STUDY ON DETERMINATION OF ELECTRICITY DISTRIBUTION COST OF COMILLA PBS-2

A Thesis submitted in partial fulfillment of the requirements for the Award of Degree of Bachelor of Science in Electrical and Electronic Engineering

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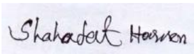
Certification

This is to certify that this thesis entitled "**STUDY ON DETERMINATION OF ELECTRICITY DISTRIBUTION COST OF COMILLA PBS-2**" is done by the following students under my direct supervision and this work has been carried out by them in the laboratories of the Department of Electrical and Electronic Engineering under the Faculty of Engineering of Daffodil International University in partial fulfillment of the requirements for the degree of Bachelor of Science in Electrical and Electronic Engineering. The presentation of the work was held on February 2018.

Candidate Signature



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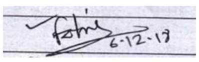

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The Thesis entitled **"STUDY ON DETERMINATION OF ELECTRICITY DISTRIBUTION COST OF COMILLA PBS-2"** submitted by **Md.Shahadat Hossen Patwary, ID No: 131-33-1349**Session: Spring 2013 has been accepted as satisfactory in some fulfillment of the demand for the degree of **Bachelor of Science in Electrical and Electronic Engineering** .

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Dedicated to

My Parents

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LIST OF ABBREVIATION

BERC	Bnagladesh Energy Regulatory Commission
BREB	Bangladesh Rural Electrification Board
PBS	Palli Bidyut Samity
CPBS	Comilla Palli Bidyut Samity
MU	Million Unit
MTk	Million Taka
PGCB	Power Grid Companyof Bangladesh
BPDB	Bangladesh Power Development Board
KVA	Kilovolt-Amperes
PF	Power Factor Improvement
DPDC	Dhaka Power Distribution Company
EC	Energy Cost
OM	Operating & Maintenance Expense
CSE	Consumer Selling Expense
AGE	Administrative & General Expense
DAE	Depreciation & Amortization Expense
TE	Tax Expense
IE	Interest Expense
SL	System Loss

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ABSTRACT

Lack of electricity is one of main problem in developing countries.Palli bidyut samity started its electricity distribution on behind the concept of "No profit No loss". In this book discussed about cost of a PBS, how to find, with example. Any time people knows about the PBS which in loss or profit and how it and its help the future take decision about electricity. In this paper Comilla PBS-2 is taken as my standard PBS for calculation of 2015-2016 fiscal year distribution cost. Using a cross-sectional survey conducted in PBS data,bo this paper studies the determination of energy cost in Comilla PBS-2. This study finds that revenue, power factor penalty, distribution cost, supply cost, surplus in Comilla PBS-2.For example, 2015-2016 years in Comilla PBS-2 29.006crore taka loss. And total distribution cost is 51.58 crore taka & total supply cost is 244.434crore taka.This paper also finds that how much system loss occur is a year & why much system loss occur in rural electrification. Finally, we know how much revenue loss in a year, system loss per unit, distribution cost per unit, supply cost per unit.

CHAPTER 1
INTRODUCTION

1.1 Introduction

Rural electrification is a system which is of bringing electrical power to remote industrial areas. Electricity is not only for lighting and also use for different purpose as like industry household, hospitals etc.But rural areas are mainly used renewable energy.PBS electrification supply for household with single line and industry use three phase.REB distribute the electricity over 40 years old and support from the government. Consumer and consulting partner are so much help this program to continue.

1.2 BREB

Rural Electrification with ordinance1997 and its name of Rural Electrification Board. Which was helping the for improving agricultural production and enhancing socio-economic.

Development plans of Bangladesh has identified rural electrification as one of the major components of overall infrastructure, implementation of which, it is held, can accelerate the pace of economic growth, employment generation, alleviation of poverty and improve living standard. A well planned and organizational rural electrification program was however, not existed till 1970s. The electrification program as carried out by the Bangladesh Power Development Board (BPDB) was mainly limited to urban centers and at best to their peripheries. At that time, the Government of Bangladesh engaged two consulting firms of USA to carry out a comprehensive feasibility study on rural electrification in Bangladesh. The firms studied all related issues in depth and put forward recommendation towards a sustainable and viable rural electrification program. In addition to the new institutional framework, the study emphasized for Area Coverage and Co-operative concept. It is against this backdrop, Rural Electrification (REB) was created by the Government of Bangladesh (GOB) in late 1970's through REB ordinance LI of 1977. The Board is a statutory Government organization primarily responsible for implementing countrywide rural electrification. The Board is a statutory Government organization primarily responsible for implementing countrywide rural electrification.

