



# INTERNSHIP REPORT

ON

## DHAKA ELECTRIC SUPPLY COMPANY LTD.




By

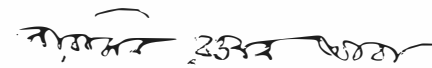
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Submitted to the  
Department of Electrical and Electronic Engineering  
Faculty of Sciences and Engineering  
East West University

In partial fulfillment of the requirements for the degree of Bachelor of  
Science in Electrical and Electronic Engineering  
(B.Sc in EEE)

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## Certificates



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# **Certificate**

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**Student Id: 2006-1-80-006**

**Department Of Electrical & Electronic Engineering  
of East West University**

**For successful completion of the Internship in DESCO**

**Held from 11 May, 2010 to 31 May, 2010.**



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**Engr. Md. Golam Rabbani**  
Manager, HRM&D



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**Issue date: 01 June, 2010**

HR-2010031



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We are grate full to Dr. Anisul Haque, Chairperson & Professor of the Department of Electrical & Electronic Engineering and Dr. Ishfaqur Raza, Associate Professor, Department of Electrical & Electronic Engineering, Bangladesh for being so kind during the period of our internship. We are also grateful to all of our teachers and friends for their cooperation and encouragement throughout our whole academic life in EWU. We also would like to thank Engr. Md. Akharul Islam, Manager(Prepaid meter production unit); Engr. Md. Mohammad Shafiqul Islam, DM(Pallobi S&D Divn.), Engr. Md. Manjurul Hoque, Manager, System protection & Grid, Engr. Md. Raihan Habib, DM(prepaid Metering pilot project), Engr. Md. Zulfiquar Tahmid Manager,(SE&D), Engr. Md. Abdus Salam, Manager(CP&MIS), Engr. Md. Golam Mowla, AM(Grid & Protection) , Engr. Md. Shawkat Ali, DM, Tongi(East)S&D Divn,DESCO , who had given us appointment from their precious time to collect related data of our report and also helped us to understand many related matters .

At last but not at the least we would like to thank the almighty Allah for giving us the chance to complete our internship and preparing the internship report

## Executive Summary

The power sector in Bangladesh faced numerous problems characterized by lack of supply capacity, frequent power cuts, unacceptable quality of supply, and poor financial and operational performance of the sector entities. There have been a number of reforms in the power sector in Bangladesh since its independence, but most of these reforms failed to bring desired improvements in the power sector. Among the three main components of the power system, recent reform activities were centered on generation and transmission. The most pressing problem in the power sector has been with the distribution system, which is characterized by heavy system loss and poor collection performance; however, the distribution system seldom got the priority in reform initiatives.

Our internship in DESCO (Dhaka Electric Supply Company Limited), focused on the planning and distribution in the practical field of power sector. Through this internship we got the opportunity to work as a member of a team which was involved in transmission and distribution of electricity around dhaka city, i.e TONGI, UTTARA, MIRPUR, and GULSHAN. We also had some experience regarding corporate culture and customer dealings. On the completion of this internship the practical experience enhance our theoretical knowledge in power sector.





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## CHAPTER 01

### 1. INTRODUCTION:

Providing a decent steady supply of electricity has become very challenging in our country for the past few decades. Statistics show that only 47% of the total population of Bangladesh has access to electricity. This figure is relatively low when compared with other developing countries in the world. The government of Bangladesh is trying to make changes in power sector development in order to make electricity available for everyone by the year 2021, Dhaka Electric Supply Company Limited (DESCO) has been formed to minimize system loss in electricity, and this also aids in increasing efficiency for electricity distribution.

The main reason for the power crisis is the shortage of supply. Supply never meets the demand. Generation of power needs to be increased and transferred to the desired distribution centers of power. Transmission capacity also needs to be upgraded and distribution of power should be improved to minimize system loss. Overall improvement of power sector requires huge investment. For this reason government of Bangladesh is appealing foreign and private investors to invest in reformation and restructuring of power sector. On this ground, govt. is promising to provide financial incentives. As a result investment opportunities in power sector in Bangladesh are promising for both private and foreign investors.

The Government of Bangladesh took an initiative to unbundle the Power Sector in the form of Public Limited Company. Aiming to provide better consumer service and to improve revenue collection, DESCO was created in November 1996 under the Companies Act 1994, as a Public Limited Company, taking over some jurisdiction area of DESA. The primary objectives in creating DESCO were to provide better consumer service and to improve revenue collection in the area of power distribution.

## 1.1. Report Origin:

We have an interest in power sector of Bangladesh, because power may be considered as the back bone of all services provided by government of the country. It was a tremendous experience that we have availed this opportunity with devotion and commitment. This report entitled “DHAKA ELECTRIC SUPPLY COMPANY LTD” is a detailed description of the 21 days long internship program at the “DESCO”. Here we are sharing our experience regarding our internship in different Sections.

## 1.2. Purpose of Study

The purpose of this report cognates the internship purpose. The objective of internship was to gather practical knowledge and experience the implementation of theoretical knowledge in real world. To this regard, this report is contemplating the knowledge and experience accumulated from the internship program. With the set guidelines by the EEE Department of East West University, this report comprises of an organization part and a project part. The prime objective of the organization part is to present a background and introduction of DESCO Ltd.

## 1.3. Sources and Methods of Data Collection:

To conduct the project the following sources have been used.

- Primary Information: The primary source of information is based on the collecting reports from different Sales & Distribution (S & D) division of DESCO.
- Secondary Information: The secondary source of information is based on Internet Searching, Reference Books etc.

## CHAPTER 02

### **2. OVERVIEW OF DESCO LTD.;**

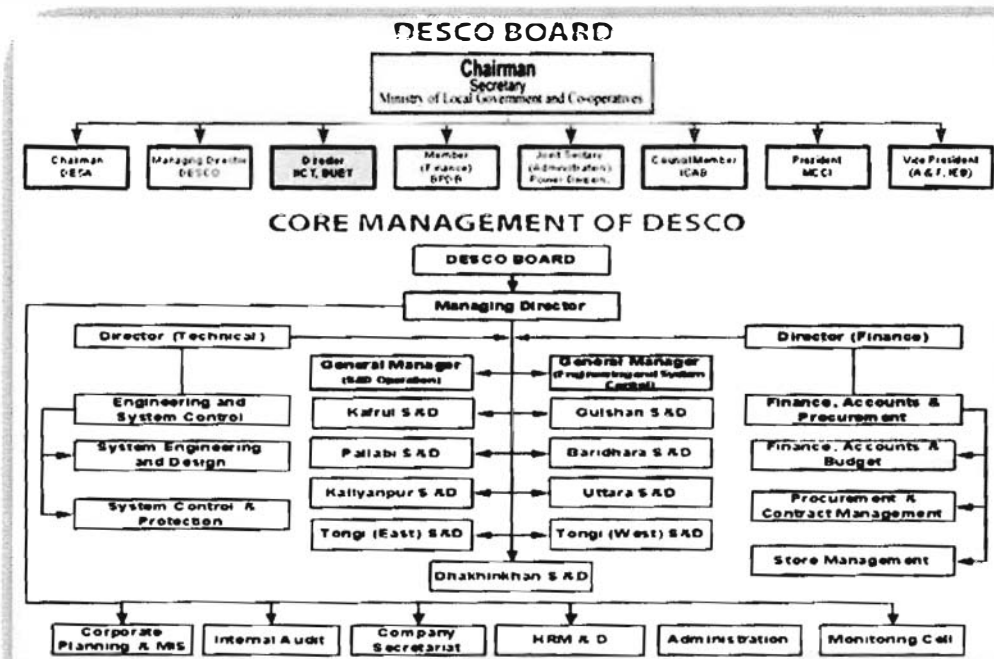
#### **2.1. Back ground:**

Dhaka, the capital city of Bangladesh is an ancient city. After partition of the Indian sub-continent in the year 1947, power generation, transmission and distribution authority in the then East Pakistan region were confined within some private companies. Power development board (PDB) is a Public Limited Company under Power Division of Ministry of Power, Energy and Mineral Resources of Government of the People's Republic of Bangladesh. The DPDC took over DESA in 1991 and started commercial operation in Dhaka. The company was entitled to perform business from the date of incorporation. But Revenue collection procedure of DESA was not working satisfactorily. Performance of DESA was hurting the generation and transmission side of the Power Sector as cash inflows to this sector come only from distribution agencies .To increase the efficiency in the area of electricity distribution, to provide better consumer service and to improve revenue collection, reform of power sector was initiated by re-bundling it. Dhaka Electric Supply Company Limited (DESCO) was created as a distribution company in November 1996 under the Companies Act 1994. As a Public Limited Company, DESCO took over some jurisdiction area of DESA with an authorized Capital of Tk. 5 billion. At present 75% shares of DESCO is owned by Government of Bangladesh and rest 25% is owned by individuals and institutions through Stock Exchange.



## 2.2. Organization:

DESCO was constructed under the Companies Act 1994 with its own Memorandum and Articles of Association. The company as a whole, owned by Government of Bangladesh and DESA representing government by acquiring 100% shares. DESCO managed by a part time Board of Directors appointed by its shareholders, who are responsible for policy decisions. The Board of Directors appoints managing Director and two full time Directors who become members of the Board after appointment. The organogram of the company is as follows (Table: 2.1):



Source: Dhaka Electric Supply Company Limited

**Table 2.1: Organ gram of DESCO**

- As a Board of Directors the Chairman of DESA owns the majority of the shares in DESCO.
- The Managing Director acts as the Chief Executive Officer of the company and responsible for overall management of the company.
- The Director (Technical) responsible for development, planning, supply, demand management and operation and maintenance of the system.
- The Director (Finance) responsible for all financial matters and commercial operations of the company.



## 2.3. Vision, Mission & Corporate Philosophy:

**Vision:** To be a role model electric supply company in the region using most dependable technologies and being a development partner in the continuous welfare of the society.

**Mission:** Service to the utmost satisfaction of consumers through reliable and uninterrupted power supply and provide value for money. Provide congenial working environment for employees.

