losses, poor networks, and delays in projects. Due to distribution network constraints, power cannot be fully transported from surplus to deficit areas, and open access

transactions cannot be effectively facilitated. The average tariff per unit of electricity has consistently been much lower than the average cost of supply per unit. The adequate tariff determination is a challenge, given the critical need for tariff revision to improve the financial position of the utilities, and also in view of the interests of the consumers to avoid any tariff shock.

G. Mismatch Between the Tariffs and Cost of Generating Power

However, the average tariff per unit of electricity has consistently been much lower than the average cost of supply per unit.

Table 1: Average Tariffs and Cost of Generating Power

Year	Unit Cost	Average Tariff per Unit	Gap between Cost and Tariff	Gap as % of Unit Cost
2007-08	4.04	3.06	.98	24%
2008-09	4.6	3.26	1.34	29%
2009-10	4.76	3.33	1.43	30%
2010-11	4.84	3.57	1.27	26%
2011-12	4.87	3.8	1.07	22%

(Source: "Annual Report 2011-12 on the Working of State Power Utilities and Electricity Departments", Planning Commission)

VII. RECOMMENDATIONS

A. Adequate and Transparent Tariff Structure

Since T&D losses are not uniform across a state, consumers in an area that has a high default rate should be charged more compared with those consumers in the areas of lesser default. With tariff rationalisation, the HT consumer, who currently bears the burden of higher tariffs, will increasingly find it competitive to buy power from the grid rather than through captive generation. This will further help the DISCOMs in improving their consumer mix, and hence their financials.

B. Reducing Cross Subsidization

The agriculture and household sectors are cross-subsidized by above-cost tariffs for commercial and industrial customers and railways. In fact, Indian industry pays a much higher price for the power it consumes in comparison with even developed nations such as the US, Germany and the UK, with just the Japanese counterparts paying more.

C. Implementation of High Voltage Distribution Systems (HVDS)

The advantages of HVDS systems are well known, particularly in containing theft of electricity. Besides, it improves the quality of power significantly and thereby improves customer satisfaction.

D. Promote use of CDM (Clean development mechanism) and Renewable Energy

- Perform, Achieve and Trade Scheme of the National Mission for Energy Efficiency
- Provisions for T&D losses in UNFCCC
- Energy Access through Off-Grid technologies for Agriculture

E. Private Players in the Distribution Sector

The Government should find ways to attract private players to the distribution sector in different forms, like multi licensing model, outsourcing, privatization and franchisee models. The best example of implementation of privatization model was in Orissa and New Delhi. This can be replicated in other states of the country.

F. Liberalization of Electricity Market

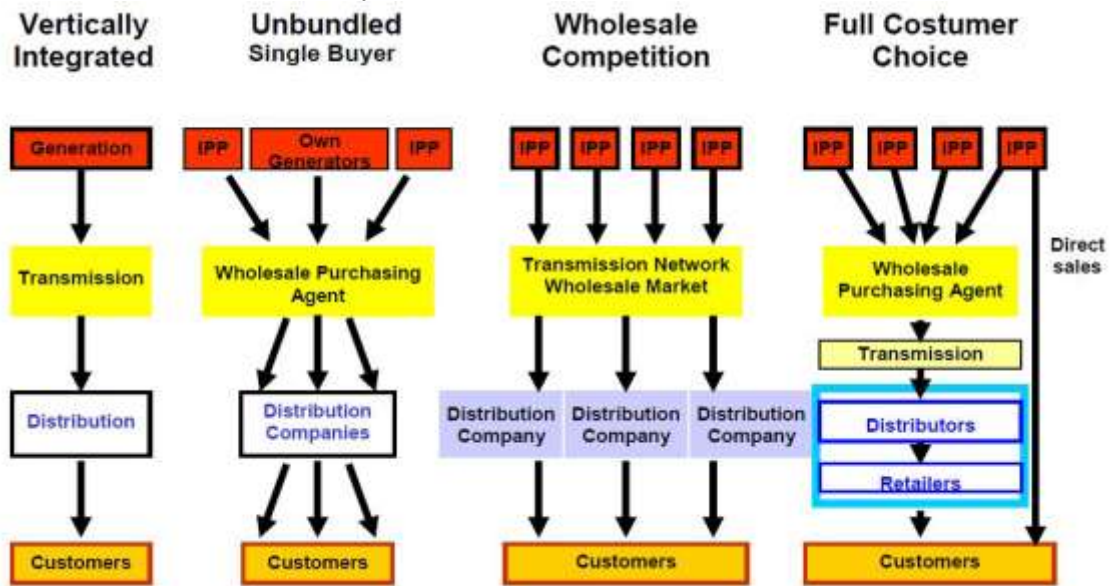


Fig.3: Liberalization of market structure

G. Move towards Demand Side Management (DSM)

DISCOMs and regulators are also encouraging the use of energy efficient devices, including efficient pump sets in agriculture, and efficient lighting and appliances. Farmers are being encouraged to use electricity in non-peak hours.

