



**Centre for Continuing
Education**

**A STUDY OF THE ELECTRICITY DISTRIBUTION
SECTOR IN INDIA, ITS ORIGIN, CHALLENGES
AND THE WAY FORWARD**

BY

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COMPANY LTD

**A DISSERTATION REPORT SUBMITTED IN PARTIAL FULLFILMENTS OF THE
REQUIREMENTS FOR**

MBA: POWER MANAGEMENT

OF

CENTRE FOR CONTINUING EDUCATION

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

ACKNOWLEDGEMENT

This is to acknowledge with thanks the help, guidance and support from everyone that I have received during the Dissertation.

First of all I would like to thank my mother, father and brother for the encouragement and support during the course of this dissertation and their blessings in this regard has been a boon to me.

I also have no words to express a deep sense of gratitude to the management of Assam Power Distribution Company Ltd. for giving me an opportunity to pursue my Dissertation, and in particular Mr Sanjib Das Gupta for his able guidance and support.

I also thank my friend Joydeep Roy for his valuable advice and suggestions during the course of the Dissertation.



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Further I certify that the work is based on the investigation made, data collected and analyzed by him and it has not been submitted in any other University or Institution for award of any degree. In my opinion it is fully adequate, in scope and utility, as a dissertation towards partial fulfillment for the award of degree of MBA.

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ABSTRACT

Electricity is one of the lifelines of modern human life. After air, water and land, the next thing in queue is definitely electricity. It has gained such importance in our day to day lives that it becomes extremely difficult to live even a few seconds without it. And the supply of such an important service has given birth to the power sector, which comprises of the generation sector, transmission sector and distribution sector. In this dissertation, we shall look into the electricity distribution sector which is the most important link in the electricity supply chain as it is responsible for the ultimate delivery of electricity into the consumer's premises. But unfortunately the distribution sector is also the weakest link in the whole power sector because of the huge financial loss that it has been incurring over the years. And this loss is taking its toll to the power sector as a whole. There are many issues starting from policy related issues and operational issues which are contributing to the inefficiency of the sector. So in this dissertation work, we shall look into the issues which are hampering the efficiency of the distribution sector and look for possible solutions to the problems. We shall focus more on increasing the operational/ functional efficiency of the distribution companies which affects their overall financial health and commercial outlook. And in the end we hope to come out with some definite solutions for the distribution sector which will help it to flourish in the coming times.

Chapter 1:

Introduction

1.1 Overview

Electricity, or “the flow of electrons” as described in science textbooks, is one of the most essential resources of mankind these days. After air, water and land the next thing which comes in the list is definitely electricity. And because of its importance these days in the lives of human beings, it can rightly be considered one of the lifelines of modern human life. Right from lighting our rooms, cooking food and storing it, to operating our electronic devices, electricity occupies such a place in our lives that it is hard to imagine even few minutes without it. And so availability of such an important resource is very important for proper living conditions.

This essentially gives birth to the power industry which is responsible for the generation, transmission and distribution of electricity to its consumers. The power/electricity industry is basically divided into three segments- the generation sector, the transmission sector and the distribution sector. The generation sector is responsible for generation of electricity through various means like thermal, hydro, nuclear, etc. The transmission sector is responsible for transmission of electricity from the generating stations to the distribution centres. And the last but the most important sector is the distribution sector which is responsible for the ultimate delivery of electricity in to the consumer’s premises, and also the collection of revenue from the consumers. The organizations responsible for distribution of electricity are also known as DISCOMs (Distribution Companies). The DISCOMs procure the power from the generation and transmission companies and take it to all hooks and corners of cities, towns, villages and supply it to the end consumers. They are responsible for proper maintenance of the distribution infrastructure so as to maintain uninterrupted and reliable power supply, and based on the consumption of the consumers the DISCOMs send the monthly electricity bills so as to generate the revenue.

The role of the DISCOMs have been increasing since the introduction of electricity service and is still continuing as the electricity demand is increasing very

steeply with increase in the number of consumers and also with the increase in the average consumption of the existing consumers. The distribution sector carries the power from where the transmission sector leaves off i.e. at 66 kV/33 kV voltage level, and then distributes the power through HT lines, LT lines, 11/0.43 kV transformers, switchgears, meters, etc. A schematic diagram of the electrical power system is as follows:

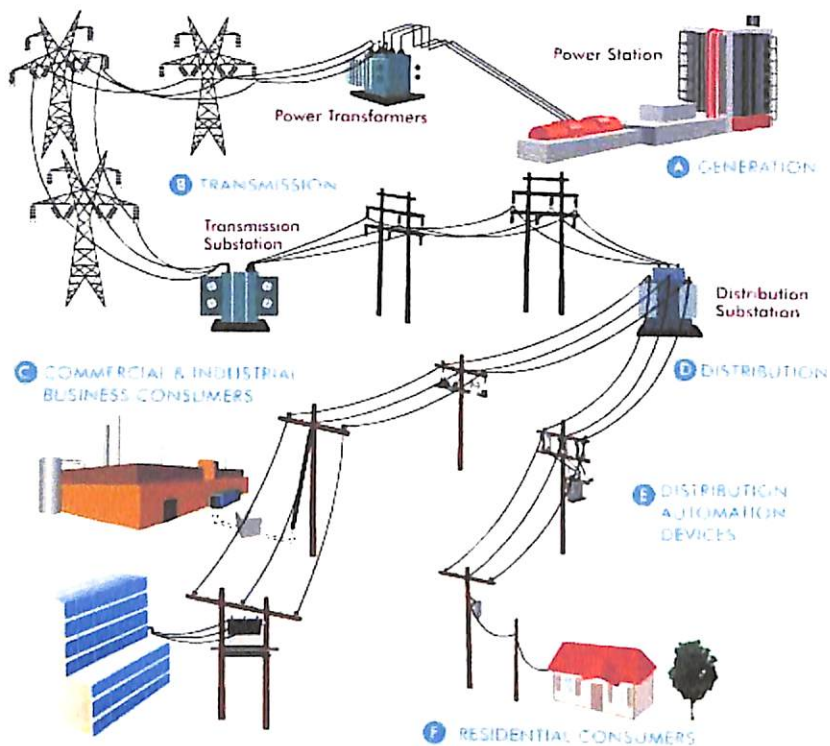


Figure 1.1: Schematic diagram of electrical power system

Traditionally, the distribution sector has been run by the State Electricity Boards (SEBs) though initially it was started by private organizations and is still run by private companies in some cities. But the common issue affecting the sector as a whole is the high Aggregate Technical and Commercial (AT&C loss), especially in the small towns and rural areas. The high AT&C loss has stalled the development of the whole power sector, though the government is trying its best by supporting the DISCOMs financially in upgradation of their age old infrastructure through various schemes like the Accelerated Power Development and Reforms Programme (APDRP), Restructured

Accelerated Power Development and Reforms Programme (R-APDRP), Integrated Power Development Scheme (IPDS), etc.