**Corporate Philosophy:** Service excellence with integrity and corporate social responsibility.

## 2.4. Ethics of DESCO Employees':

The members of the DESCO, in recognition of the importance of their service in affecting the quality of life throughout the nation, and in accepting personal obligations to their responsibilities, do hereby commit themselves to conduct of the highest ethical and professional manner and agree:

- a) To accept responsibilities in making electricity distribution and sale of power decisions consistent with the safety, health, and welfares of the consumers, and to disclose promptly factors that might endanger the consumer or the environment.
- b) To be honest and realistic in stating claims or estimates based on available data.
- c) To reject bribery in all of its forms.
- d) To improve understanding of technology, it's appropriate application, and potential consequences.
- e) To seek, accept, and offer honest criticism of technical work, to acknowledge and correct errors, and to credit properly the contribution of consumers.
- f) To treat fairly all persons regardless of such factors as race, religion, gender, disability, age or political support.
- g) To avoid injuring others, their properties, reputation, or employment by false or malicious action.
- h) To assist colleagues and co-workers in their professional developments and to support them in following this code of ethics.

## 2.5. Corporate Social Responsibilities:

The company's approach to corporate social responsibility as an electricity distribution utility service is through six key priorities that drive all decisions and actions. These areas are:

- a) Customer service;
- b) Employee commitment;
- c) Financial strength;
- d) Environmental respect;
- e) Regulatory integrity, and
- f) Operational excellence.

The company aims to be regarded in the top of all companies in its industry for each of these key priorities, with a vision to be the best all-round performer in its sector.

Various corporate social responsibility programs running under DESCO –

- a) Customer awareness programs about the electricity distribution rules and regulations.
- b) Identification of unauthorized connections.
- c) Campaign for energy saving programs.
- d) Distribution of over 5 million energy saving bulbs to every premises and withdraw flickering, dim and burned-out lamps to conserve energy.
- e) With the collaboration of leading telecom operator GP, provide easy bill pay service, which brings consumer a hassle free and secured solution to pay their bills.
- f) Installing Pre-Paid meters to reduce hassle of paying bills at banks and fear of 'ghost bills.'

## CHAPTER 03

### **3. CURRENT POWER SECTOR STRUCTURE:**

The power sector in Bangladesh has been under the authority of government directly or indirectly. The power sector in Bangladesh has been managed, facilitated and regularized by the government in such a way that it is capable of delivering flourished outcome. Overview of Bangladesh power sector has been given below:

#### **Owner & Regulator:**

- Power Division, Ministry of power, energy & mineral resources

#### **Generation:**

Generation of power involves the following authorities:

- Bangladesh Power Development Board (BPDB)
- Rural Electrification Board (REB)
- Ashuganj Power station co. Ltd (APSCL)
- Electricity Generation Company of Bangladesh Ltd. (EGCBL)
- Independent Power Producer (IPP)
- Small Power Producer (SPP)



#### **Transmission:**

Transmission of power is authorized by Power Grid Company of Bangladesh Ltd. (PGCB)

#### **Distribution:**

Distribution of power is controlled by:

- Bangladesh Power Development Board
- Dhaka Electricity Supply Authority (DESA)
- Dhaka Electric Supply Company Ltd. (DESCO)
- Rural Electrification Board through Rural Electric Co-operatives, Palli Biddiyut Samities (PBS)
- West Zone Power Distribution Co. Ltd (WZPDCL).

## 3.1. Supply Chain:

DESCO purchases electricity from Bangladesh Power Development Board (BPDB), authority responsible to generate electricity. Electricity is transmitted from the Power Plants to DESCO's receiving sub-stations through the National Grid. Power Grid Company Bangladesh Limited (PGCB) is in-charge of the National Grid and they receive wheeling charge for transmission of electricity through the National Grid. DESCO distributes electricity to the consumers through its own distribution network and collects revenue against the electricity usage.

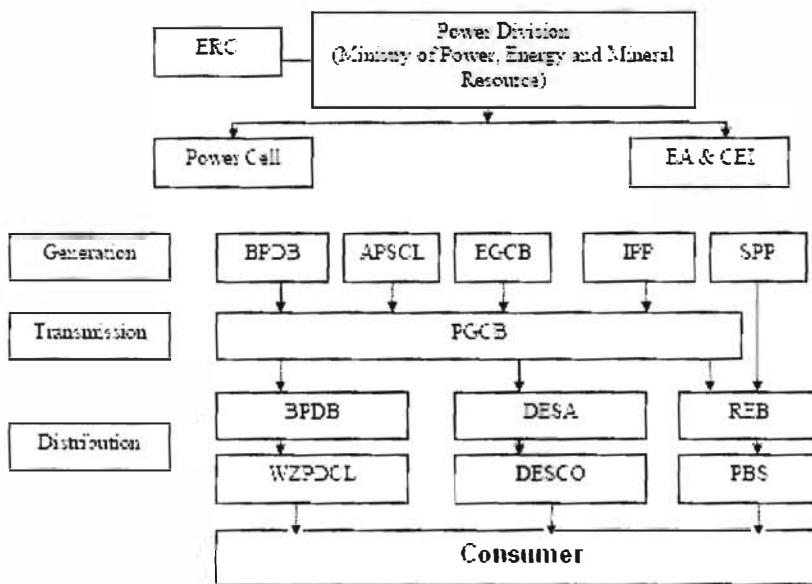


Figure 3.1: Power Supply chain to consumer

## 3.2. Energy Purchase and Sales Rate:

The energy Purchase Rate, Sales Rate and Wheeling Charges are fixed by the Bangladesh Energy Regulatory Commission (BERC).

Purchase Rate from PDB: 2.62 Taka/KWH

Wheeling Charge (to PGCB): 0.05 Taka/KWH

The electric energy selling rate varies with types of consumers, timing of consumption (peak, off-peak) and amount of consumption. The energy selling rates are also fixed by the Bangladesh Energy Regulatory Commission (BERC).



### 3.3. Territory:

The service area of DESCO is mainly the Northern part of Dhaka City, Viz. Mirpur, Pallabi, Kafrul, Kallyanpur, Gulshan, Banani, Cantonment, Baridhara, Badda, Uttara, Daxin Khan, Tongi Pourashava and Purbachal Model Town. The service area is about 220 square kilometers except Purbachal Model Town.



DESCO Area

DPDC Area

Figure 3.2: Territory of DESCO



### 3.4. Responsibilities of DESCO:

Every member of DESCO is dedicated to –

- Provide dependable Power service to the customers with honest and sincerity.
- Monitor about future requirement of energy.
- Work together with community and customers to conserve it.
- Follow rule of saving by avoiding wastage and misuse.
- To work in power distribution system with the knowledge of the state-of- the-art technology
- Capable to work to ensure sustainable development for providing quality power and ensure customer satisfaction.
- Installing new lines, substations etc. in the newly developed area and existing area, to fulfill the ever rising demand of electricity.

### 3.5. Demand Forecast:

As per the Power System Master Plan (PSMP) demand forecast is provided below (Table 3.1):

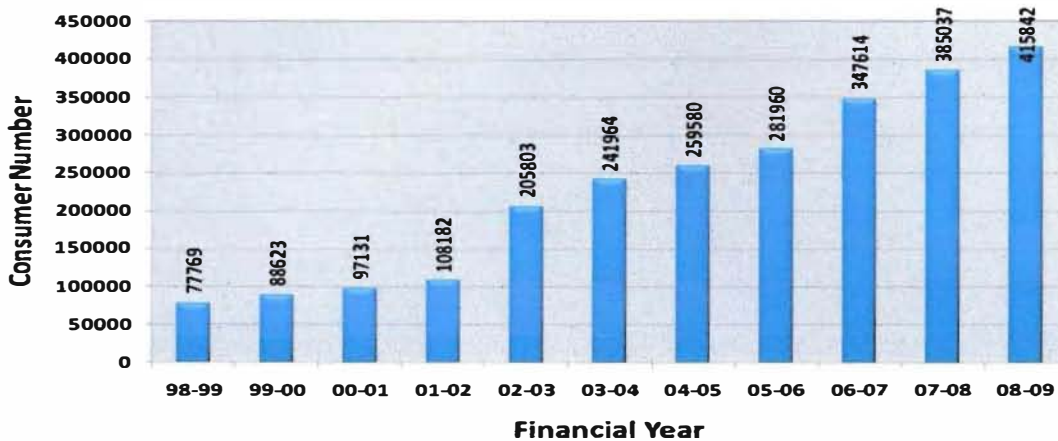
Fiscal Year	Demand Forecast (MW)
2004	4256
2005	4597
2006	4967
2007	5368
2008	5802
2009	6271
2010	6779
2011	7311
2012	7887
2013	8508
2014	9180
2015	9907
2016	10512
2017	11291
2018	12128
2019	13027
2020	13993

**Table 3.1: Power demand forecast**

It can be observed that every year demand is increasing on an average by 8% every year. But now it has been observed that demand of electricity is surpassing the amount that was forecasted. As an example, demand of 5368 MW was forecasted for the year 2007 but actual power demand was close to 7000 MW.

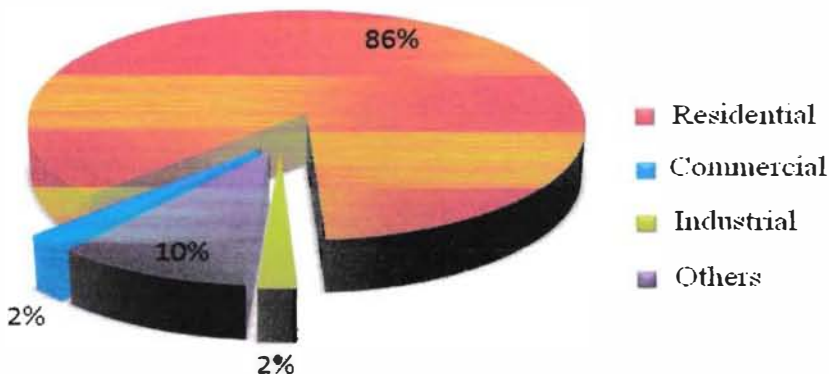
## 5. Consumer Number and Mix

The following figure (figure 3.3) shows the total number of DESCO consumers since its inception in June, 2009.



**Figure 3.3: Consumer Growth of DESCO**

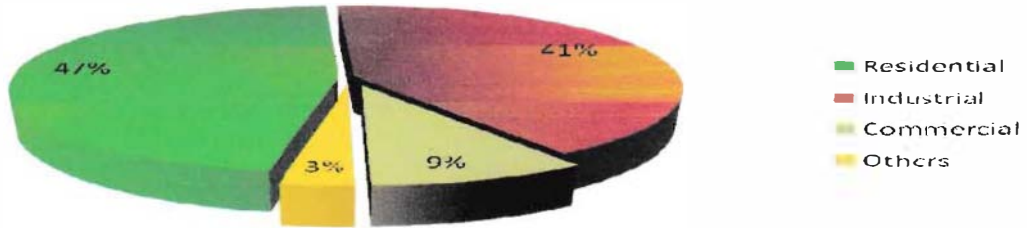
The following figure (figure 3.4) shows the Consumer Mix of DESCO upto June, 2009.