H. Adoption of Supervisory Control and Data Acquisition (SCADA)

A well planned and implemented SCADA system not only helps utilities deliver power reliably and safely to their customers but it also helps to lower the costs and achieve higher customer satisfaction and retention.

SCADA Operation	Analog Values Archiving	Message Archiving	Tagging	Load Shedding	Load Forecasting	ABT
<ul style="list-style-type: none"> Perform data consistency checking. Determine data that is not available. Identify anomalous measurements in the network. Verify overloads and alarms on monitored equipment. 	<ul style="list-style-type: none"> PowerFlow performs power flow studies that include loss of power system equipment, changes in generation, changes in bus load, and any other changes in system or area quantities 	<ul style="list-style-type: none"> Contingency Analysis function is used to analyse the real-time power system security under pre-defined contingency conditions such as loss of an equipment or feeder. 	<ul style="list-style-type: none"> Safety being the prime concern, tagging is available in SCADA, wherein tags such as PTW, Caution Order, Control Inhibit etc. can be used to increase operational safety 	<ul style="list-style-type: none"> Load Shedding module has been customized to suit NDPL requirements, block Load Shedding, Under-Frequency, ISLS, Distress Load Shedding as well 	<ul style="list-style-type: none"> Load Forecasting can be done based on temperature, humidity, historical load and day type (for e.g holidays) 	<ul style="list-style-type: none"> A tentative ABT UI can be calculated based on the Sanction Schedule given by DTL and actual load

Fig.4: SCADA implementation topology and its various functions

I. Implementation of IT Based Application and Automation Technology

A number of utilities have now started focusing on IT based applications to bring about efficiency in distribution. Some of these technologies are:

- Customer indexing & GIS based Database
- Reliability Monitoring of Power Distribution Systems
- Distribution and Grid Station Automation
- Outage Management Systems(OMS) & Distribution Network Planning
- Automated Meter Reading/ Advanced Metering Infrastructure

J. Enterprise Resource Planning

Employing an enterprise asset management solution will help utilities free work management from tedious and manual data entry and streamline new service initiation through improved dispatch, scheduling and tracking.

K. Approach Towards Smart Grid

A smart grid (fig 4) delivers electricity from suppliers to consumers using two-way digital technology to control appliances at consumers' homes to save energy, reduce cost and increase reliability and transparency. A phased approach for distribution sector is depicted below:

- Phase 1: Curtailing AT&C Losses
- Phase 2— Focus on operational efficiency and customer service excellence
- Phase 3—Focus on Smart Grid development