Today there are 78 operating rural electric cooperatives called Palli Bidyuit Samity (PBS), which bring service to approximately 1,66,16,789 new connection being made and more than 3,19,708kms of line has been constructed. Central to the PBS system, the area coverage concept generally comprises 5-10 thanas having a geographical area ranging between 1500-2000 sq. km. For each PBS load forecast is made for the next 20 years based on detailed study and accordingly load centers are set up in order to identify the location of the distribution Sub-Stations. The cost of the distribution system is given on a thirty three years term loan to the PBSs with first eight years as grace period with an interest rate of 3% per year. To maximize consumer welfare, the PBSs operate on the financial principle of "No-loss & No-profit" basis.

1.2.1 Rural Electrification Board at A Glance (As on June' 2016)

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Table 1.1: The main features of rural electrification in Bangladesh as on October, 2016

Website	www.reb.gov.bd
Number of PBSs organized	78
Number of PBSs operating commercially	78
Number of district under the program	61
Number of Up-Zillas under the program	453
Number of villages electrified	68,049
Total distribution line constructed	3,19,708 Km
Total distribution line energized	3,03,464 Km
Total 33/11 KV sub-stations constructed and commissioned	765 (589 Constructed by BREB, 87 Constructed by Private, 89 taken over from PDB/DPDC/OTHERS)
Installed Capacity of Sub-stations	8150 MVA
Total number of consumers	1,66,16,789
Total number of irrigation pumps connected	1,95,945
System Loss	11.99% (cumulative),10.57% (Oct'2016)

Table 1.2: Category wise connection

Domestic	13,866,977
Commercial	1,106,381
Char Inst.	207,280
Irrigation	220,292
General Power	1,50,969
Large Power	4,969
Street Light	15,110
Solar	14,128
Total	**15,586,106**

1.2.2 Future Plans

According to the 1991 census, number of villages in Bangladesh is 86038, out of which about75000 villages have been planned to be brought under RE programmer. Remaining villages constitute the areas presently covered by BPDB/DESA and the Chittagong Hill Tract Districts where RE programmer has not yet been considered for implementation.

It is the ultimate goal to bring all the villages of Bangladesh under electrification by the year2020. Under the RE programmer, which started in 1980, about 45% villages have already been brought under electrification by 2005. The mid-term plan is to cover further 20% villages by2005 and remaining villages to be covered by 2020 under the long term-plan.The number of approved PBSs up to December, 2006 is 70 which covers more than 90% of effective area for rural electrification. This number is expected to rise up to 72 during the midterm plan period and up to 75 during the long-term plan period by re-organizing/re-structuring the existing PBSs and by inclusion of new areas taken over from BPDB/DESA.

Description	1980-2008 (28 years)	2009- June,2016 (7 years)	Plan for 2021
Consumer	74,00,000	82,00,000	2,30,00,000
Line (Km)	2,17,000	98,000	4,40,000
Sub-station (MVA)	4,650	3,296	15,000
Electricity Supply(MW)	2,025	4,388	9,200
System Loss	15.65%	12.48%	9%

Table 1.3 Future Plan

1.3 PBS (Pally Bidyut Samity)

The PalliBidyutSamity (PBS), a rural electric society, is the creation of the Bangladesh Rural Electric Board (REB). The PBS has proven to be a very effective means of organizing prospective consumers into formal groups for the purpose of providing electric service. The PBS is governed by a local board of directors, elected by the consumer members of the PBS. However, the PBS is subject to the regulation of REB. The REB initially finances and carries aut the construction of power facilities in the PBS service area. The power 17 facilities are turned over to the PBS by REB and a debt transfer is made from REB to PBS. PBS personnel are trained in advance of their assuming responsibility for the management and operation of the electric plant facilities. The PBS relies on REB to audit, inspect, and monitor the operations af the PBS. In addition, REB provides technical assistance and continued training to PBS personnel, and assures that REB standards are met. The PBS systems already in operation are monitored closely by REB to assure that REB standards are met

. It appears that as the PBS gains experience and provides evidence to REB of its ability to operate effectively, REB gives the PBS more autonomy. The PBS systems presently in operation are at different stages of development and the newer ones require that REB exercise closer control and provide more training, support and advice, and technical assistance than to the older PBS's.

1.3.1 Comilla PBS-2

Since its inception in 1992, Comilla Palli Bidyut Samity-2 is playing a vital role in Agricultural, Industrial and Socio-Economic Development of Comilla District. The Rural Electrification Program conducted by Comilla Palli Bidyut Samity-2 has acted a leap-forward in the development of socio-economic structure of rural areas in Comilla District as well as entire Bangladesh. If has significant and sustained impact on agricultural growth, industrialization and business & commercial activities in the rural areas. It is a consumer owned entity organized on the basic principles of Co-operative for distribution of electric power to its members and operates on No Loss - No Profit basis for the mutual benefits of all its Members.