**Figure 3.4: Consumer Mix of DESCO (June - 09)**

The following figure (figure 3.5) shows the Consumption Pattern of DESCO's Consumers.

## Consumption Pattern



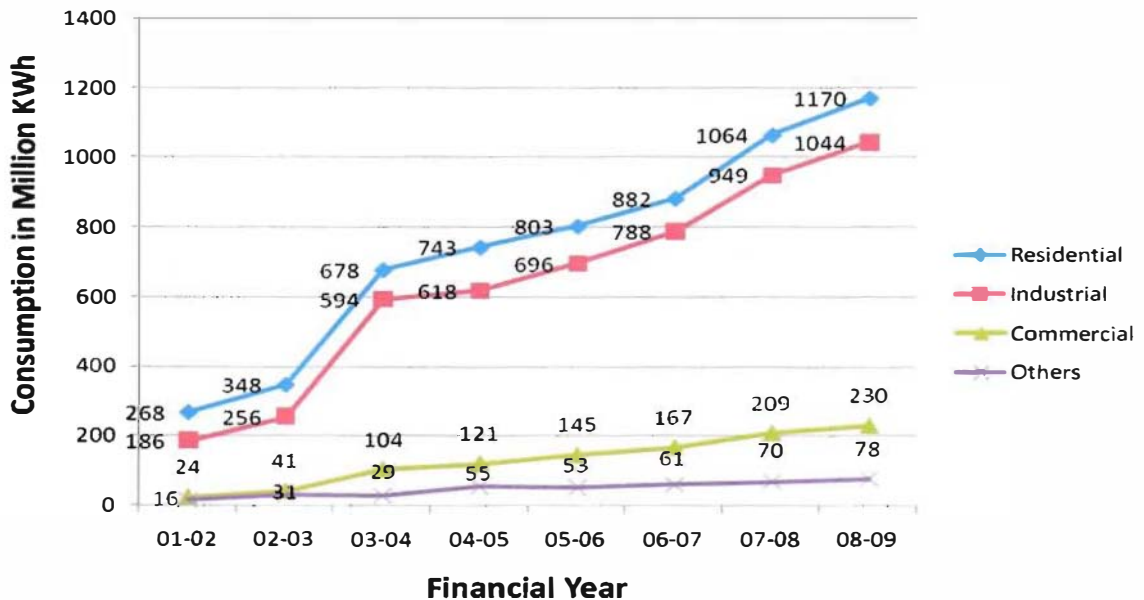
Source: Yearly Financial Progress report of Dhaka Electric Supply Company Limited to ADB.

**Figure 3.5: Consumption Pattern of DESCO's Consumers**

### 3.7. Consumption Growth:

Over the recent years, electricity consumption in DESCO is categorized according to customer type and shown in the following chart.

## Consumption Growth



**Figure 3.6: Usage Category wise Consumption Growth**

## CHAPTER 04

### **4. COMMERCIAL PERFORMANCE:**

DESCO performs different kinds of services inside its territory. These are:

- One point service center
- Disconnection and Reconnection
- New connection
- Metering
- IT section and Bill collection
- Pre-paid meter production
- Outsourcing Operations
- Data acquisition System
- E-governance
- Wireless & telecommunication and DAS (Data acquisition System) communication.



#### **4.1. One point service center:**

One point service is the most essential and latest customers' services centre in power sectors in this country. Consumers' complaints (regarding billing and metering) are addressed on priority basis in this centre. It is the front desk of DESCO through which customers get the opportunity to contact with the authority without any hassle. All types of consumer can collect necessary informations according to their demand. We visited one point centre with Engr. Mohammad Shafikul Islam on 13.05.10 .The main activities of one point service center are listed below-

1. Provide the required information to the consumer instantly.
2. Receive all types of consumer complaint or information and register these in the system.
3. Provide proper guidance to the consumers.
4. Provide after sales service to guarantee customer satisfaction.
5. Continue communication with the consumers for queries.
6. Solutions are handover to the consumer as per needs.

## 4.2. **Disconnection and Reconnection:**

We visit this operation with Engr. Mohammad Shafikul Islam on 15.05.10. The function of connection and disconnection is one of the most vital and complex activities. When a consumer is unable to pay his bill in time then his power supply gets disconnected step by step. At first the authorities notify the consumer and allow a period to pay the dues. If the dues are not cleared within that period then disconnection takes place. As soon as the dues are clear the consumer gets reconnected again.

- **Temporary Disconnection :**  
Temporary Disconnection takes place when payments are not made in time.
- **Permanent Disconnection:**  
Permanent Disconnection takes place when consumers do not pay the bill more than six months or power usage involves any illegal activities.

There are mainly four reasons for Disconnection. These are:

1. Non-payment of electric bill.
2. Illegal usage of electricity.
3. To guarantee safety or security.
4. On consumer demand- (a) Temporary D/C (b) Permanent D/C.

## 4.3. **New connection:**

After fulfilling all kinds of formalities Consumers get new connection from the DESCO. Usually it takes not more than a week. This is assured by one point service centre.

## 4.4. **Metering:**

We visited Metering unit with Engr. Mohammad Shafikul Islam on 15.05.10 in Mirpur section. DESCO has different types of consumers. Some requires HT and other requires LT connection. The consumer who's requirement are above 50KW, provided with HT connection. Readings for HT connection require extra caution and safety. The DESCO higher authority sends team to take HT reading. Desco outsources meter reader for LT readings. The HT meter is capable of measuring 38 parameters which includes timer, KW, KVA, KVAR, PF, etc.



The procedures of metering are listed bellow –

1. Prepare meter reading schedule in every month. Monitor and guide meter reader to ensure error free reading.
2. After receiving readings from meter reader submit the meter reading book in IT section to prepare the bill.
3. On completion of billing process, the printed bill is handed over to the contractor/bill server to distribute this bill for distribution.
4. Ensure bill collection from the consumer.
5. Motivate the consumer to pay the bill on time.
6. Generate a meter reports by a meter reader to find defective meter. Then collect the meter report from meter readers & take necessary action to solve these defects.
7. Disconnection activity continues for unpaid dues.
8. Ensure reconnection on receiving previous dues.
9. Change damage /defective/faulty meter or defective/joint/insecure service drop.
10. Install meter for new consumer and disconnect illegal connection.

#### 4.5. IT section and Bill collection:

IT section and Bill collection play an important role in DESCO. The total system is maintained by the IT section. All the information and database are stored and maintained by this section. The complete billing processes are made by this IT section.

At the instant of time, account equivalent month is calculated by,

$$\text{Accounts Receivable (AR)} = \frac{\text{Total amount receivable}}{\text{Avg monthly billed amount}} \times 100$$

The collection important ratio (CI) is calculated by,

$$\text{CI} = 100 - \left( \frac{\text{System loss}\%}{100} \times 100\% \text{ collection} \right)$$

If the CI ratio is close to 1 then it gives very good performance.

Net working capital (NWC) = Current asset – Current liabilities

$$\text{Current ratio} = \frac{\text{Current assets}}{\text{Current liabilities}}$$

$$\text{The gross profit margin} = \frac{\text{gross profit}}{\text{sales}} \times 100$$

## 4.6. Pre-paid meter production:

We visited Prepaid Meter production with Engr. Mohammad Akharul Islam on 12.05.10 in Mirpur section. Prepaid meter is the most convenient and modern approach in metering system. We learned about its operations and construction. This pre paid meter is mainly produced in Mirpur section of DESCO and installed in UTTARA. There are two types of prepaid meter –

1. Smart card reader base.
2. Key pad base

The billing procedure working process is processed by a smart card which contains all the information of consumers which are saved in vending station. All the procedures are monitored by the system master station. The smart card has real clock timer and key pad card base has no real card clock timer.

The pre-paid metering system is customer-friendly. This also puts an end to the disputes between house-owners and tenants over electricity bill. A customer will be able to control his consumption to keep it within his personal budget. When consumer wants to pay their bill, at first they go to the vending station. Then they pay the bill to the system master station. This is represented by the flow diagram:

Meter → Vending station → sms (system master station)

For internal activeness a small transformer is used whose primary and secondary turns are 200 and 9 turns respectively. Atmel software is used for designing and updating the meter. It has an friendly hour and holiday hour in the time of a station process off.

## 4.7. Outsourcing Operations

Most of the major activities of commercial operation are operated by outsourced employers. In DESCO Outsourced activities of commercial operations are -

1. Collect personal meter reading.
2. Bill distribution.
3. Disconnection & Reconnection activity.
4. New meter & service drop installation.
5. Find defective/faulty meter & service them and do drop change.
6. Notice & certificate distribution.
7. Collection of consumer related data.
8. Disconnection of Illegal connection.

#### 4.8. **Data Acquisition System (DAS)**

DESCO has implemented a Data Acquisition System (DAS). It is mainly a micro controller based operation. Data Acquisition System is integrated remote terminal unit for data gathering and computer-server network, which helps to monitor the real time load status of the network and implement rational load shading. The software is developed by Bangladesh University of Engineering and Technology (BUET). The information that requires monitoring is provided by DAS. The DAS is the microprocessor based device, which converts all analog information into digital to use or display in computer. The DAS information includes transformer voltage, current, power, power factor, feeder loads, etc.

#### 4.9. **E-Governance:**

We experienced the e-governance system with Engr. Mohammad Rashid on 23.05.10 in DESCO head office of Banani. E-Governance is the most efficient and effective communication system for an organization. All information and data get transferred by a local network system. All official activities are maintained by e-governance. Status of different sections under DESCO can be monitored by this system. It is a network run by software which involves minimum manual operations. Each system is assigned a particular password. Without this password no one can access the system. The one point billing section which includes new connection or disconnection, service section and banking section everything is governed by this policy. The consumers billing system and the information of the consumer location is identified. All the nine S&D (Sales and Distribution Division)'s and all other units of DESCO is interconnected under a single network. Data from each administrative unit are transmitted to HQ using the network. The objective is to create a paperless office for quick and efficient management. All decisions on a file can be made electronically. Institute of Information and Communication Technology of BUET has been developing this system.