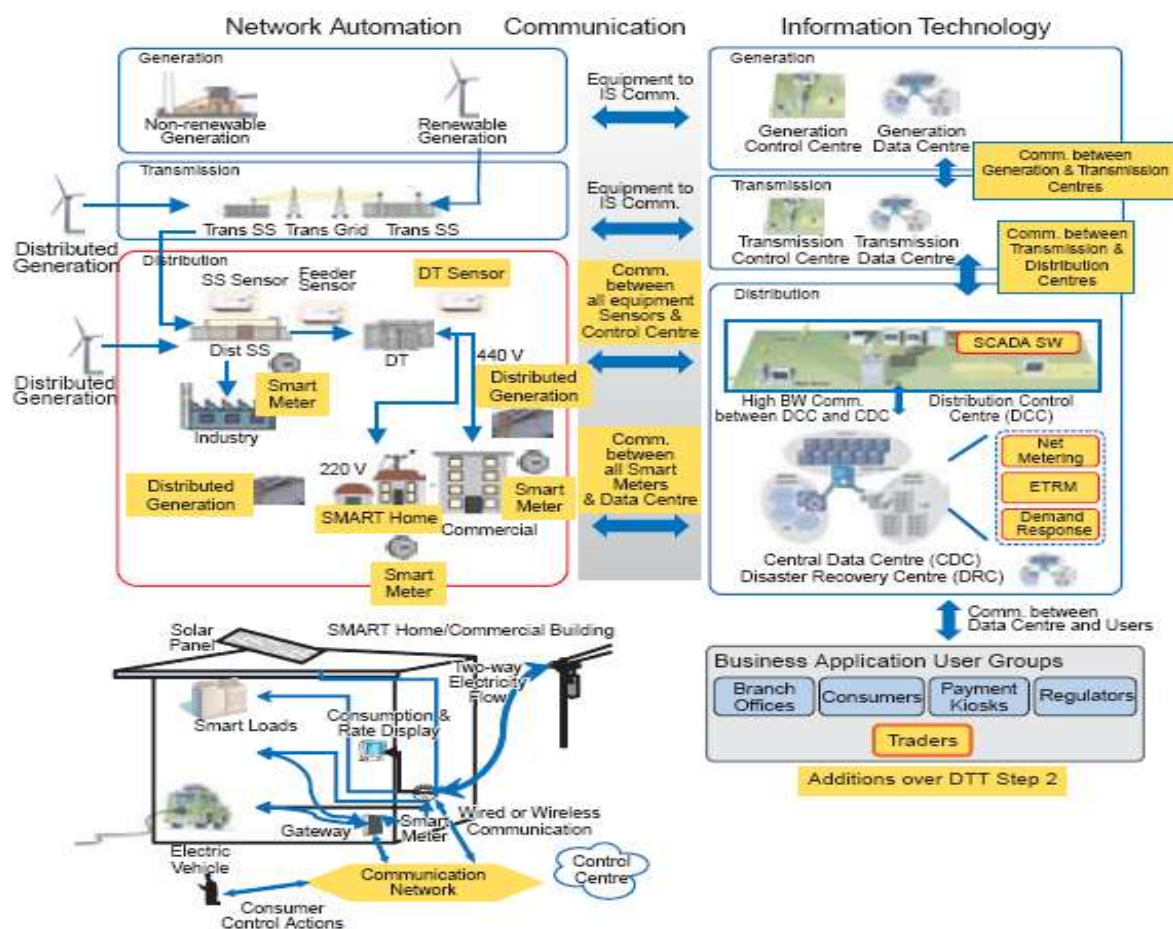


Fig.4: Smart grid development with automation technology

L. Other measures

- Development of adequate distribution infrastructure by constructing new lines/ substations and augmentation /up gradation of existing distribution infrastructure.
- Systematic Planning & Development of distribution infrastructure using the system development techniques/software and do away with the present practice of haphazard / casual and ad-hoc practice.
- Adequate and proper maintenance of distribution infrastructure as per the best practices all over the world.
- The financial institutions should be encouraged to provide easy loans to utilities for taking remedial measures .
- Consistent adoption of RAPDRP (Restructured Accelerated Power Distribution Reform Program)
- Introducing *Outsourced call centres* for whistle-blowing
- Utilities should prepare realistic power *Master Plans* for their systems to develop a strategy to meet the targeted loss level.
- **Legal Measures** for reducing commercial losses through Electricity Act, 2003. The relevant Sections of the Act are 55, 126, 127, 135, 138, 145, 150, 151, 152, 153, 154, 156, 157, 168, 169, 170 and 171.

- Users' Associations, Panchyats and Franchisees in Billing and Collection.
- Fully Operationalize Open Access Provisions of Electricity Act(EA) of 2003 and Regularize power trading.
- Empower autonomy of Central Electricity Regulatory Commissions (CERCs) and Central Electricity Regulatory Commissions (SERCs)
- Promote installation of Captive Power Plants and Optimal use of *distributed generation* .
- Adoption of *Automatic Power Factor Controller (APFC)* which is capable of automatic turn on and off, *Anytime Payment(ATP) Centre ,E- billing, Customer Care Centre, Prepaid Meter, 100% metering of feeders, distribution transformers and consumers, 100% billing / collection efficiency, energy accounting and auditing on real time basis.*

VIII. FUTURE OUTLOOK AND PROSPECTIVE

Several drivers[15] will shape the outlook of the Indian power distribution sector in the coming years and help the DISCOMs to become prospective. A few among these are:

A. Continued demand for power

The Integrated Energy Policy predicts that in order to eradicate poverty, the country's economic growth needs to be at least 8 per cent annually until 2032 and in that time frame, the power capacity needs to rise to as high as around 800 GW.

B. Distribution Reforms

Unbundling of the vertically integrated SEBs into functional entities is a key requirement of the EA 2003. While most of the States as depicted above have unbundled their utilities into Generation, Transmission and Distribution Companies, the real benefit of unbundling can be derived only through bringing in best practices and professional management through Privatization or PPP models.. However, in the long run, privatization seems to be a sustainable solution

C. Supply codes and Performance Standards

Supply Code lays down standards and procedures for recovery of electricity charges, billing cycles, disconnections, and restoration of service and metering among other things. To protect consumer interests, the EA 2003 requires the SERCs to specify standards of performance for distribution licensees. The commissions also have to specify the penalty and compensation to be paid by the licensees to the affected parties if the former fails to meet the standards. The licensees also have to furnish information regarding the level of performance achieved, the number of cases in which compensation was made along with the aggregate amount of compensation, to the SERCs. Both supply codes and standards of performance help in improving efficiency in power distribution operations and consumer service.

D. Growing consumer awareness

For both SEBs and private companies, consumer interest is becoming a high priority. Connections are far easier to come by, bill payments are being streamlined, and complaints are addressed more promptly and effectively. Utilities in Andhra Pradesh and Delhi have proved to be frontrunners in establishing high standards of customer service. A virtuous cycle of better customer satisfaction resulting in more revenues for the DISCOMs, who in turn are investing in better services, seems to be finally coming into play.