Table 1.4Here some information of Comilla PBS-2

Website	Ww.Comillapbs2.Org
Date Of Registration	1992
Date Of Energization	April 1,1994
Area	2373 Sq. Km
No. Of Upazila	06
No. Of Union	76
No. Of Zonal Office	04
No. Of Area Office	02
No. Of Complain Centre	8
No. Of Control Room	01
Total Consumer Connected	227707
Category Wise Connections (A) Domestic (B) Commercial (C) Charitable Institution (D) Irrigation (E) General Power (F) Large Power (G) 33kv (H) Street Light	 205841 13184 3614 3001 1958 80 0 29
Improvement Of Power Factor	0.95
No. Of Sub-Station (33/11 Kv) Active	25
Average Revenue (Per Unit)	TK. 0.223*
Average Cost (Per Unit)	Tk. 3.462*
OPERATING MARGIN (Up To Jun,16)	TK. 94121451.21
SYSTEM LOSS (As Per Billing Meter) THIS MONTH (JUN, 16) YEAR TO DATE (2015-16)	 24.44% 14.75%

1.4 Social and Economic Benefits of Rural Electrification

.It prepared for undevelopment areas.

- Minimize separation through communication.
- Improve safety on the road.
- Raise hospital and healthcare by electrifying remote rural areas.
- Minimize the people cost of candles and kerosene .
- Improve productivity, through the use of electricity .

1.5 Objective

The scope of this study is the realize the costs of electricity with power transfer is a new term.We also realize the PBS loss in different way and it reduce properly.we calculate the electricity different item and fixed with them.

CHAPTER 2
LITERATURE REVIEW

2.1 Introduction

The energy problems of the developing world are both serious and widespread. Lack of access to sufficient and sustainable supplies of energy affects as much as 90% of the population of many developing countries. Some 2 billion people are without electricity; a similar number remain dependent on fuels such as animal dung, crop residues, wood, and charcoal to cook their daily meals. Without efficient, clean energy, people are undermined in their efforts to engage effectively in productive activities or to improve their quality of life. Developing countries are facing two crucial and related problems in the energy sector. The first is the widespread inefficient production and use of traditional energy sources, such as fuel wood and agricultural residues, which pose economic, environmental, and health threats. The second is the highly uneven distribution and use of modern energy sources, such as electricity, petroleum products, and liquefied or compressed natural gas, which pose important issues of economics, equity, and quality of life. To address these problems, this paper evaluates some successful programs and recommends that governments support market-oriented approaches that make the energy market equally accessible and attractive to local investors, communities, and consumers. Such approaches ideally improve access to energy for rural and poor people by revising energy pricing and by making the first costs of the transition to modern and more sustainable uses of energy more affordable.

2.2 There Are Some Research Paper Analysis about Rural Electrification

Shahidur R Khandakar& Douglas F. barners&HussainSamad says that, Lack of access to electricity is one of the major impediments to growth and development of the rural economies in developing countries. That is why access to modern energy, in particular to electricity, has been one of the priority themes of the World Bank and other development organizations. Using a cross-sectional survey conducted in 2005 of some 20,000 households in rural Bangladesh, this paper studies the welfare impacts of households' grid connectivity. Based on rigorous econometric estimation techniques, this study finds that grid electrification has significant positive impacts on households' income, expenditure, and educational outcomes. For example, the gain in total income due to electrification can be as much as 30 percent and as low as 9 percent. Benefits go up steadily as household exposure to grid electrification (measured by duration) increases and eventually reach a plateau. This paper also finds that rich households benefit more from electrification than poor households. Finally, estimates also show that income benefits of electrification on an average exceed cost by a wide margin [1].

World Bank Says That, Energy poverty is a well-established concept among energy and development specialists. International development organizations frequently cite energy-poverty alleviation as a necessary condition to reduce income poverty. Several approaches used to measure energy poverty over the past 20 years have defined the energy poverty line as the minimum quantity of physical energy needed to perform such basic tasks as cooking and lighting [2].

Gerald Foley (Volume 20, Issue 2, February 1992, Pages 145-152) says that, rural electrification does not cause development. Electricity is a derived demand occurring only when an area has reached a certain economic level. This has important consequences for the choice of areas for electrification. Rural electrification subsidies are generally excessive and tariffs need to be greatly increased [3].

Tania Urmee& David Harries & August SchlapferSaya That, to understand the causes of this slow progress, a literatures review on renewable rural electrification programs was undertaken. Renewable energy (RE) systems represent the most environmentally friendly and cost-effective means of providing electricity to those living in rural communities or regions in developing countries, however, this has been relatively slow and in many countries the proportion of the rural population supplied with electricity remains low and the proportion supplied with electricity from renewable energy systems is even lower [4].