### 4.10. **Wireless & telecommunication and DAS communication:**

Wireless communication is necessary to communicate substation from a distant and remote place. Wireless communication requires portable hand set, repeater, and transmitter. Actually, repeater is used to communicate within 80-100km. The Repeater rating is 80-100km and handset rating is around 5w. There are the different types of channel used in base -station. When a person needs to communicate other stations, first he communicates base-station through the wireless communication set, where a fixed frequency channel is used. Then base-station transmits it to the desired stations by using another fixed frequency channel. This two way radio communication system is used to establish communication between sub-stations. Wireless communication is the more efficient and smart system than telephone and mobile communication. In the absence of telephone and other communicating method this is the most reliable and quick approach to communicate. A particular frequency band is allocated by BTRC for this purpose.

## CHAPTER 05

### 5. OPERATIONAL PERFORMANCE:

#### 5.1. Distribution System Loss:

System loss is one of the most important parameters for measuring the performance of the distribution sector. It is the percentage change in the energy sales and energy purchase. Starting from the inception, DESCO is showing constant improvement in reducing system loss. At the beginning, in the year 1998-99 the system loss was 40.61%, where as in the year 2008-09 it is reduced to 9.79%, which is the lowest among all the electricity distribution agencies of Bangladesh.



Source: Yearly Financial Progress report of Dhaka Electric Supply Company Limited to ADB.

**Figure 5.1: Year-wise Distribution System Loss of DESCO**



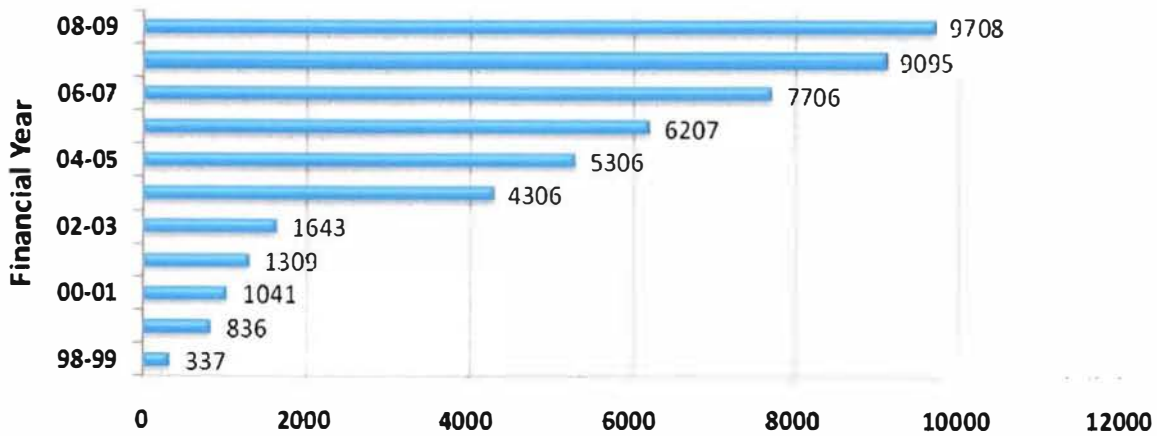
**5.2. Net Revenue/Bill Collection:**

Net-Revenue collection indicates the amount collected from the consumers against the consumed energy within a specific period, usually one month or a year. Net revenue collection does not include all other charges like VAT, surcharge, demand charge, service charge, etc.

DESCO achieved a tremendous success in revenue collection. In FY 1998-99, the collection of revenue was 337 million, where as in FY 2007-2008, the collection of revenue reached to 9095 million, which played a vital role in gaining the profit. In the 2008-09 financial years, the net collection is 9708 million, which is much higher than the last year’s net collection of bills.

Routine maintenance of distribution lines and equipments, using standard equipments and materials, regular monitoring of all the distribution lines and electricity meters have made it possible to achieve this success.

**Net Collection of Bill**



**Year-wise Net Collection of Bill (in Million Taka)**  
 Source: Yearly Financial Progress report of Dhaka Electric Supply Company Limited to ADB.

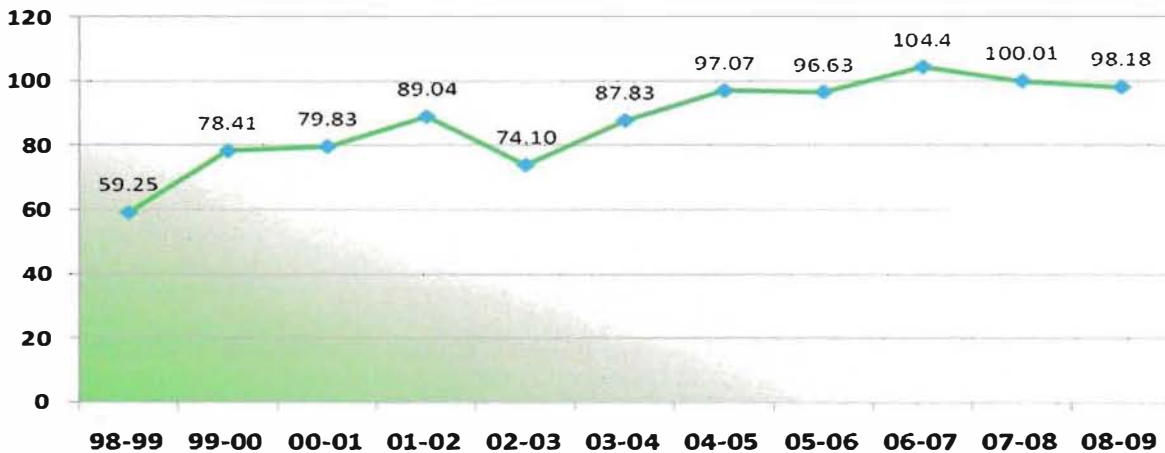
**Figure 5.2: Year-wise Net collection of Bill/Revenue**

It is to be noted that, revenue collection jumped in the year 2003. This is due to the inclusion of Gulshan, Banani, Uttara and Cantonment area in the DESCO system which was previously under DESA.

### 5.3. Bill Vs Collection:

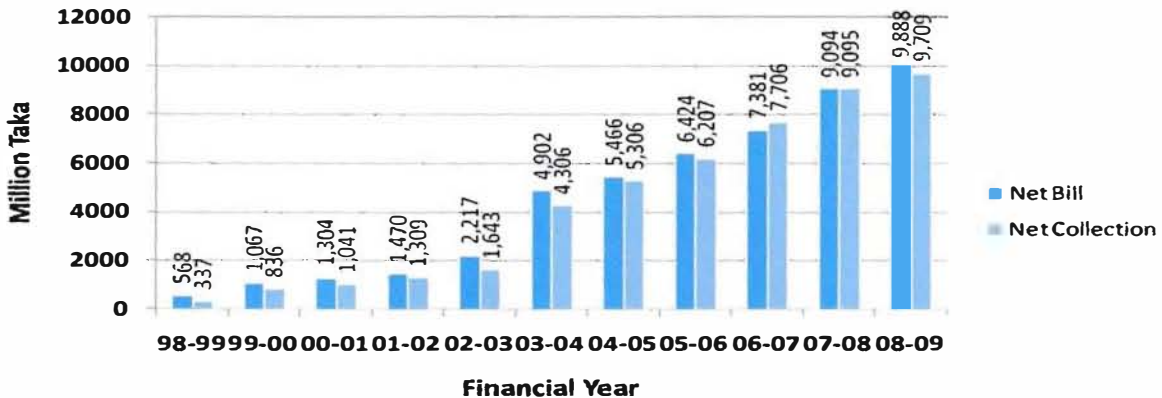
One of the major objectives of establishing DESCO was to improve the revenue/bill collection. Within seven (07) years from its inception, DESCO improved its bill collection from 59.25% to almost 100%. DESCO achieved this performance by notifying the consumers regularly regarding their dues and disconnecting the service connections for not paying the bills after receiving the notices.

**Collection/Bill (%)**



**Figure 5.3: Year-wise Collection/Bill (%)**

**Billing Vs Collection**

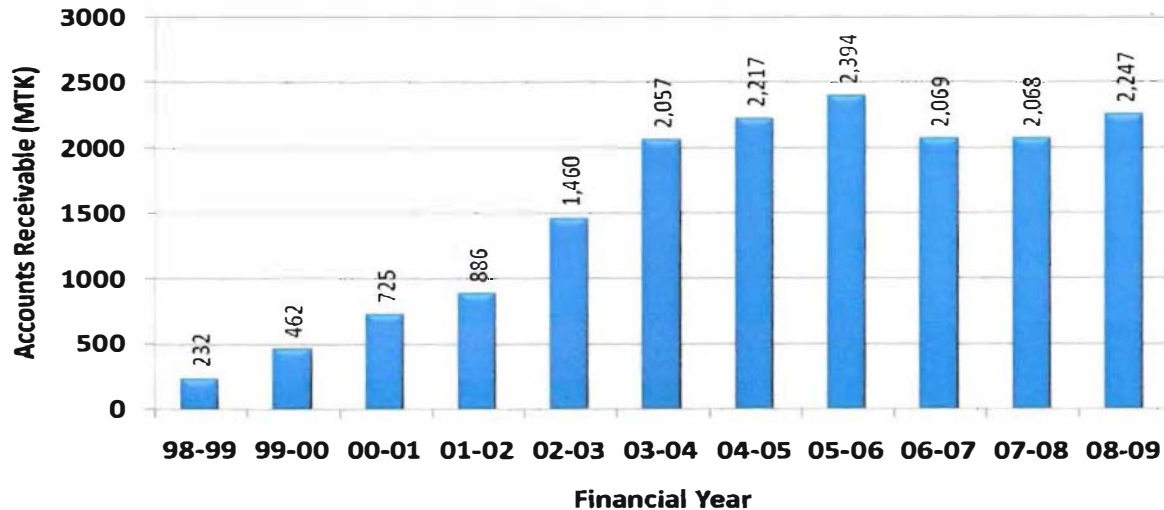


Source: Yearly Financial Progress report of Dhaka Electric Supply Company Limited to ADB.

**Figure 5.4: Year-wise Bill issue Vs Collection amount**

It is to be noted that, in the year 06-07 and 07-08 collection/bill (%) was nearly 100. This was the result of a crash program undertaken to collect the un-paid bills of the previous years.

#### 5.4. Account Receivables:



**Figure 5.5: Year-wise Account Receivables**

Usually electricity is sold using post paid billing system. At the end of a month meter reading is collected and based on the reading bill is prepared and distributed to the consumer. 15 to 20 days is required to conduct this operation. Again, one month time is given to the consumer to pay the bill. Therefore, Distribution Agency or Company receives the payment against their sales after a period of two months. As a result, in the current system, the ideal Account Receivable Equivalent Month shall be near two. From the following chart, it is very much clear that, DESCO has successfully reduced its account receivable equivalent month. However, there is scope for further improvement.