Also, electrical distribution has become even more challenging today as electricity has reached almost every nook and corner of the country and has become an indispensable part of day to day lives. The DISCOMs are bound to adopt the best practices in commissioning and maintenance of their assets so as to provide the best service to their consumers. And to adopt the best practices the DISCOMs need to invest heavily in research and development, upgradation of infrastructure, training and motivation of employees, etc. But these can happen only when the existing business is running smoothly in a financially efficient way generating enough revenue. But unfortunately this is not happening today as most of the DISCOMs in the country are running in losses and they are struggling to even buy the power from generating companies so as to maintain continuous supply.

The reasons for this condition are many which need to be looked into and studied in detail so that we can make a turnaround in this sector. And this is exactly what we are trying to do in this research study.

1.2 Background

Electricity supply was first introduced in India in the city of Calcutta (now Kolkata) in the year 1897 by a company named Calcutta Electric Supply Corporation, which was controlled from London. After Calcutta, electricity supply was next started in the city of Bombay (now Mumbai) in the year 1905 by the Bombay Electric Supply and Tramways Company (BEST). From there on, electricity service started to expand in other parts of the country as well. Though initially the electricity service in India was started by private organizations, it was soon taken over by the State Electricity Boards (SEBs), which were directly controlled by the government. These SEBs were responsible for power generation, transmission and distribution and this setup continued for a long time till 2004, when the SEBs were unbundled into GENCOs (Generation Companies), TRANSCOs (Transmission Companies) and DISCOMs (Distribution Companies). The DISCOMs are also known as distribution licensees or distribution utilities.

Right from the introduction of electricity, the government formulated several policies and passed several acts so as to lay the basic framework and regulate the

supply of electricity in the country. The Indian Electricity Act, 1910, is one of those first Acts which laid the foundation of regulation of the electricity in the country and also regulated the relationship between the consumers and the distribution licensees. Next was the Electricity (Supply) Act, 1948, which laid the foundation of the Central Electricity Authority (CEA). Then came the Electricity Regulatory Commission Act, 1998, which constituted the establishment of Central and State Regulatory Commissions, which are responsible for regulating the functioning of private distribution licensees and SEBs. Then in 2001, the government formulated the Electricity Bill which tried to replace all the previous acts and also increase competition in the energy sector by facilitating open access to the transmission and distribution grid, power trading, etc. After proper deliberation, finally in the year 2003, the government enacted the Electricity Act, 2003, which repealed all the earlier acts and provided the basic framework and guidelines for the present electricity sector. The National Electricity Policy 2005 and National Tariff Policy 2006 are also important regulations governing the power sector today with an aim to bring competition in the sector and improve the services to the end consumers.

Though the government enacted all the above policies and implemented them in the best possible way, still the electricity distribution sector is in a very critical situation which is mainly due to the high Aggregate Technical and Commercial (AT&C) Losses, because of which it has become the weakest link in the power sector. It assumes great significance as this segment has a direct impact on the whole power sector's commercial viability, and ultimately on the consumers who pay for their electricity service.

1.3 Purpose of the Study

As mentioned in the previous paragraphs, the electricity distribution sector is the most crucial link in the whole power sector as it is responsible for the end distribution of electricity into people's homes and also collection of revenue from each and every household, and this revenue generated keeps the whole power sector running right from generation. But at present this crucial link has become the weakest link in the power sector which is taking its toll in the economy of the country as a whole and also affecting the living conditions of the people. The distribution sector has been plagued with high distribution losses (AT&C losses), coupled with theft of electricity, low metering levels and poor financial health of the distribution utilities with low cost recovery. Because of the poor financial health, the utilities are not able to pay back the generation companies the cost of the power

purchased, which is ultimately affecting the generation capabilities of the GENCOs also. Also due to lack of reserve funds, the distribution utilities are not able to undertake further investments for infrastructure augmentation which is affecting the quality of power supply to the consumers.

The government has rolled out several schemes and policies so as to help the DISCOMs to reduce their AT&C losses to less than 15% which will improve the financial health of the DISCOMs. But other than a few companies, majority of the DISCOMs in the country are running at losses more than the permissible limit which has left the sector in a crippled state. So it has become very important to study about this important sector and look for new ways of what can be done so as to improve the current state of affairs.

The electricity demand has been rising very steeply since the last few years in the towns and villages especially owing to the universal electrification schemes of the government like Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY), Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY), Sahaj Bijli Har Ghar Yojana (SAUBHGAYA), etc. And these schemes have led to improvement in living conditions in the interior parts of the country. The rise in the per capita consumption of electricity in India from the year 2005-06 to 2018-19 is as shown below:

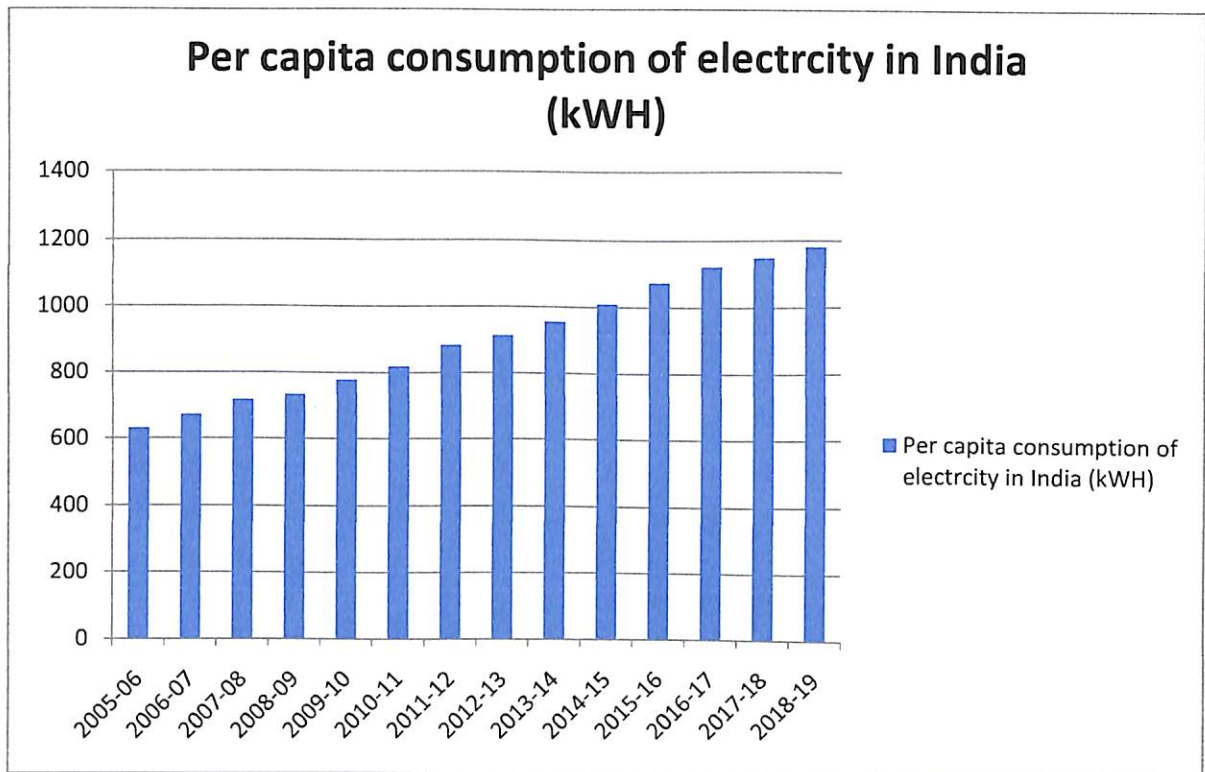


Figure 1.2: Rise in the per capita consumption of electricity in India over the years

Almost all homes in the country have access to electricity today and this has surely been a blessing for a large section of the poor people who were compelled to live under dark till now. Taking electricity to all hooks and corners has also helped the person in their agricultural activities which occupies a major part of our economy. Factories and industries have started to come up in the villages with the advent of electricity and this has led to the increase in jobs for the local people. But over and above, to sustain this service we need to have efficient DISCOMs with good financial health, so that they can keep on providing good service to the consumers and keep on improving.

All these above points clearly indicate that we need to create an efficient power distribution sector for the betterment of the country as a whole. And this is exactly the purpose of this research, which is to study the electricity distribution sector in India right from its starting and look at how it has evolved over the years and what can be done to improve its operational and financial efficiency.

Chapter 2:

Review of Literature

In India, the electricity/power sector is a concurrent subject, meaning it is the joint responsibility of the central and the state governments. Right from the introduction of electricity in the country, the government has formulated several policies and passed several Acts so as to regulate the power sector. A study of the various acts that have been enacted so as to run and improve the power sector over the years is as follows.

2.1 Acts and Policies in the Indian Power Sector

2.1.1 Indian Electricity Act, 1910

The Indian Electricity Act, 1910 is one of the first acts in the power sector which laid the basic framework of power supply in India. It provided for the issues related to issue of licenses to other persons, companies for generation, distribution and supply of electricity, determine their power and obligations and provided a framework for the taking over or their undertaking by the State Electricity Boards (SEBs), the state government or by a local authority. The main goal of the Act was to regulate the relations between the consumers and the licensees and ensured that the consumers were fairly treated by the latter. Having said that it was also ensured that the licensees get reasonable returns for their services. It laid down the legal framework for technical works like erection of poles, drawing of electrical wires, etc. This Act also provided the basic concept of policy based tariffs.

2.1.2 Electricity (Supply) Act, 1948

The Electricity (Supply) Act, 1948 was passed so as to promote the rationalization of production and distribution of electricity and also take other measures for development of the power sector as a whole. This Act strengthened the role of the government in the power sector and prescribed that the most of the generation and distribution of electricity has to be undertaken by the State Electricity Boards (SEBs).

The main part of the Electricity (Supply) Act, 1948 deals with the constitution of the Central Electricity Authority (CEA), State Electricity Boards (SEBs), consultative committees, local advisory bodies, their statutory powers and functions. It goes further by authorizing the state government to make rules concerning the management and accounts of the SEBs. To maintain and secure the equitable distribution of electricity, the state government is additionally allowed to give directions to licensees for regulating the supply, distribution, consumption or use of electrical power.

2.1.3 Electricity Regulatory Commissions Act, 1998

The Indian Power sector had been beset by problems which hindered the development of the sector and restricted its capacity to respond to the growing demand of power brought by economic liberalization. The fundamental issues facing the power sector were namely: lack of rational retail tariffs, the high level of cross-subsidies, poor planning and operation, inadequate capacity, the neglect of the consumer, the limited involvement of private sector skills and resources and the absence of an independent regulatory authority. Considering the paramount importance to restructure the power sector, the government of India conducted to conferences of all the Chief Ministers of India to discuss about the issues facing the sector, and the outcome of these meetings was the adoption of the Common Minimum National Action Plan for Power (CMNPP). The CMNPP identified the creation of regulatory commission as a step so as to solve the issues in the power sector and improve the operational performance of the SEBs. This ultimately led to the establishment of the Central Electricity Regulatory Commission (CERC) and the State Electricity Regulatory Commissions (SERC) at the state level. The main functions of these commissions are as under:

Functions of CERC

- To regulate the tariff of the generating companies owned or controlled by the Central Government.
- To regulate inter-State transmission including tariff of the transmission utilities.
- To regulate the inter-State sale of power.
- To aid and advise the Central Government in the formulation of tariff policy.