NjeriWamukonya& Mark Davis (Volume 5, Issue 3, September 2001, Pages 5-13) says that, despite a large body of literature on the impacts of grid electrification, very few studies have compared the relative socio-economic impacts of these two technical approaches [5].

AkankshaChaurey& Tara Chandra Kandpal (Volume 14, Issue 8, October 2010, Pages 2266–2278) says That, The challenges of providing electricity to rural households are manifold.

Ever increasing demand–supply gap, crumbling electricity transmission and distribution infrastructure, high cost of delivered electricity are a few of these. Use of renewable energy technologies for meeting basic energy needs of rural communities has been promoted by the Governments world over for many Decades [6].

Charles MoongaHaanyika (Volume 34, Issue 17, November 2006, Pages 2977–2993) says That, Some of the problems that have besieged rural electrification in most developing countries include inadequate policies, weak institutional frameworks and limited financing. In the last two Decades, governments in developing countries have been making various efforts both at the policy level and in financing to facilitate increased levels of rural electrification. However, the introduction of market-based reforms in the power sector in the last Decade has affected the institutional and financing arrangements for rural electrification. The reforms have also affected the rate of electrification and affordability of electricity [7].

Elisabeth Ilskog&BjörnKjellström (Volume 36, Issue 7, July 2008, Pages 2674–2684) says That, Increasing the current low level of access to electricity in developing countries is important for economic development and poverty eradication. Encouraging the involvement of new actors for implementation of rural electrification projects is a relatively new policy. At the same time, it is required that the projects contribute to sustainable development. It is therefore of interest to investigate whether, for instance, private sector involvement can contribute more to some aspects of sustainability than the conventional approach where rural electrification is the responsibility of a government utility. It seems that so far no studies have addressed this issue [8].

Peter Muldera& Jonas Tembeb (Volume 36, Issue 8, August 2008, Pages 2785–2794) Says That, Electricity is universally recognized as a necessary, although not sufficient, requirement for social and economic development. However, increasing access to electricity in developing countries has proven to be difficult and expensive, particularly in rural areas. In this article, we analyze the dynamics of the relationship between electricity and socio-economic development by means of a cost–benefit analysis of a typical rural electrification project, assessing the impact of electricity on households, education, agro-business, commerce, and the public sector [9].

S.S. Hosseiny& M. Saakes& M. Wessling (Volume 13, Issue 8, August 2011, Pages 751–754) says that, the earlier research on electricity supply to rural areas has tended to address the technical and financial performance of both grid connected and Decentralized power systems and the socio-economic impact of electrification. However, this study has chosen to examine the impact of the developments and trends on the approach to rural electrification and its implications for developing countries in particular. In most cases government subsidies were needed to make rural electrification programs feasible. In many industrialized countries, and some developing countries, separate organizations were made responsible for the implementation of these programs. These organizations have met with varying degrees of success in reaching customers. In particular small-scale private rural utilities have seldom proved to be successful [10].

CHAPTER 3
SOCIO-ECONOMIC IMPACT

3.1 Introduction

The Bangladesh Rural Electrification (RE) Program was founded with a Presidential Ordinance in October 1977 that established the Rural Electrification Board (REB) as the semi-autonomous government agency reporting to the Ministry of Energy and Mineral Resources, which was responsible for electrifying rural Bangladesh. A USAID-funded Feasibility Study in 1976 provided options for the development of the program and Decisions were taken at that time to development the program using the rural electric cooperative concept that had been successfully used to electrify rural America. Since its inception, the purpose of the program has been to use electricity as a means of creating opportunities for improving agricultural production and enhancing socio-economic development in the rural areas, whereby there would be improvements in the standard of living and quality of life for the rural people.

Enormous changes have occurred in areas all across rural Bangladesh due to people having access to electricity. The magnitude of changes and the impact of the RE Program is vast and diversified and information documenting these have become more acute in recent years. All stakeholders, particularly the Government of Bangladesh and the development partners need documentation that supports the large funding requirements that are needed to expand the program further. Given these circumstances, Decisions were taken to have this "Economic and Social Impact Evaluation Study of the Bangladesh Rural Electrification Program" completed under the USAID-funded Rural Power for Poverty Reduction (RPPR) Program that was being implemented by NRECA International Ltd. in partnership with USAID and REB. This Study was begun in March 2002 with the selection of the Human Development Research Centre (HDRC), an established Bangladeshi consulting firm working under the leadership of Dr. Abul Barkat of Dhaka University. This Report is a result of that effort and provides an enormous amount of information about direct and indirect impacts of electricity, as well as the related impacts on other rural development programs and projects.