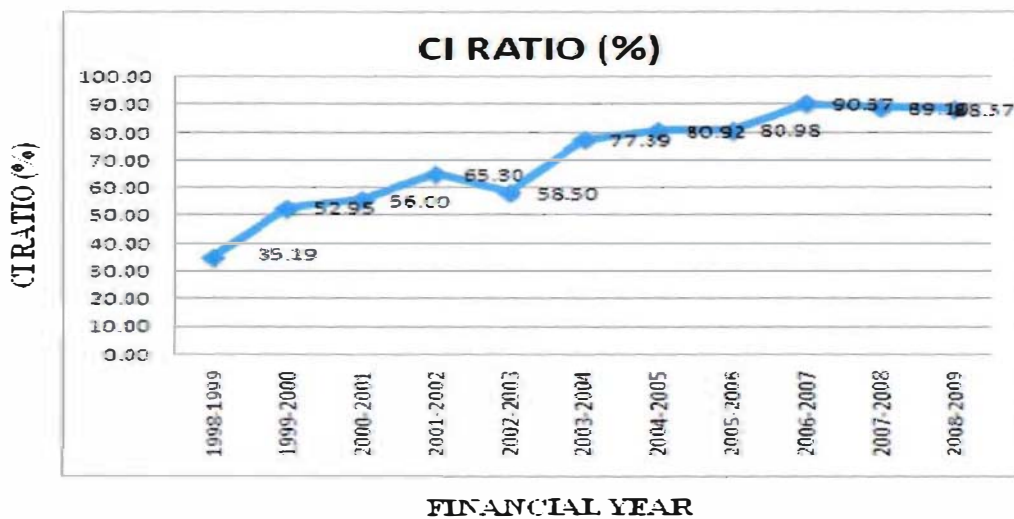


## 5.5. Collection Import (CI) Ratio:

For a specific period of time-

$$\text{Collection Import (CI) Ratio} = 100 - \left( \frac{\text{System loss in \%}}{100} \times \text{Collection in \%} \right)$$

This is the most appropriate indicator to evaluate the operational performance of an electricity distribution agency or company. It combines both the commercial and system operational indicators. Usually CI ratio over 90 is treated as very good performance. From the following chart clearly from the last three years DESCO has been maintaining a CI Ratio near 90%. This shows its satisfactory overall operational performance.

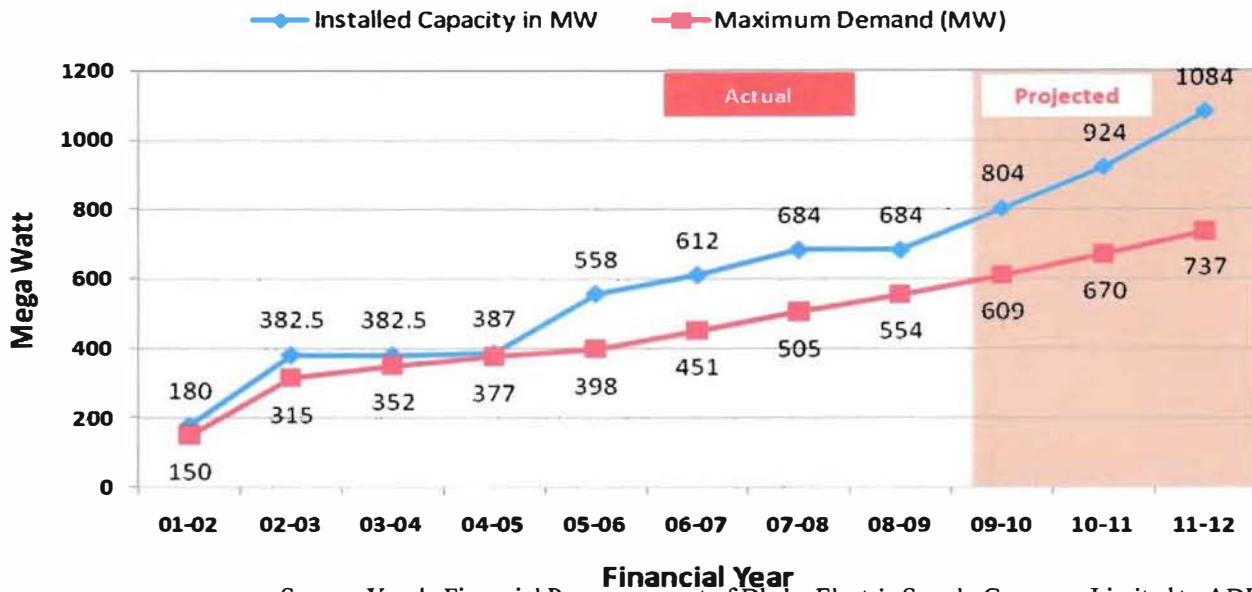


Source: Yearly Financial Progress report of Dhaka Electric Supply Company Limited to ADB.

**Figure 5.6: Year-wise Collection-Import Ratio (%)**

From the figure 5.6, we can see that, In the year 2003 the CI ratio dropped to 58.5%. This is due to the inclusion of a new area under DESCO’s jurisdiction, which had higher system loss compared to other DESCO unit.

5.6. Maximum Demand Vs Installed Capacity:



Source: Yearly Financial Progress report of Dhaka Electric Supply Company Limited to ADB.

**Figure 5.7: Year-wise Maximum Demand of Electricity and Installed Capacity of DESCO**

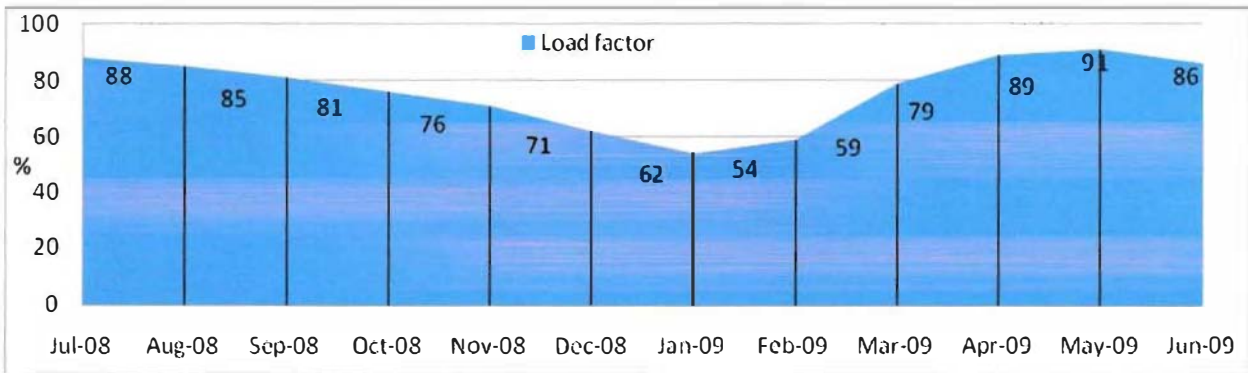
From the above chart (Figure 5.7), clearly the installed capacity of DESCO in distributing electricity is much higher than the maximum demand for electricity within its jurisdiction area. This indicates that, there is no load shedding within DESCO area for any kind of shortage in its distribution capacity.

It should be noted here that the demand is increasing at the rate of 10% annually. After implementation of the ongoing projects of DESCO in 2012, installed capacity would be 1084 MW where actual demand would be 737 MW considering the constant increment in load by 10% up to this.



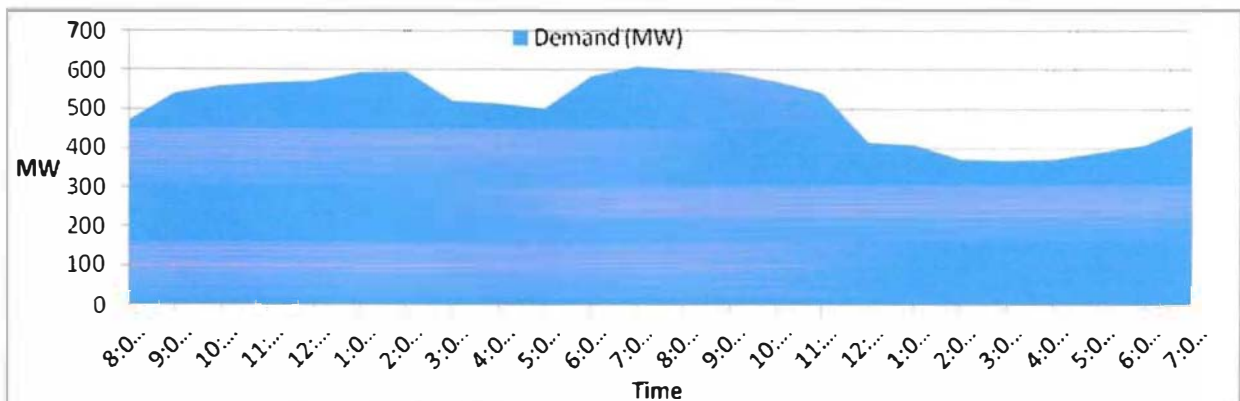
## 5.7. Demand Factor:

Demand of electricity does not remain same throughout 24 hours of a day. It also varies from season to season. From business point of view demand Factor is a vital parameter. Demand factor calculates utilization of the system. Demand factor equals the ratio of average supply of electricity to Maximum demand for that period. Greater demand factor represents the more utilization of the resources. Demand factor of DESCO in the last year was 62.53%. Load pattern of the day is maximum at evening and minimum at mid night. Depending on demand, peak hour is defined from 5 pm to 11 pm.



Source: Yearly Financial Progress report of Dhaka Electric Supply Company Limited to ADB.

**Figure 5.8: Month wise Load factor (%)**



Source: Yearly Financial Progress report of Dhaka Electric Supply Company Limited to ADB.

**Figure 5.9: Load curve of a day the high demand date (April 04, 2009)**

## CHAPTER - 06

### **6. OPERATION & MAINTENANCE OF A SUBSTATION:**

There are three major parts in a power station. These are generation, transmission and distribution. Lossless and minimum errorless distribution of power is the main purpose of power distribution. For this reason power station operation and maintenance is required. Line maintenance is also required for distribution of power. The substation authority maintains the substation regularly. The general equipments of a substation are given below:

1. The power Transformers
2. Switchgear or Circuit Breaker
3. Current Transformer and Potential Transformer
4. Isolator and Lightning Arrester or Surge Diverter
5. Auxiliary Transformer
6. Bus bar
7. Battery and Battery Charger
8. Control Relay Panel
9. Remote Terminal Unit for SCADA/ DAS
10. AC & DC Distribution Panels

We have learned maintenance of substation equipments is basically of two types. First one is schedule maintenance (preventive maintenance) and the other one is emergency or break-down maintenance.