Functions of SERC

- To determine the tariff for electricity, wholesale, bulk, grid and retail.
- To determine the tariff payable for the use of the transmission facilities.

- To regulate the power purchase and procurement process of the transmission utilities.

The Act also aims to improve the financial health of the SEBs are losing heavily on account of irrational tariffs and lack of budgetary support from the State Governments. Further the creditworthiness and operational efficiency of the SEBs also needed to be improved. It made it mandatory for the SERCs to fix the retail tariff in such a way that none of the consumers or category of consumers are charged a tariff less than fifty percent of the average cost of supply. If the State Government wanted to provide any benefits to any class of consumer, the Act enabled the State Government to do so by compensating the SEBs by paying the subsidies directly to the latter. Thus it enables the State Governments to fix any tariff for any category of consumers, provided it pays the subsidy to the SEBs so as to compensate the loss.

2.1.4 The Electricity Act, 2003

In the year 2001, the Electricity Bill was introduced which tried to replace all the previous Acts in the power sector. The main aim of this bill was to increase the competition in the energy sector by facilitating open access to transmission and distribution grid, power trading, setting up of captive power plants, etc. It tried to convert electricity into a type of tradable commodity, and in the process tried to recast the energy sector in such a way that it will function on commercial lines and generate enough profits to fund its own expansion. This bill was ultimately enacted and came to be known as the Electricity Act, 2003.

The main objectives of the Electricity Act, 2003 were:

- To consolidate the laws related to generation, transmission, distribution, trading and use of electricity.
- Taking measures conducive to the development of the electricity industry.
- Protecting the interest of consumers and supply electricity to all areas.
- Rationalization of electricity tariffs.
- Ensuring transparent policies regarding subsidies.

-Promotion of efficient and environment friendly policies.

-Constitution of regulatory commissions.

-Establishment of appellate tribunal.

The Act provides a comprehensive yet flexible legislative framework that enables power development and at the same time enables the sector to move towards competitive market scenario. Competition with regulatory oversight is the cardinal principle around which the Act is woven. The competition is to be there to encourage efficiency in performance and regulatory oversight to protect the interests of all the stakeholders, especially the consumers' and recovery of costs for the investors. The Act encourages private sector participation in generation, transmission and distribution and also promotes open access in transmission and distribution. Another important feature of this Electricity Act, 2003 is the recognition of power trading as an independent activity.

2.1.5 National Electricity Plan, 2005 and Power Trading

The above mentioned Acts were the basic Acts on which the electricity sector in India has been running over the years. Along with these to increase competitiveness and transparency in the sector, power trading was given impetus and new policies were formulated for the same. The National Electricity Plan (NEP), 2005 directed the appropriate commissions to frame regulations for both inter-state and intra-state power trading. It also pushed for the creation of Power Exchanges in India. Consequently two power exchanges were set up namely: The Indian Energy Exchange and Power Exchange of India Ltd. These exchanges were conceived to catalyze and modernize the electricity market in India by introducing a transparent and neutral market through a technology enabled electronic trading platform. The concept of power trading tried to change the vertical structure of the power industry which were controlled by the State Electricity Boards who enjoyed monopoly in the sector and it somehow led to the increased inefficiencies in their operations. The Central Electricity Regulatory Commission (CERC) further released the Power Market Regulations, 2010, which deal with the creation of a comprehensive market structure that enables the transaction, execution, and contracting of all type of possible products in the electricity market. Power trading tried to add a new dimension to the existing monotonous structure of the power sector by establishing a wider power market for all. It

encouraged the private players to take more interest in the sector and also provided the existing State Electricity Boards to procure additional power to meet their peak demands from other non-conventional sources, private generation companies, etc.

2.2 Reforms in the Power Distribution Sector

The power distribution sector has seen several reforms over the years to meet the government's aim of 'Power for All' and also to improve the efficiency of the sector as a whole. The reforms have resulted in various changes in the sector few of which are unbundling of SEBs, higher competition, introduction of Open Access (OA), reduction of losses, rationalization of tariffs, financial packages, etc. These reforms can be broadly classified under three heads: Structural, Operational and Financial.



Figure 2.1 Reforms in Power Distribution

2.2.1 Structural Reforms

The distribution sector has been traditionally run by the State Electricity Boards (SEBs) which were entities owned by the state government and having monopoly in electricity distribution. But the institutional setup or governance/administration were not at par with typical commercial organizations which led to shortfall in their performance. It was realized that until the governance structure of the SEBs was changed, their performance cannot be improved. Thus the

structural reforms were formulated so as to grow a performance driven work culture and create a more accountable, transparent and efficient distribution entity.

The first step in the implementation of structural reforms came with the unbundling of the Odisha State Electricity Board (OSEB) in 1995 which corporatized it and also established the Odisha Electricity Regulatory Commission (OERC), which was independent of any political interference.

Then in the year 2002, to increase the commercial performance of the state run distribution entities, privatization of the distribution licensee was brought in. It was believed that private sector expertise would ensure affordable and quality electricity service to the consumers and improve the sector's overall performance. Odisha and Delhi were the first states to privatize the distribution utilities and it was highly successful in Delhi in reduction of losses and providing better services to consumers. In Odisha though, it did not fetch the results which were intended to.

In some places the franchisee system was also put into practice, where particular areas were allotted to distribution franchisees who run the normal distribution business on behalf of the DISCOM and helped to reduce the losses by better revenue collection and also improve the operational performance thereby providing better services to the consumers.