3.2 Impacts in Different sector

3.2.1 Household Level

In terms of both overall (age 7 years and above) and adult (age 15 years and above) literacy, the rates are higher in the HE compared to those in the WE-EV and WE-NEV. The overall literacy rates in HE, WE-EV and WE-NEV are 70.8%, 54.3%, and 56.4% respectively. The respective adult literacy rates are 73.2%, 54.9%, and 57.3% (Figure 4.4). The impact of electricity on literacy and quality education is analyzed in Section 4.4.1. The respondents in the electrified households (HE) reported higher awareness about crucial public health issues than the two other categories of HHs. Awareness about at least ten out of the total of 20 public health issues was reported by 78% respondents in HE, 31% in WE-EV and 25% in WE-NEV (Figure 4.5). Not only health awareness, but also in terms of health practices the HE were reported to be in a better-off situation. Such practices include treatment while sick by medically competent persons, child delivery attended by trained persons, use of medically competent persons for ANC and PNC check-ups and maternal morbidity, use of family planning methods, child immunization, and use of vitamin-A capsules to prevent night blindness. All these health related vital quality of life and human development aspects along with electricity's role in those have been analyzed in Section 4.2.2. Women in the electrified households were found more empowered than those in the two other sample categories (WE-EV and WENEV). Such enhanced empowerment were evident in the following aspects: independence in spending, spatial mobility, andparticipation in household Decision-making.

3.2.2 Cultural Impact

Electricity enlightens people. Human development as a condition of enlarging people's opportunities and choices is not possible without provisioning the benefits of electricity to mass people. Electricity's role in influencing economic life of people has been evident and discussed in Section 4.3. Electricity impacts upon social and cultural development of individuals, families, and community at large. This impact is mediated through various intervening channels such as knowledge building and behavioral changes through TV viewing, radio listening, extended lighting hours etc. The changes in economic life (on income, employment, expenditure, savings, credit, asset building, as already discussed) together with the changes in the various dimensions of social and cultural life generate a sort of synergistic effect attributable to a host of development agents, of which, electricity has determining role. Thus, based on this concept of "electricity as mediating agent for social and cultural developments", this section presents the analysis of impact of electricity on the following relevant broad areas: education, health hygiene sanitation, gender dimensions including women's empowerment and changing status, modernization in the form of changing outlooks and ideational changes, extended hours and time allocation, and social environment and protective security.

3.2.3 Impact on Education

Education forms the knowledge-base of economic development. Recognizing 'education' as a cornerstone to human capital formation (T. Schultz and G. Becker), 'education' as a means to human capability building and through that to human life, and 'education' as a key input into human development— adequate emphasis has been made in this study to reveal the educational status of the members of electrified and non-electrified households. Attempts are made to underscore the role of electricity in improving the educational status of people. In doing so, the following areas were covered: literacy (overall and adult), years of schooling, enrolmentratio, educational expenses, and quality of education. Genderdisaggregated data were obtained and analyzed.

3.2.4 Impact on Health, Hygiene and Sanitation

People’s health status is the prime component of human development. This is because of the fact that human longevity (life expectancy at birth) which has been formally accepted as the number one variable in measuring the extent of human development or human deprivation is basically a function of health status. The linkages between health, poverty reduction and economic growth are much more powerful than has been generally understood. The WHO Commission on Macroeconomics and Healthby-challenging the traditional argument that health will automatically improve as a result of economic growth argued that the opposite is true: improved health is a critical requirement for economic development in poor countries 40>.. This commission's path breaking report states "Health is a priority good in its own-right, as well as a central input into economic development and poverty reduction. Increased investment in health would translate into hundreds of billions of dollars per year of increased income in the low-income countries. There are large social benefits to ensuring high level of health coverage of the poor, including spillovers to wealthier members of the society" (p.16). In the words of Nobel Laureate AmartyaSen, health is among the basic capabilities that gives value to human life35>. The global survey commissioned by UN Secretary General (Kofi Anan) (Millennium Poll, UN 2000) consistently ranked good health as number one desire of men and women around the world. In economic terms, health and education are the two cornerstones of human capital, which Nobel Laureates Theodore Schultz and Gary Becker have demonstrated to be the basis of an individual's economic productivity. Recognizing the values of good health as means to humane capability building and through that to human life (AK Sen), health as a cornerstone of human capital (T Schultz and G Becker), and health as a central input into economic development and poverty reduction (WHO 2001) –adequate emphasis has been given in this study to understand the various dimensions of health status in the electrified and non-electrified households. Since, health practice and behavior is a function of health awareness (among others), the later has been analyzed first. Such awareness is mediated through very many agents, of which, television shall be a major one. Thus, in all possible health related issues, the role of electricity has been identified using electricity-driven equipment's especially TV as the agent. Electricity's impact (or influence) on health is not only mediated through TV, but also through availability of other facilities such as refrigerator, fan, modern diagnostic facilities (possible only if electricity is available) etc. Keeping the above stated in view, the following broad spectrum areas of health-hygiene sanitation were covered in the survey: awareness on crucial public health issues, source(s) of knowledge, disease and treatment patterns, health care expenses, attendance at child delivery, access to ANC and PNC check-ups, TT immunization, maternal morbidity, child immunization, infant death (infant mortality ratio), status of intake of vitamin A capsule to prevent night blindness among children, use of family planning, source of drinking water, type of latrine facility in use, use of hand-washing material after defecation, use of soap while bathing, role of media in changing health-hygiene-sanitation behavior and practice. All the questions in this section of the survey were asked to the women (female head of the household or wife of the male head).