Inspection is strongly required for uninterrupted electrical power supply. So, DESCO check up their all substation equipment regularly. Inspection of DESCO's substation equipment consists of daily inspection, weekly inspection, monthly inspection, quarterly inspection, half-yearly inspection and annual inspection.

## 6.1. Operation & maintenance of a Power Transformer:

Transformers are used for protection and for metering. There are two types of Transformer,

1. Current Transformer
2. Potential Transformer

Our supervisor discussed about the transformer. This is a passive device which transfers alternating (AC) electric energy from one circuit into another through electromagnetic induction. A power transformer is designed to change amplitude of high-frequency pulses by the turns' ratio and to provide isolation between circuits. Here we know about the fundamental theory and principles of the operation of power transformers. There are three operating control system:

1. Operation of Tap Changer
2. Operation of cooling control system
3. Operation of breaking system

The fault free operation of power transformers is a factor of major economic importance and safety in power supply utilities and industrial consumers of electricity. In this section, we only observed because this section is totally worker based. We observed test oil sample of the transformer main tank & tap the changer tank to check condition of oil gauges and oil level. We also knew about how to -

- Check oil leakage & integrity of gasket joints
- Check the tightness of nuts & bolts
- Check the insulation resistance of bushing
- Re-greasing of bearings
- Check the performance of oil temperature & winding temperature meter
- Change the oil of on-load tap changer (OLTC).
- Calculate insulation resistance between each winding and ground.
- Calculate the Dielectric Absorption Ratio-  $DAR = (I.R. \text{ of } 60 \text{ sec}) / (I.R. \text{ of } 15 \text{ sec})$

After that, our supervisor also discussed about the control system and driving mechanism of on-load tap changer (OLTC).

### 6.1.1. Protection of a Power Transformer:

DESCO always tries to keep standard protection for substation. Then they need some equipment to protect the transformer.

- Buchholz relay
- Differential relay
- Pressure relief relay
- Oil surge relay for OLTC
- Over fluctuation protection
- Earth fault protection: Stand by the earth fault or restricted earth fault
- Thermal over heating protection: Winding temperature and Oil temperature

### 6.1.2. Test of Insulating Oil of Transformer:

Regular sampling and testing of insulation oil taken from transformers is a valuable technique in a preventative maintenance program. If a proactive approach is adopted based on the condition of the transformer oil, the life of the transformer can be extended. In this section, we have learned some of the parameters of transformer oil tests and their significance.

**Dielectric strength:** The dielectric strength of insulating oil is a measure of the oils ability to withstand electrical stress without failure.

**Acidity or neutralization number:** Acids in the oil originate from oil decomposition/oxidation products. Acids can also come from external sources such as atmospheric contamination.

**Interfacial tension:** The Interfacial Tension (IFT) measures the tension at the interface between two liquids (oil and water) which do not mix and is expressed in dyne/cm. The test is sensitive to the presence of oil decay products and soluble polar contaminants from solid insulating materials. Good oil will have an interfacial tension of between 40 and 50 dynes/cm.

**Dissipation factor:** The Dissipation test measures the leakage current through oil, which is the measure of the contamination or deterioration i.e. reveals the presence of moisture resin,

varnishes or other products of oxidation oil or of foreign contaminants such as motor oil or fuel oil.

**Polychlorinated biphenyl:** Polychlorinated biphenyl's (PCB) is a synthetic transformer insulating fluid that has found its way into mineral insulating oil via cross contamination.

**Origin of gases in transformer oil:** Fault gases are caused by corona (partial discharge), thermal heating and arcing. Arcing is a fault caused by high energy discharge. The major gas produced during arcing is acetylene. Power arcing can cause temperatures of over 3000deg/C to be developed. A normally aging conservator type transformer having a CO<sub>2</sub>/CO ratio above 11 or below 3 should be regarded as perhaps indicating a fault involving cellulose provided the other gas analysis results also indicate excessive oil degradation.

## 6.2. Operation and Maintenance of Some Other Equipments:

DESCO has a long history in improving and updating the engineering in equipments technology. Except transformer DESCO uses some other equipment for their operations. In this section, we have learned operations and maintenance of those equipments which are discussed below:

### 6.2.1. Breakers:

A circuit breaker is a piece of equipment, which can.

- Make or break a circuit either manually or by remote control under normal conditions.
- Break a circuit automatically under fault conditions
- Make a circuit either manually or by remote control under fault conditions.

Following maintenances are required to increase the life time of breakers:

- Timing and Insulation resistance test
- Measurement of contact resistance
- Check SF<sub>6</sub> gas pressure and the Charging Mechanism
- Check security of couplings and pipes
- Measurement condensation temperature (Dew point) of gas



## 6.2.2. Insulator:

Our supervisor said, Construction of oil-filled transformers requires that the insulation cover the windings. For distribution transformers which are smaller and have a slighter insulation weight, resistance heating can be used. This is a method where current is injected in the windings and the resistance in the windings is heating up the insulation. The benefit is that the heating can be controlled very well, and it is energy efficient.

Maintenance of Insulator is given below:

- Check security of nuts bolts and clamps securing drive parts.
- Clean and inspect porcelain insulators.
- Check split pins in clevis and oil all clevis pins
- Clean and lubricate auxiliary switch contacts.

## 6.2.3. Lightning Arrester:

DESCO always concern to protect transformers from lightening in mishap condition, that's why Lightning Arrester is used.

## 6.2.4. Bus Bar:

Bus bars are used to carry very large current or to distribute current to multiple devices used switchgear or other equipments.

Following maintenance is required for Bus bar to reduce different kind of loses:

1. Cleaning of insulators.
2. Tightening or changing of clamps.
3. Checking of insulation resistance.

## 6.2.5. Relays:

A relay is most simply an electronically controlled switch. Switches come in all types of forms and so do relay. Devices either connected as normally open or normally closed it's provided by relay. DESCO use IDMT (Inverse definite minimum time) relay, Instantaneous relay (without time delay), Definite time relay and impedance relay. Definite time relay is used in under frequency protection, distance or impedance relay are used for 132kV and above transmission line & feeder and Pilot wire protection or line differential protection.

There are some relay panels used in 132KV & 33 KV side which are listed below:

1. Protective Relays.
2. Annunciate.
3. Control switches.
4. Energy meters.
5. Voltmeters, ammeters, power factor meter.
6. Semaphore indicator.
7. Heater.
8. Auxiliary Relays.
9. Terminal strip and Test terminal block.



### Protection of Power system:

ESCO takes proper steps to protection of a power system. The switchgear division of the company is itself a complete unit with knowledge, experience, skills as well as machineries, machining facilities and test equipment. During our internship period, we have visited some of our fabrication unit which is one of the equipped plants with power sharing machine.

Protection is required to prevent electrical failure and to continue natural operation. Switchgear fuse are used as protective devices. Functional characteristics of protective relaying are:

1. Sensitivity, Selectivity and Speed
2. Reliability

Testing are examined in the factory testing lab which is directly monitored by the quality controller, and we have done this test practically. We have also learned protection of Bus bar and feeder.

#### 1. Bus bar Protection:

Bus bar protection is required when the system protection does not cover the bus bars, or when, in order to maintain power system stability, high-speed fault clearance is necessary.

1. Bus protection by differential protection
2. Bus protection by over current relay
3. Frame leakage earth protection

Back-up protection of bus is also required:

- By distance protection from the remote end.
- By over current protection from the far end.

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## Feeder Protection:

means a connection between two circuits. Feeder can be in the form of overhead transmission lines or cable. DESCO takes following protection to protect the feeder:

1. Non directional Over current and Earth fault protection
2. Directional Over current and Earth fault protection

## Faults of the Power System:

Conceptual design of network protection schemes determines the secure and reliable supply to consumers with electricity. Network protection schemes must recognize incorrect and possible operating conditions clearly and separate the faulty equipment rapidly, safely and completely from the power system. An expansion of the fault onto other equipment and system components has to be avoided.

Classification of faults of the power system:

1. Short Circuit fault
2. Three phase fault (with or without earth)
3. Two phase fault (with or without earth)
4. Single line to ground fault
5. Open circuit fault
6. Simultaneous fault

## Different Testing Instruments and Equipments of Grid Substation:

uses several instrument and equipment to test any grid substation, which are:

1. Capsule vacuum gauge 0-50mbar
2. AVO Meter and Low Ohm Meter
3. Digital Transformer oil testing set and secondary injection set.
4. Oil centrifuging machine
5. Earth tester and Polarity tester
6. Thermometer infrared mini and Mc lead gauge.
7. Value of mille amps measuring clip on ammeter
8. Clip on ammeter, Gas burner
9. Tan delta test set, Turn ratio test set and Moisture test set for transformer oil.
10. Testing board with necessary cables' legs
11. CT  $V_k$  testing set (knee point voltage test)

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# CHAPTER - 07

## FORECASTING PROFITABILITY OF DESCO:

DESCO has done better from beginning by reducing system loss, increasing revenue, collect receivables, decrease receivables and increase profit. Standard System loss for distribution system has been fixed 7% by the technical expertise committee of ADB. For achieving the target by 2015, DESCO has taken the plan to reduce a system loss by 0.5 percent in each year and to improve its system quality and efficiency.

### Forecast with Present Demand trend (Load shedding exists):

The generation & purchase cost of electricity of BPDB is higher than their selling price. BERC is expected to increase the selling price for distribution agencies by 5 percent in each year. However, the government does not give permission to increase the tariff structure. Taking consideration the present purchase price increment and reduction plan a forecast is prepared for year 2009-10 to 2014-15. The summary of the "profit profile" and "Earnings per Share" are shown in figure 7.1 and figure 7.2.