2.2.2 Operational Reforms

Besides the structural reforms, major importance was given to the operational aspect of the DISCOMs as well as it was believed that improving the operational performance of the utilities would automatically lead to improvement in the financial performance and would also lead to better services to the consumers. Keeping this in mind, the Central Government took many initiatives to provide power for all, strengthening the age old distribution system to bring down the technical losses and improve the performance of the utilities. The key operational reforms that have been taken up are:

-Revision of tariff determination process

-Open Access

-Accelerated Power Development and Reforms Programme (APDRP)

-Restructured- Accelerated Power Development and Reforms Programme (R-APDRP)

- Integrated Power Development Scheme (IPDS)
- Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY)
- Deen Dayal Upadhaya Gram Jyoti Yojana (DDUGJY)

2.2.2.a APDRP, R-APDRP AND IPDS

In order to improve the age old distribution network of the distribution utilities and thereby increasing their operational performance and reduction of the technical losses, the government approved these schemes. Urban areas with population more than 30,000 were selected and ring fencing areas were fixed by installation of energymeters for the implementation of APDRP and R-APDRP schemes. The government provided funds to improve the distribution infrastructure of those areas and also proper metering of all feeders, DTRs and consumers. The upgradation of the infrastructure led to reduced technical losses in the system and also reduced outages which ultimately led to improvement in the operational efficiency. The proper metering of all substations, feeders, DTRs helped in monitoring the current leakage from the system by preparation of proper energy audit.

IPDS was launched in 2014 with similar objective to reduce AT&C losses of the utilities, by enabling Information Technology (IT) based systems for energy accounting and auditing, improving the billing system and collection.

These schemes came like a boon for the distribution utilities as they could augment their systems with the grant provided by the government, which would have been nearly impossible to do from their own funds as they were already under tremendous financial stress.

2.2.2.b RGGVY and DDUGJY schemes

RGGVY scheme was launched in 2005 with the aim of electrifying 1 lakh un-electrified villages and also provide free electricity connections to about 2.34 crore households. This helped in expansion and improvement of the distribution network and also providing electricity access to people below poverty line.

DDUGJY was introduced as a continuation of the RGGVY, focusing on basically three objectives:

- Separation of agricultural and non-agricultural feeders.

-Strengthening and augmenting the sub-transmission and distribution systems including metering of distribution transformers, feeders and consumers.

-Rural electrification by providing household electricity consumers to all remaining households.

2.2.3 Financial Reforms

Other than the structural and operational reforms, financial reforms were also enacted from time to time to de-stress the distribution utilities from their mounting losses.

In the year 2001, a bailout package was announced for the SEBs, with the assumption that this one-time package would enable them to clean out their balance sheets and improve their efficiency.

The DISCOMs borrowed heavily from banks over the years to strengthen their systems to handle the increasing power demand, leading to heavy financial burden as revenues did not increase proportionately. This created a problem for the banks also as the DISCOMs were unable to pay the loans and were on the way of being declared as Non-Performing Assets. The Central Government introduced a financial restructuring package in 2012 in order to ease out the stress of the DISCOMs as well as financial institutions. The states took over 50% of the loans and the rest 50% was converted into long term loans by the financial institutions.

In 2015, the Central Government launched the UjjwalDiscom Assurance Yojana (UDAY) to ease out the financial burden of the DISCOMs. Under this scheme, the state governments had to take over 75% of the debts of the DISCOMs as on 30 September 2015 over the following two years i.e. 50% in fiscal 2016 and 25% in fiscal 2017. The DISCOMs on the other hand were given targets to reduce their AT&C loss to 15% or less. This helped the DISCOMs to reduce their interest cost burden substantially and helped to improve their financial health.

These were some of the reforms that have taken place in the electricity distribution sector over the years. But still this sector is the most weakest link in the whole power sector. Rising AT&C loss, leakage of power due to theft, inefficient commercial operation of the DISCOMs and many other factors continue to add to the woes of the sector. Another important aspect relating to the commercial efficiency of the sector is the difference of the Average Cost of Supply (ACS) and the Average Revenue

Return (ARR). The lesser the difference the better it is for the sector. The ACS-ARR difference came down from Rs 0.76/unit in FY'12 to Rs 0.30/unit in FY' /unit in Jan 2019 after the implementation of UDAY. But this is far from the target fixed under the scheme. So it is very important to take up a diagnostic study of the distribution sector covering all its aspects in order to see what actually is going wrong in the sector and what needs to be done to get it right. And this is exactly the soul purpose of this research work. In the following chapters we shall analyse the different aspects of this sector.

Chapter 3:

Problems in the Electricity Distribution Sector

As discussed in the previous chapters, distribution is the most crucial link in the power sector as it is responsible for the ultimate delivery of electricity into the consumers' homes as well as collection of revenue from them. It has also been discussed that distribution is the weakest link in the power sector which is affecting the whole power sector. So, in this chapter we shall discuss about what are the root problems in this distribution sector which is affecting the commercial viability of the power sector as a whole.

The major cause of all the problems is the poor financial health of the DISCOMs. The DISCOMs buy the electric power from the generating companies and bring it to the distribution substations via the transmission lines of the transmission companies. Then they distribute it to the consumers via the distribution lines and transformers. Now, the DISCOMs need to pay the generating companies for the energy bought from them and they also need to pay the transmission companies for utilizing their infrastructure in transmitting the power. But the DISCOMs are not able to recover the complete charges for the power that is supplied by them and also there is a lot of leakage due to malpractices which goes out as unaccounted energy. Due to this the DISCOMs are not able to pay the generating companies the cost of the power that has been bought. As the generating companies don't receive the payments on time, the generation capacity is also affected in future which ultimately leads to shortage of power for the end consumers.

3.1 Types of losses in power distribution

The power distribution sector has been plagued by basically two types of losses:

3.1.1.) Transmission and Distribution loss(T&D loss): This loss is basically the difference between the total energy which has been injected into the system and the sum of the energy which has been billed to the consumers. This loss covers the technical

losses of the transmission and distribution lines and the loss due to theft of electricity. The prime reason for the technical loss is the ageing infrastructure of the utilities which have crossed their working age and are running in overloaded condition due to the increase in power demand. Incorrect feeder metering is also another reason for technical loss as the energy coming in or going out cannot be measured due to faulty or no metering. Losses due to power theft also add to T&D loss in the system.