3.2.5 Impact on Gender Dimensions: Women's Empowerment, Changing Status and Modernization Effects

In Bangladesh, socio-economic changes triggered by increasing rates of landlessness and impoverishment has not only profoundly affected men, but also has changed the lives of rural women. The subsequent five-year plans of the government of Bangladesh tried to involve women in various development activities47>. This section provides an insight into whether Rural Electrification Program (REP) has contributed to the socio-economic empowerment of women and has given them more opportunities for sustainable livelihood and for changing their status. The impacts of REP on the major issues that concern women's socio-economic status have been analyzed. The discussion of various issues are assessed against the present conditions that prevail in the local community and in the rural electrification sector. The findings will enable to draw some useful directions and implications for policy formulation on gender and rural electrification. Against the broader objective of this study, all relevant indicators were used which helped to collect the gender-sensitive and sex-specific data. Gender-sensitive data compare the situation of women to that of men, and identify various aspects of their relative advantages or disadvantages. On the other hand, sex-specific data record the absolute position of women at particular points in time. This section focuses on household level data and information obtained in the study. The specific objectives of this section are to evaluate the extent of benefits to women flowing from rural electrification, to examine the level on involvement of women in income-generating activities against women's status to social, economic and institutional spheres/aspects, and to identify the gap that needs to be addressed in policy formulation. As for evaluating women's progress through REP on women's life, this section has used both quantitative and qualitative techniques. Quantitative techniques are used to measure the quantitative dimensions whereas qualitative techniques are used to extract people's judgment and perception about a subject.

3.2.6Impact on Household Time Allocation after Sunset

The availability and allocation of time is one of the major determinants in shaping the life style, for each individual concerned. In this section, the allocation of time for household members after sunset has been analyzed for three categories of household— HE, WE-EV and WE-NEV. Electricity enables the household members to accomplish their activities in an effective manner, both in terms of time and job quality. Given the extra time available after sunset due to electricity, it is also possible to explore new activities having significant impact on the living standard of family members in the electrified household. With an objective to capture the diverging pattern of time allocation, comparisons have been made among household heads and senior most students — both for male and female, for three categories of households. Households with electricity were asked separate questions to address the change in time allocation by comparing pre and post-electrification era and is analyzed with respect to broad categories of activities. On the last part of the section, the use of additional time due to electricity has been evaluated with reference to poverty reduction. For this, the pattern of allocation of time has been discussed for landless households only.

3.2.7 Impact on Social Environment and Protective Security

Social environment and protective security constitute major components of human development seen as a freedom-mediated process (AK Sen., 2000). It has been hypothesized in this study that electricity will accelerate this process through creation of employment opportunities in different fields, through enhanced security of household, through facilitating the security of mobility at night, and through access to TV watching which will, in turn, influence social norms and values. Most of the relevant issues have already been analyzed and discussed in the previous chapters. The remaining parts of investigation in to these areas are presented below.

3.2.8 Impact on Income

Average yearly income so much high then non electrified village.The electrified house slow loss but in totally income is high.Electricity can be part by part with different value then relatively income high.

3.2.9 Impact on Employment

Electricity generates employment. The impact on employment was both direct and indirect. In agriculture, an estimated 1.1 million persons are directly involved in farmlands using rural-electricity connected irrigation equipment's. Currently, 63,220 industries using rural electricity employ 983,829 persons; and electrified industries, on average, generate 11 times more employment than the non- electrified industries. Rural and wholesale shops using rural electricity employ 848,630 persons. There has been direct employment of 16,223 persons in the PBSs. More so, women in the electrified compared to those in the non-electrified households are involved more in household level income-generation activities and depict better re-allocation of time for remunerative employment.

Unemployment rate is relatively low in the electrified households; and relatively higher share of non-agricultural employment in the electrified households indicates modernization effect of electricity on occupation. On the top of all these, there has been an enormous spill-over effect of rural electrification on employment in various support-services.

3.2.10 Impact on Mass Media

Trouble in the household and industrial,irrigational are movement electrified area.This areas have shown a very much progress trend in their economic.