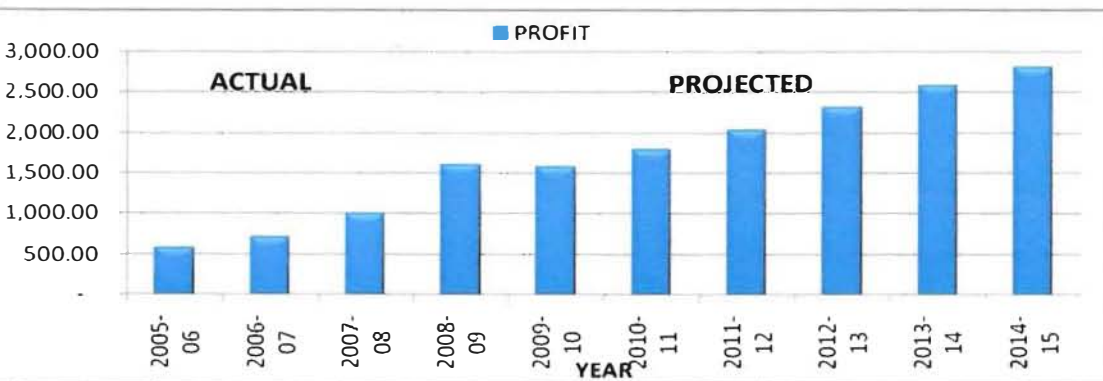


Figure 7.1: Profit profile (Actual & Forecasted)



Figure 7.2: Earnings per Share (Actual & Forecasted)

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## Assumptions and considerations for forecasting:

Some Assumptions and considerations for forecasting. Following assumptions and considerations for forecasting are mainly taken:

- Material loss will be decreasing 0.5 % in every Fiscal Year.
- Material cost will be increasing 0.5% in every Fiscal Year.
- DESCO declared new tariff structure from March-10. According to this up to date tariff structure the sales rate was increased by 3.60 % from previous Fiscal Year.
- DESCO will be targeted to decrease its account receivables 15 % per fiscal year and maintains equivalent month outstanding below 1.50.
- Percentage increase of import unit percentage in every fiscal year is 8.73 %.
- Existing 09(Nine) Sales and Distribution (S&D) divisions will be split up to 15 S&D for improving service quality and efficiency. Though the average administrative percentage was assumed that expenses will increase 300 % more. So, administrative expense percentage considered 3.15.
- In 2010, employee's salary increased 20 % than previous. And to operate new S&D, it needed 30 % more human resources than existing one. Though current employee expense percentage is 3.34, assumed that expenses will increase 50 % more. So, employee expense percentage considered 5.01.
- Current depreciation percentage is 0.41 and per annum increase rate is 0.05 %. DESCO needed to invest 1000 million taka per fiscal year for up to gradation of its existing distribution system network and improving system quality and efficiency.
- Current average interest percentage rate for ADB's long term 20-year loan is 4.53. However, DESCO targeted to pay up on 11% rate to conclude it in advance pay at 27% rate in every Fiscal Year by Power sector companies to Government.
- Current dividend payout rate is 45%. It assumed that in 2009-10 DESCO will pay out dividends at 50 % rate and then in every fiscal year increase rate will be 5%.
- Current rate for Advance income tax is 1.65 %. It assumed that it will increase the trend rate 1 % every year than the previous.
- It is shown that in every year average rate of the increase in stores and inventories is 10 %.



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DESCO planned to invest 1000 million taka per fiscal year for gradation of its existing distribution system network and improving system quality and efficiency. So, Long term assets will increase 1000 million taka in every year.

Rate of Current Liabilities items (Creditors for goods, Creditors for Expenses, Creditors for another expenses, Current maturities, Accounts Payable, Accrued expenses) increase rate maintained with average rate.

Due to up on 11% rate to conclude Long term loan from ADB in advance, Long term liabilities will decrease in every Fiscal Year.

### **Difficulties with Load shedding:**

In recent few years, the insufficient generation of electricity is the main difficulty for the power of Bangladesh. Every summer Bangladesh faced huge load shedding problem. In the year registered maximum demand was 6271 MW at a peak hour and recorded maximum electricity production was around 4500MW, which was the highest of any time in the country. However, still this was not sufficient for demand. This indicated that there is always at least 1771 Megawatts short of electricity at the peak period.

DESCO has no generation facility. It receives power from BPDB through PGCB. So, load shedding situation affects its business very badly. In 2009, Maximum demand at the peak period was 737MW. Against such demand got the highest supply only 479 MW (65% of demand) and recorded highest load shedding was 259MW. In 2009 DESCO imported 2,742.96 million units' electricity for distribution but necessity was 3702.96 million. Due to high supply shortage in the summer season, DESCO lose 960 million units to sell in 2009.

Another important difficulty is System loss. DESCO is trying hard to reduce the system loss and has already reduced it significantly. Standard system loss for distribution system has been fixed by the technical expertise committee of ADB. Allowable System Loss in different steps of distribution is shown in the table 7.2.

	Process done	Allowable System loss
11 KV to 11KV	Through Power Transformer	0.25%
11 KV transmission	11 KV conductor	2.25%
11 KV to 0.415 KV	Through distribution Transformer	2.50%
0.415 KV or LT Line	Through LT lines & Service wire	2.00 %
	Total	7.00%

**Table 7.1: Allowable System Loss in different steps of distribution**

Fiscal Year (2008-2009) DESCO's system loss was 9.79 percent. It is come down gradually from 12.7% to only 9.79% by eight years. First two years it was reduced 7% and 8%. After that it reduced slowly.

### **Forecast with No Load shedding:**

Unit price of BPDB from different Independent Power plant (IPP) is different. The rate of unit cost of electricity varies from Taka 12.64 to Taka 2.42. Among them AES, Haripur CC and Meghnaghat CC shows the average unit rate Taka 2.73 to Taka 2.79 but purchase agreement with all the small gas based plant shows the average unit rate Taka 4.41 to Taka 4.30. Government is processing to set up 1000 MW power plants based on heavy oil fuel (12.64 Tk. per unit cost) and giving the subsidiary more than 20 Billion taka in power generation. So, DESCO is planning to set power purchase rate at 3.025 Taka per unit.

Strategic planning for DESCO to take the advantage of no load shedding condition but power purchase rate will be –

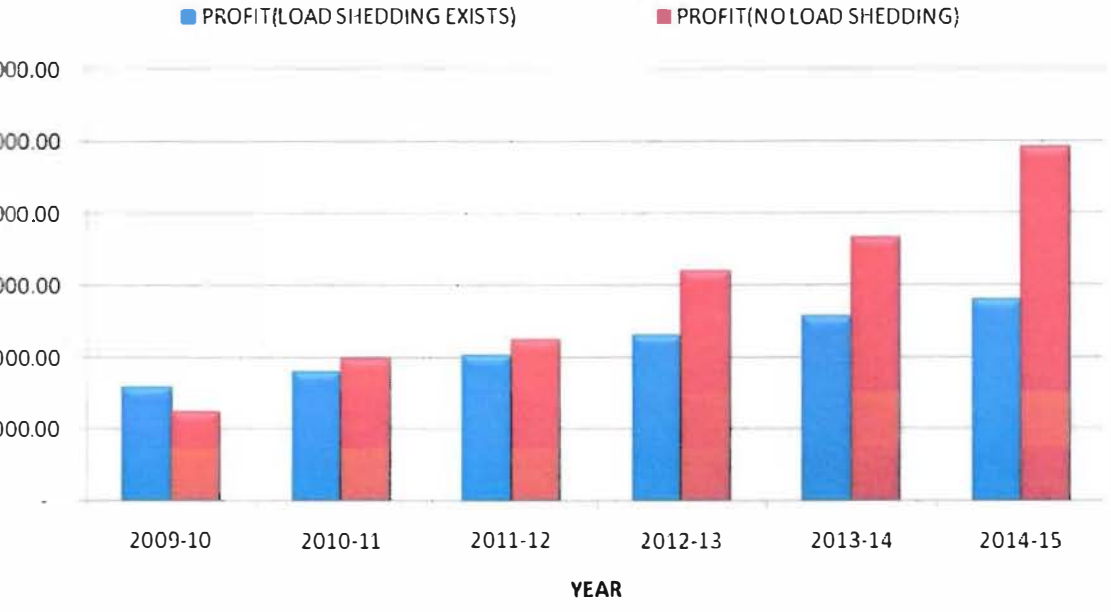
To reduce the system loss to 7.00 % within the year 2011 and maintain it.

To protect power pilfering, it should invest extensively to underground the cable network and install digital metering system in all consumer premises. These will cost more than 4000 million taka. So, first year it will invest 2000 million taka and then afterwards 1000 million taka for these purposes.

Install Pre-paid metering system extensively to achieve revenue collected before the consumer use the power; this will maintain account receivables below 1.00 equivalent months outstanding. This will cost more than 2000 million taka, because the cost of

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more 420 thousand prepaid meters to its consumer premises. According to consumer growth trend then after every year it needed to invest 500 million taka for prepaid metering system. So, first year it will invest 2000 million taka and then afterwards 500 million taka.

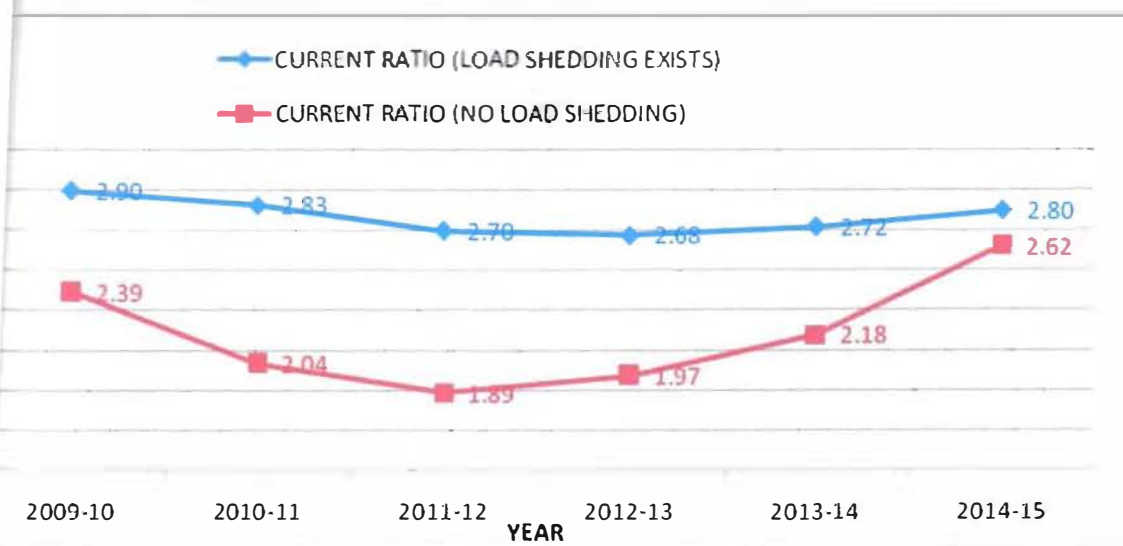


**Figure 7.3: Profit (Net Income after Tax) difference between forecasted Load shedding existence condition and No Load shedding condition**

The above graph (Figure 7.3) of Net Income after Tax also called as Profit profile, it is stated that first year due to excessive investment in long term assets and split up of new assets to improve performance. Net income of no shedding condition decreases than load shedding existence condition, but the benefit returns just immediate year and profit increases significantly.