3.1.2.) Aggregate Technical and Commercial Loss (AT&C loss): The T&D loss only covers the technical loss in the system but it does not cover the losses due to the deficiency commercial operations of the utilities, which ultimately lead to non-realization of the payments from the electricity consumers. So the concept of Aggregate Technical and Commercial Loss (AT&C loss) was introduced which covered both the technical and commercial aspect of the losses. It is the true indicator of overall efficiency of the distribution business.

Now, there are several factors which contribute to the overall AT&C loss in the system which are as follows:

-Power Theft: Power theft is a major contributor to the high AT&C loss of the distribution sector in India. It is basically the stealing of power by illegal means by the people. Major portion of power theft occurs in the agricultural sector where large pumps, motors, etc. used for agricultural purposes are tapped directly from the distribution lines of the utilities. Also many industries and factories also sometimes illegally use the power which goes out unaccounted and the utilities suffer the losses. Though there are rules framed under the Electricity Act to penalize the power thieves, but the DISCOMs are not able to completely check this issue which is affecting their efficiency very badly. Power theft occurs more in the rural areas and so the AT&C loss of the DISCOMs are more in the rural areas. The remoteness of the rural areas also make it convenient for power theft.

-Non billing: Generally the electricity consumers are raised a monthly energy bill for the electricity consumed by them which they need to pay within a specified due date so as to continue receiving the electricity supply. But in many interior rural areas there are several consumers who are enjoying the electricity supply but the utilities are not raising any energy bill to them. This is basically due to operational callousness of the utilities which is directly contributing to its financial loss.

-Incorrect billing:In many areas though the consumers are raised a monthly energy bill, but the billing is not done properly, which means that the consumers are not billed as per their actual consumption. This can happen in many ways. Like in many places, the consumers are not having any energy meters installed at their premises and the monthly energy bill is billed on average basis which may not be their actual consumption. In other places though energy meters are installed but the utility's meter readers don't visit the actual premises and provide the wrong meter readings. This not only causes the financial loss of the utility but also tremendous consumer grievance which ultimately affects the commercial outlook of the utility.

-Inefficiency in collection:Collection efficiency is one of the most important factors in calculating the AT&C loss of an utility. It is the ratio of the revenue that is realized to the total demand that is raised for the power injected. The higher the collection efficiency, the better it is for the utility. But unfortunately, the utilities are not able to realize the total cost of the power. In many places, consumers with huge outstanding dues are enjoying the power without clearing the dues and without being disconnected. Also in many places the utilities are complacent to adopt new technologies for payment which adds to the inconvenience of the consumers. These factors directly affect the financial loss of the utility.

-Lack of Investment:Distribution sector has been a loss making sector since a long time. Due to this the utilities don't have enough capital to make investments in upgrading their infrastructure or adopting new technologies. Also, due to the sector's poor commercial outlook, the banks and other financial companies are reluctant to invest in the sector. This situation ultimately contributed to even more loss for the distribution sector, as the utilities are bound to operate with the existing infrastructure in overloaded condition.

-Poor and outdated HR policies:Majority of the SEBs have been operating with the same old manpower arrangement that was there during their origin. But the power sector has grown many folds and the way of working has also changed with the increasing use of electricity in people's lives. Due to this the operational efficiency of the utilities is affected which ultimately leads to commercial loss as well as increase in consumer grievance.

Moreover, after the implementation of the rural electrification projects like RGGVY, DDUGJY and SAUBHAGYA, the electrical network has spread out to all nooks and corners of the country. The line length and number of transformers and associated equipments have increased many folds than what it was a few years ago. But the staff strength of the utilities have not increased proportionately nor the utilities have been able to adopt state of the art modern technology for the operation of these equipments which is badly affecting their operational efficiency and leading to more and more financial loss.

-Erratic power supply in rural areas: The Central Government has been pressing for universal electrification in the country so that every household in the country has access to electricity supply. And with the implementation of projects like Rajiv Gandhi GrameenVidyutikaranYojana (RGGVY), DeenDayalUpadhaya Gram JyotiYojana (DDUGJY), SAUBHAGYA, the government has almost attained this target. But though electricity supply has spread out to all corners of the country, the quality of the supply especially in rural areas is very poor. There are continuous outages due to breakdowns, etc. and in many places problems of low voltage exist. All these issues make the consumers unsatisfied and they start losing confidence on the DISCOMs. This affects the payment behavior of the consumers which affects the revenue collections of the DISCOMs.

All the above mentioned factors contribute to the high AT&C loss of the DISCOMs which lead to their poor financial health. The poor financial health of the DISCOMs imply that they are unable to buy power from the generating companies, not able to make investments for new infrastructure or augmenting the existing ones, which ultimately affects the retail consumers. The generating companies also bear the hammer as they do not get timely payments from the DISCOMs for the power already sold, and also there is no surety regarding the future sale of power.

Chapter 4:

Analysis and ways to improve the functioning of the distribution sector

In the previous chapter we have listed out the basic factors which contribute to the operational inefficiency of the distribution sector and ultimately lead to the high AT&C loss for the distribution companies. These factors are basically concerned with the operational aspect of the distribution utilities and it is very important to improve the performance of the utilities in these aspects. This is because improving the operational efficiency will ultimately lead to better consumer satisfaction and better financial health as well.

Now, to improve the performance of the sector, we have to take steps at two levels:

- I. Policy related issues.
- II. Operational issues of the DISCOMs.

The policy related issues covers all those steps which the government takes so as to formulate the policies governing the power sector. This includes modifications, amendments in the existing Electricity Act, regulation of tariffs, or other initiatives which will increase the competition in the electricity market or for the benefit of the consumers.

Simultaneously along with improving the policy related issues, it is even more important to improve the operational efficiency of the DISCOMs. This is because whatever policy is being formulated, it is to be implemented by the DISCOMs and the effectiveness of the policies will depend on how efficiently these are implemented by the DISCOMs. So in this study we shall be concentrating more on the operational issues of the DISCOMs as improving this aspect will definitely lead to the overall improvement in the sector.