CHAPTER 4
IMPORT ENERGY
OFCOMILLAPBS-2

4.1 Introduction

The demand of electricity is increasing day by day. Crisis of power is one of the major problems in Bangladesh. For economic emancipation and in order to meet the consumer demands, the electricity growth that is generating more electricity, building more transmission/ distribution capacity, bringing more area/ population under electricity coverage and ensuring more efficient management of these are the essential issues. The Government of Bangladesh (GOB) has decided to build power plants in private sectors and Independent Power Producers (IPPs) launched their business in Bangladesh. According to the power sector growth in the country

4.2 Import Energy

CPBS-2 import energy from government & private sector as their consumer demand.Its import twelve sectors i:e; Jangalia Grid and Narayanpur Grid under PDB & Private sector name Sakura Captive Power Ltd.we calculate the 1 year cost 2015-2016 and explain about different way.

Table 4.1 Import (Energy, Capacity, Line, Total Sold, and System Loss) 2015-2016

Import point	Capacity	Line	July				August			
			Unit kWh (Purchase)	%	Total KWh(sold)	SL %	Unit kWh (Purchase)	%	Total KWh(sold)	SL %
Jangalia(Chouddagram)	100/164 MVA	132	6,110,798	17.42			6,069,984	16.11		
Comilla PBS-1-11KV		11	55,597	0.16			69,184	0.18		
Jangalia(Kotbari) 11KV		11	1,399,156	3.99			1,563,822	4.15		
Jangalia (Head Office)		132	14,100,647	40.20			15,419,396	40.92		
Jangalia(Moinamoti)	25 MVA	33	-	-			-	-		
Jangalia(Moinamoti)	25 MVA	33	4,469,785	12.74			5,458,341	14.48		
Head Office-S/S		33	-	-			-	-		
Debpur Grid(B-para)	2*50/75 MVA	132	5259690	14.99	29,914,412	14.72	5789340	15.36	31,894,711	15.36
Sakura Captive Power	25 MVA	33	1575507	4.49			1200148	3.18		
Narayonpur(B.Baria)		33	0	-			0	-		
Jangalia(Comilla PBS-4)	2*50/75 MVA	33	2105272	6.00			2113242	5.61		
Jangalia (Chouddagram)	100/164 MVA	132	0	-			0	-		
Moinaoti Grid Station		132		-				-		
Total			35,076,452	100	29,914,412		37,683,457	100	31,894,711	

Import point	Capacity	Line	September				October			
			Unit kWh (Purchase)	%	Total KWh(sold)	SL %	Unit kWh (Purchase)	%	Total KWh(sold)	SL %
Jangalia(Chouddagram)	100/164 MVA	132	4,713,128	12.65			11,534,488	31.85		
Comilla PBS-1-11KV		11	65,300	0.18			63,489	0.18		
Jangalia(Kotbari) 11KV		11	1,584,017	4.25			1,487,732	4.11		
Jangalia (Head Office)		132	12,668,269	34.01			10,048,334	27.75		
Jangalia(Moinamoti)	25 MVA	33	-	-			-	-		
Jangalia(Moinamoti)	25 MVA	33	6,581,767	17.67			6,192,622	17.10		
Head Office-S/S		33	-	-			-	-		
Debpur Grid(B-para)	2*50/75 MVA	132	5730300	15.38	31,196,061	16.25	5389838	14.88	33,579,598	7.26
Sakura Captive Power	25 MVA	33	1434162	3.85			889436	2.46		
Narayonpur(B.Baria)		33	0	-			0	-		
Jangalia(Comilla PBS-4)	2*50/75 MVA	33	1500596	4.03			604106	1.67		
Jangalia (Chouddagram)	100/164 MVA	132	2973638	7.98			0	-		
Moinaoti Grid Station		132		-				-		
Total			37,251,177	100	31,196,061		36,210,045	100	33,579,598	

Import point	Capacity	Line	November				December			
			Unit kWh (Purchase)	%	Total KWh(sold)	SL %	Unit kWh (Purchase)	%	Total KWh(sold)	SL %
Jangalia(Chouddagram)	100/164 MVA	132	8,318,005	28.84	24,395,771	15.41	8,099,687	30.92	22,349,286	14.69
Comilla PBS-1-11KV		11	44,988	0.16			53,620	0.20		
Jangalia(Kotbari) 11KV		11	1,106,263	3.84			959,466	3.66		
Jangalia (Head Office)		132	8,907,066	30.88			-	-		
Jangalia(Moinamoti)	25 MVA	33	-	-			8,749,184	33.40		
Jangalia(Moinamoti)	25 MVA	33	4,385,263	15.20			3,597,956	13.73		
Head Office-S/S		33	-	-			-	-		
Debpur Grid(B-para)	2*50/75 MVA	132	3728970	12.93			3547350	13.54		
Sakura Captive Power	25 MVA	33	419991	1.46			1037794	3.96		
Narayonpur(B.Baria)		33	0	-			0	-		
Jangalia(Comilla PBS-4)	2*50/75 MVA	33	1930737	6.69			152769	0.58		
Jangalia (Chouddagram)	100/164 MVA	132	0	-			0	-		
Moinaoti Grid Station		132		-				-		
Total			28,841,283	100	24,395,771		26,197,826	100	22,349,286	