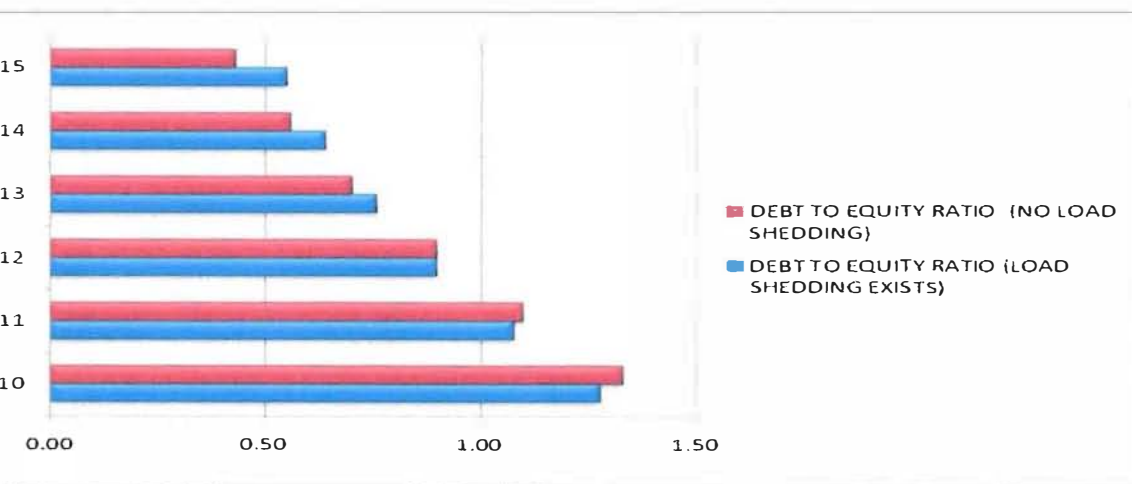


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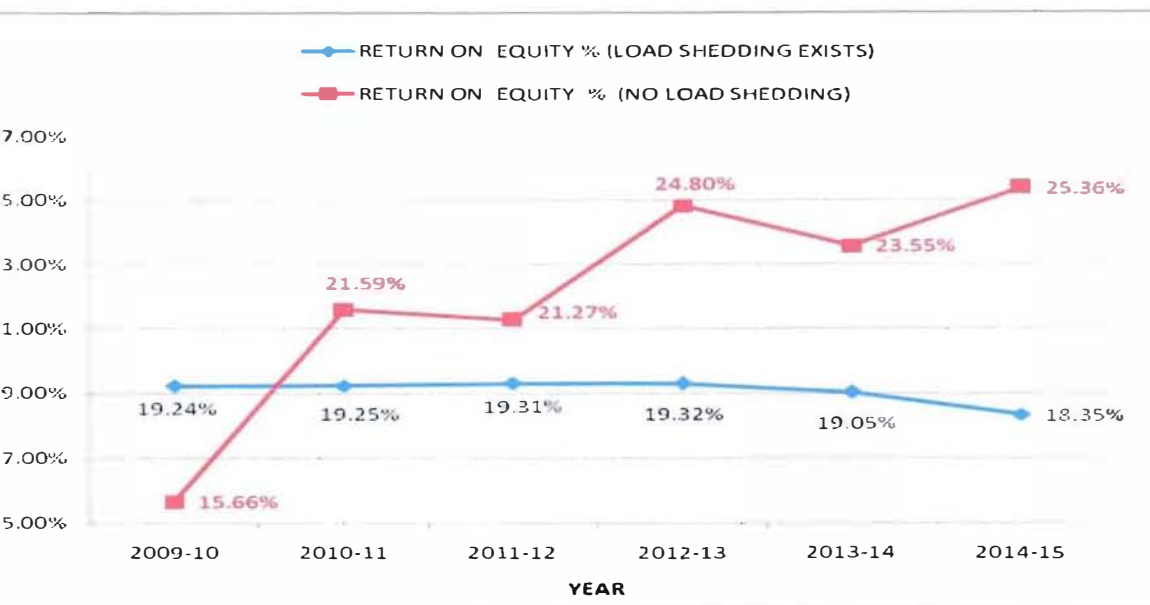
**Figure 7.4: Current Ratio difference between forecasted Load shedding existence condition and No Load shedding condition**

graph of the current ratio (Figure 7.4), it demonstrated that, due to excessive invest in term asset current ratio for no load shedding condition falls behind and decreasing from shedding existence condition, but the benefit of improved system efficiency returns the tly increasing the current ratio of no load shedding from 2012-13 at improving it higher te. It is noted here that to judge the financial solvency of a company, the current ratio 2: 1.



**Figure 7.5: Debt to Equity Ratio difference between forecasted Load shedding existence condition and No Load shedding condition**

The above graph (Figure 7.5) of Debt to Equity ratio, it demonstrated that, as retained earnings increases significantly due to superior efficiency and performance of the system and D will pay back its long term ADB's loan on higher rate of expenses. Long term debt ratio decreases. It is noted here that to judge the financial solvency of a company, the debt to equity ratio should be less than 0.5. In load shedding existence condition it is not successfully maintained in targeted 2014-15 year, but in case of no load shedding condition it is successfully maintained in targeted 2014-15 year.



**Figure 7.6: Return on Equity difference between forecasted Load shedding existence condition and No Load shedding condition**

From the above graph (Figure 7.6) of Return on Equity percentage, it demonstrated that, as shareholder's equity increases significantly by higher earnings from retained earnings due to superior efficiency and performance of the system, also net income increases more significantly due to the effect of the effective and efficient distribution network system due to no load shedding. The prepaid metering system earned the revenue more promptly and huge reduction from the elimination of power pilferage generates more net incomes. It is noted here that, the return on equity percentage should be greater than 15% to judge the financial solvency of a company, and D is successfully maintaining it.

# CHAPTER - 08

## FUTURE PLANNING AND DEVELOPMENT

We learnt about planning and development of DESCO from S&D Division, DESCO H/Q. Engr. Md. Zulfiqar Tahmid Manager, (SE&D) was our coordinator. 23<sup>rd</sup> May 2010, 9:00am to 11:00am, we were in S&D Division, DESCO H/Q. Engr. Md. Zulfiqar Tahmid showed us their current activities, major project and future plan in a power point slide. He gave us a brief idea about distribution planning, line construction and relevant issues.

### **Survey of Existing Systems**

We heard that DESCO does survey on different types of existing systems and below we mentioned the various types of surveys done by the DESCO.

Distribution Line Equipment Survey

Survey of Distribution Sub-stations

Survey of 33/11 kV Sub-stations Compilation on Maps

### **Survey of Loads**

People who we worked with DESCO, did survey on the loads (data) of all 11kV feeders. They determined the present load of 33/11kV sub-stations and maximum demands for the last 10 years from the sub-stations log book. From the survey, DESCO estimated a future demand of loads or establishments in a particular area.

### **Planning Of 33/11 KV Substations**

Following criteria's are required FOR PLANNING OF 33/11KV S/S:

Existing capacity and firm capacity of Sub-stations

Shifting of load from over loaded existing Sub-station on adjacent existing / proposed Sub-station.

Addition or replacement of the transformer for increasing S/S capacity.

Depending on Load forecast up to next 10 years. Location of proposed new S/S, if required, considering the load centre, available 33 KV source.

Modification or extension of control room building, equipment foundation, and cable trenches, etc.

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### On Going Planning

are some ongoing plans of DESCO which we have gained some knowledge about. They

- Installation/rehabilitation of 33/11 KV substations
- 33 KV network planning for 33/11 KV substations
- 11 KV underground line planning for feeders and switching stations.
- Purbachal new town project.
- Uttara 3<sup>rd</sup> phase project, Etc.

plans are still waiting for DESCO's final approval.

### On Going Projects

are many projects was approved by DESCO.

- Strengthening DESCO'S ELECTRIC distribution network - 2. ST
- Upgrading and expanding distribution system in GULSHAN circle

#### 1. Purbachal New Town Project

- DESCO has to forecast the load of Purbachal.
- DESCO has collected materials for construction of the line and appointed contractor for that.
- RAJUK has allotted required lands for DESCO to construct Sub-Station for supplying power.
- DESCO has prepared the staking sheet and planned the required substation.



## Chapter – 09

### **CONCLUSION:**

Power sector of Bangladesh has to go for a long way in the future. Developing country even neighboring countries' position is far better than us. For achieving the target government has some initiatives to increase the generation of electricity. As the power sector is a capital-intensive industry, huge investment will be required for addition generation capacity. Public is not in a position to secure this huge investment for power generation. Recognizing these Government of Bangladesh modified its industrial policy to enable private investment in power sector and Private Sector Power Generation Policy was framed in 1996 for promoting private sector participation in the generation of electricity.

One of the most important problem of the power sector was the shortage of the fund. BPDB generates electricity, purchases electricity for IPP, sells them to the distribution organization and some consumers directly. However, they could not sales of the standard amount due to high system losses and not to collect sale revenue which they could be a sale because of poor management. In few years of its commencement, in the year 2010 DESCO is the most profitable utility provider of Bangladesh with the net profit of Taka 2140 million (2008-09). Providing electricity to all the citizens is a Constitutional obligation for the Government of Bangladesh. By running its operations in the efficient and effective manner, incorporating new ideas in providing better consumer service, DESCO has become the role model for all the electricity service providers of Bangladesh. However, the service quality is far behind the world standard. A change in the Management's view, employee mindset, MIS structure, etc. is required to make it a world class company.

## APPENDIX A (ACRONYMS)

ADB	Asian Development Bank
BPDB	Bangladesh Power Development Board
DESA	Dhaka Electric Supply Authority
DPDC	Dhaka Power Distribution Company
DESCO	Dhaka Electric Supply Company Ltd.
GDP	Gross Domestic Product
GOB	Government of Bangladesh
GWh	Giga Watt hour
IPP	Independent Power Producer
0.KWh	Kilo-Watt-Hour
1.KV	Kilo-Volt
2.MKWH	Million Kilo-Watt-Hours
3.MTk.	<i>Million Taka</i>
4.MW	Mega Watt
5.OLTC	<i>On-Load tap changer</i>
6.PBS	Palli Biddut Samity
7.REB	<i>Rural Electrification Board</i>
8.S&D	<i>Sales and Distribution</i>

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