We shall now look into these in a detailed way:

4.1.) Improving the operational/functional drawbacks of the DISCOMs

In this section we shall be taking up the problems of the DISCOMs as pointed out in the previous chapter and look for possible solutions to those.

4.1.1.) Curbing the menace of power theft: As mentioned in the previous chapter, power theft is a major threat to the financial health of the power distribution sector. It leads to direct outflow of electricity which goes unaccounted and directly hits the revenue performance of the DISCOMs. Power theft occurs in several ways like: direct hooking from the distribution wires, interference and by-passing the metering system, etc. Though power theft has been criminalized in the electricity Act, 2003, and has provisions for penal punishment for the accused, still power theft has been rising in many parts of the country and this has hit the distribution sector very badly. This is primarily because the DISCOMs are not able to tackle it in the right way.

As a solution to this situation, DISCOMs should give special attention to its anti-theft/vigilance cells. Though anti-theft drives are done in many places by the teams but these are not effective to curb this menace. The number of anti-theft teams should be increased especially in rural areas where power theft is more prevalent. The team members of the anti-theft teams should be specialized in these activities and they should be entrusted with the duties only related to curbing power theft. The Electricity Act also provisions the establishment of special police stations for curbing power theft but at present, the number of police stations are not enough to cover all the theft prone areas. So the number of police stations with adequate force needs to be increased. In this regard the DISCOMs may also look to hire specialized personnel as vigilance officers from the civil police force or external security agencies who shall be authorized to take necessary action so as to bring an end to power theft. Moreover, actions should be taken so that the accused persons are penalized in the right way for the committed crime.

Other than these, some infrastructural changes are also needed to be made so as to curb power theft. Firstly, the overhead bare power conductors should be converted to insulated cable conductors. In majority of the places in our country the overhead lines are bare conductors which are very easy to tap into. So, bare conductor to insulated cable conversion should be given top priority so as to reduce power theft. Secondly, prepaid energy meters should be installed in place of the normal energy meters so as to reduce power theft. But both these initiatives involving infrastructure modification require huge amount of capital investment which may not be affordable by most of the DISCOMs owing to their poor financial health at present. So the

government must look into it as to how it can take some initiatives in this regard to help the DISCOMs.

4.1.2.) Improving the billing functions of the DISCOMs: Billing is one of the most important functions of the DISCOMs in the context of revenue collection. The DISCOMs generally supply the electricity first and then in the following month, energy bills are raised to the consumers for the units injected into the consumer's premises. So raising correct energy bills based on the actual consumption of the consumers is very essential. But unfortunately the billing functions are not done correctly by most of the DISCOMs of the country leading to high revenue losses consequently. Raising correct energy bills is the first step towards revenue generation of a DISCOM.

After the implementation of the RGGVY, DDUGJY and SAUBHAGYA schemes, the number of consumers have increased many folds especially in the rural areas. But in most of the areas, the DISCOMs have not been able to handle such a sudden surge in the number of consumers. They have not been able to serve such a large number of consumers efficiently and they have not been able to send correct energy bills to each and every consumer. This has led to drop in the revenue collections of the DISCOMs and increase in the AT&C loss. In many places, the DISCOMs have still not been able to incorporate all the consumers in the billing cycle which has led to complete revenue loss. The DISCOMs need to incorporate all the consumers who are ~~remaining electricity in their jurisdiction into the billing cycle and monthly energy bills~~ should be served to them.

Moreover, serving proper energy bills based on the actual consumption of the consumers is also very important. In many places, it has been observed that though the consumers receive energy bills, but they are not as per actual consumption. In cases where billing is done less than the actual consumption, the DISCOMs suffer revenue loss and in places where billed units is more than the actual consumption, consumer grievance increases. This is mainly due to inefficiency of the meter readers and billing staff to collect actual meter readings or in some cases due to lack of integrity. To get over these issues, the DISCOMs need to first ensure that they have the minimum necessary manpower to carry out the billing activities. These people then need to be trained periodically so as to keep them updated about different aspects of meter reading. The DISCOMs must also adopt new technologies for billing purposes so as to

bring in transparency and efficiency into this important task. A good example of this is the e-suvidha billing app designed and developed by the Assam Power Distribution Company Ltd.(APDCL) for on-spot billing purpose. It is a mobile phone based app which the billing person installs in his phone and then carries it to the consumer premises. He/she also carries a thermal bluetooth printer with him. The billing personnel go to the consumer premises, feeds the meter reading into the app and gets the bill printed on the spot itself. The bill is then handed over to the consumer. Through this innovative step, APDCL has cut short three different activities viz. meter reading, bill processing and bill dispatching into one step. The company has improved its billing performance in many interior places with this app and has tasted financial success. The app also has a GPS tracker which helps in tracking the billing person whether he/she is actually visiting the consumer's premises or not. The consumers have also expressed satisfaction with this new technique.

Along with this, the installation of prepaid meters is also another important step which the government is trying to implement in order to solve the billing related issues.

4.1.3.) Improving the collection efficiency of the DISCOMs: After proper billing, the next step is obviously collection of the revenue from the generated bills. This is the most significant function for the commercial performance of the DISCOMs as everything comes down to how much money the company makes. Collection of revenue is a major issue for the DISCOMs especially in rural areas where the percentage of consumers paying regular electricity bills is very poor. In urban areas also some high value consumers default in the energy bill payments which directly affects the financial health of the DISCOMs. There are many reasons for non-payment of energy bills which differ from place to place or on the category of consumers. In rural areas people are sometimes unable to pay the bills due to their own economic problems. On the other hand some are intentional defaulters. We shall be concentrating more on improving the collection in rural areas as figures show us that the DISCOMs suffer more losses in rural areas.