E. Focus on IT

IT is increasingly playing a prominent role in making the transition. More and more DISCOMs are adopting IT systems and practices to improve operations and customer service. Supervisory Control and Data Acquisition (SCADA) is being used for better management of distribution networks. Spot billing, call centres, remote meter reading, automated billing, and energy accounting are some of the IT mechanisms being incorporated.

F. Environmental and social pressures

The National Action Plan for Climate Change calls for about 5 per cent of the national generation to be based on renewable sources. Further, as per policy objectives, DISCOMs have to procure a certain percentage of their power requirement through renewable sources. **The Jawaharlal Nehru National Solar Mission has envisaged an RPO (Renewable Purchase Obligation) mandate increasing from 0.25% to 3% of energy purchased by 2022.**

G. Tariff rationalization

The tariff rationalisation will result in commercial viability of the DISCOMs and hence lead to corresponding investments in related infrastructure.

H. Improving grid standards

Just about five years ago, Indian grids were both unsafe and unreliable with voltages and frequencies fluctuating way beyond stated or permissible parameters resulting in frequent grid disturbance and collapses, equipment damages and/or operations at much lower efficiencies. The regulatory mechanisms of the availability based tariff (ABT) and unscheduled interchange (UI) have created a solid base for maintaining grid standards.

These drivers along with the government's focused interest in the distribution segment as illustrated through the institutionalisation of the Restructured-APDRP will shape the outlook for the sector in the coming years.

IX. CONCLUSIONS

In this paper, details about the power sector specially distribution sector reform is discussed. Special attention is given nowadays towards distribution side for improving the losses. Energy Audits of all feeders and replacement of old energy meters will help to reduce technical and commercial loss. The state utility has learned from the reform experiences of other states and hence adopted a franchise-based distribution model that allows not only a public-private partnership, but also better control on the performance of the franchise. This model can be further extended to those divisions where the distribution loss is very high and collection efficiency is poor. New ideas are to be implemented for better service and consumer's satisfaction leads to better collection efficiency. Undoubtedly distribution reform is pathway to provide reliable quality and uninterrupted supply at reasonable prices to all consumer categories and to the development of an efficient, commercially viable and competitive power sector.

REFERENCES

- [1]. Indian Electricity Act. 2003. Online available: <http://powermin.nic.in/acts/notifications/electricity>.
- [2]. Best practices in Distribution Loss reduction, Distribution Reform, Upgrades and Management (DRUM) project training material Of USAID INDIA. Available at <http://www.usaid.com>.
- [3]. www.planningcommission.nic.in
- [4]. www.powermin.nic.in
- [5]. Subhes C.Bhattacharyya, "Sustainability of power sector reform in India: what does recent experience suggest?", Elsevier -0959-6526-2006 Elsevier Ltd/ doi:10.1016/j.jelepro..2005.10.004.
- [6]. Sarh Patts Voll, Michael B. Rosenzweig and Carlos Pabon Agudelo, "Power Sector Reform: Is there a Road Forward?," Elsevier -1040-6190-2006 Elsevier Ltd/ doi:10.1016/j.tej..2006.06.006
- [7]. Anoop Singh, " Power sector reform in India: current issues and prospects" Elsevier -0301-4215-2004 Elsevier Ltd/doi:10.1016/j.enpol.2004.08.013.
- [8]. O.P Rahi, Harish Kumar Thakur, and A.K.Chandel "Power sector reform in India: A case study", IEEE Transactions -978-1-4244-1762-9/ 08-2008 IEEE R. E. Sorace, V. S. Reinhardt, and S. A. Vaughn, "High-speed digital-to-RF converter," U.S. Patent 5 668 842, Sept. 16, 1997.
- [9]. (Ninad P.Totare, Shubha Pandit, "Power sector reform in Maharashtra, India", Energy Policy 38 (2010) 7082-7092 Maharashtra State Electricity Distribution Company Ltd, 2005.
- [10]. Ten Point Action Plan Sharma, D. Paramesswara,Nair, P.S. Chandramohan, Balasubramanian, R., 2005.
- [11]. Economist report" National Competition policy and economic growth in India" Oct- 09,2013.
- [12]. Power distribution reforms in Gujarat,draft report oct-2009.
- [13]. "Electricity Losses in India:Liberalization ,Theft control and Carbon Finance"-An Article , 2011.
- [14]. P. Abraham"Report on Restructuring of APDRP" Ministry of Power, GOI ,2006
- [15]. A Report for Transmission & Distribution by POWERGRID
- [16]. GOI, Ministry of Power Report on"Technology: Enabling the transformation of power distribution, roadmap and reform".