Now, to improve the collection efficiency of the DISCOMs, the first step is to ensure that each and every consumer receives the monthly energy bills on time. This is a very simple but the most important step to improve collection because on random

survey it has been found that the dispatching of energy bills is very irregular in rural areas. In urban areas, the people are aware as well as capable, and so even if the hardcopy does not reach on time, people receive their energy bills via SMS or email. But this is not the case in rural areas. So special attention must be given to ensure proper dispatch of energy bills in rural areas. In this regard, spot billing apps (like APDCL's e-suvidha) may also be introduced quickly in all rural areas as it ensures proper dispatch of the energy bills. DISCOMs must also organize regular camps in the consumer localities to make them aware for regular payment of energy bills. Know Your Consumer (KYC) forms may be rolled out to gather information about the consumers so that better services can be provided to them. Help from local NGOs or SHGs may be taken for door to door awareness among the consumers.

Generally, it has been observed that in rural areas the consumers are in far flung areas and the nearest DISCOM cash counter may be many kilometres away which makes it inconvenient for the consumers to go and pay their bills. This somehow discourages the consumers to make regular payments. To solve this issue, the DISCOMs must take special measures to organize monthly outcollection camps at the far flung areas to make it convenient for the consumers. Along with the above mentioned steps, strong initiatives must be taken to incorporate new modes of payment like e-payment, wallet based services, etc.

Along with the above steps regarding regularizing of payments of the consumers, steps must also be taken to recover the arrears dues of the defaulting consumers. Disconnection drives must be conducted regularly with the help of police force if required for disconnecting lines in sensitive places. Also one-time payment settlement schemes may be introduced to recover old dues by providing certain facilities to the consumers, like waiver of surcharge, etc.

4.1.4.) Modification in the HR rules to change the managerial and employee structure: Most of the DISCOMs of the country are running on the same manpower structure of the SEBs that was there when they were established. But, the electricity industry has changed a lot over the years. Electricity is not just a luxury anymore but rather a lifeline for the people. And its importance is not just restricted to cities and towns but in rural areas also, people are largely dependent on electricity service for

domestic use, agricultural use, etc. And more importantly, the DISCOMs must have a proper commercial attitude in their working style so as to generate profits.

So, the whole manpower arrangement of the DISCOMs must be modified so as to ensure the right kind of people are placed at the right places. The manpower must be evenly distributed keeping in mind the consumer density as well as the revenue demand of the area. The areas which fetch more revenue must be given more preference in providing better services. The DISCOM staff must be trained regularly so as to keep their knowledge and skills updated. They must also be trained to be sensitive to the needs of the consumer so that the consumers are always satisfied with the service.

The DISCOMs must also take steps to simplify the various official processes so that the consumers find it very convenient to avail the services. In designing these modifications, the basic idea must be to ensure that the processes contribute to the overall improvement of the commercial aspect of the company.

Along with these, special emphasis must be given for incorporation of modern technologies through research and development so that the basic functions are done in the most efficient way as possible.

4.1.5.) Proper investment in improving infrastructure and providing better power supply to the consumers:The existing infrastructure of the DISCOMs needs to be upgraded time to time so as to handle the increased load requirements these days and provide better power supply to the consumers. Though the DISCOMs have upgraded a lot of their lines, substations, etc. under the government schemes like R-APDRP, IPDS, etc. still a lot is required to be done.

Also, the quality of power supply needs to improve everywhere. In our country, though electricity has reached all villages and 100% household electrification is to be completed shortly, the duration and quality of power supply is still a burning issue. There are many places where there are long power cuts due to infrastructural constraints. So adequate steps must be taken immediately so that the consumers receive the power supply round the clock. This way the consumers will be satisfied and will feel more encouraged to make timely bill payments.

These were some of the basic functional or operational aspects of the distribution sector which need to be improved by the DISCOMs for the overall improvement in the sector. These are the basic functions which all DISCOMs perform in rendering their service to the consumers. But the efficiency of doing these functions determines the ultimate commercial performance of the company. DISCOMs which excel in performing these functions efficiently will surely be in a better place in the sector.

Chapter 5:

Conclusion

After studying about the electricity distribution sector and going through this dissertation work, we can see that this sector has always been a very challenging one as far as the commercial aspect is concerned. Right from its introduction, we have seen that the sector has seen many changes in the policies and regulations governing the sector. Over the years, the government has introduced many acts and amendments so as to make the electricity sector more competitive and most importantly consumer friendly. But the issue which is ringing the bells at present and is hindering the proper functioning and development of the sector is the poor financial health of the distribution companies. Most of the DISCOMs in the country are going through tough times with respect to their financial performance. The DISCOMs are losing crores of rupees due to unaccounted theft of power as well as outstanding dues of the consumers. And this has been happening for many years which has led the DISCOMs to a very weak position at present. Due to the huge outstanding money receivable by the DISCOMs, they are not able to pay the generation company for the power purchased from them. They are also not able to invest in improving their own infrastructure due to this financial crunch. This whole scenario has weakened the power sector as a whole and more importantly it is affecting the common electricity consumers also.

In this dissertation work, we have also identified several basic functional/operational drawbacks of the DISCOMs which are pulling it back. Problems like power theft, non-billing/ incorrect billing of consumers which are leading to high AT&C loss for the consumers. An even more bigger problem is the inefficiency in collection of revenue by the DISCOMs. Consumers with huge outstanding bills are enjoying power without being disconnected, and in some places even after disconnection, the outstanding dues are not recovered leading to increase in bad debt for the DISCOMs. These problems are more in rural areas and hence the DISCOMs operating in those areas are taking the burden.

In order to change this scenario, we have to improve the operational parameters of the DISCOMs as evident from the discussion in Chapter 4. The DISCOMs have to find new and innovative ways to improve upon their operational parameters. This includes steps to rearrange the employee structure of the companies, incorporating new technologies to perform the basic functions, etc.

Another important aspect which should be given prime importance is improving the consumer relationship with the DISCOMs. The DISCOMs should take special steps to make better interaction with the consumers, and must be very sensitive to the needs of the consumers. The work culture of the DISCOMs must change to a customer centric one. To make better interaction with consumers DISCOMs may take the help of social groups, NGOs, etc. It is believed that only when the consumers become more aware of the situation and they feel satisfied with the services of the DISCOM, then only they will be more interested in paying timely energy bills which will ultimately help to improvement in the sector.

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