Import point	Capacity	Line	January				February			
			Unit kWh (Purchase)	%	Total KWh(sold)	SL %	Unit kWh (Purchase)	%	Total KWh(sold)	SL %
Jangalia(Chouddagram)	100/164 MVA	132	8,853,120	30.11	25,739,596	12.46	9,508,680	30.40	27,822,641	11
Comilla PBS-1-11KV		11	56,626	0.19			57,467	0.18		
Jangalia(Kotbari) 11KV		11	1,006,029	3.42			1,201,064	3.84		
Jangalia (Head Office)		132	9,881,328	33.61			10,361,424	33.13		
Jangalia(Moinamoti)	25 MVA	33	-	-			-	-		
Jangalia(Moinamoti)	25 MVA	33	4,075,380	13.86			4,618,440	14.77		
Head Office-S/S		33	-	-			-	-		
Debpur Grid(B-para)	2*50/75 MVA	132	4456620	15.16			4575330	14.63		
Sakura Captive Power	25 MVA	33	913101	3.11			782096	2.50		
Narayonpur(B.Baria)		33	0	-			8086	0.03		
Jangalia(Comilla PBS-4)	2*50/75 MVA	33	160656	0.55			164907	0.53		
Jangalia (Chouddagram)	100/164 MVA	132	0	-			0	-		
Moinaoti Grid Station		132		-				-		
Total			29,402,860	100	25,739,596		31,277,494	100	27,822,641	

Import point	Capacity	Line	March				April			
			Unit kWh (Purchase)	%	Total KWh(sold)	SL %	Unit kWh (Purchase)	%	Total KWh(sold)	SL %
Jangalia(Chouddagram)	100/164 MVA	132	12,166,200	30.51			12,659,400	30.83		
Comilla PBS-1-11KV		11	70,651	0.18			77,791	0.19		
Jangalia(Kotbari) 11KV		11	1,573,131	3.95			1,550,831	3.78		
Jangalia (Head Office)		132	-	-			7,846,800	19.11		
Jangalia(Moinamoti)	25 MVA	33	9,000,084	22.57			12,116,592	29.51		
Jangalia(Moinamoti)	25 MVA	33		-			-	-		
Head Office-S/S		33	10,095,936	25.32			-	-		
Debpur Grid(B-para)	2*50/75 MVA	132	5849010	14.67	32,926,208	17.42	5375160	13.09	32,685,297	20.40
Sakura Captive Power	25 MVA	33	916040	2.30			1186595	2.89		
Narayonpur(B.Baria)		33	4454	0.01			658	0.00		
Jangalia(Comilla PBS-4)	2*50/75 MVA	33	194129	0.49			245919	0.60		
Jangalia (Chouddagram)	100/164 MVA	132	0	-			0	-		
Moinaoti Grid Station		132		-				-		
Total			39,869,635	100	32,926,208		41,059,746	100	32,685,297	

Import point	Capacity	Line	May				June			
			Unit kWh (Purchase)	%	Total KWh(sold)	SL %	Unit kWh (Purchase)	%	Total KWh(sold)	SL %
Jangalia(Chouddagram)	100/164 MVA	132	11,112,120	31.53			13,030,560	30.143		
Comilla PBS-1-11KV		11	63,386	0.18			75,816	0.175		
Jangalia(Kotbari) 11KV		11	1,207,908	3.43			1,040,285	2.406		
Jangalia (Head Office)		132	7,040,544	19.98			8,233,632	19.047		
Jangalia(Moinamoti)	25 MVA	33	9,622,772	27.30			-	-		
Jangalia(Moinamoti)	25 MVA	33	341,388	0.97			13,492,122	31.211		
Head Office-S/S		33	-	-			-	-		
Debpur Grid(B-para)	2*50/75 MVA	132	4619791	13.11	32,594,813	7.52	6045238	13.984	32,662,517	24.44
Sakura Captive Power	25 MVA	33	867891	2.46			1092466	2.527		
Narayonpur(B.Baria)		33	0	-			239	0.001		
Jangalia(Comilla PBS-4)	2*50/75 MVA	33	368310	1.04			213583	0.494		
Jangalia (Chouddagram)	100/164 MVA	132	0	-			0	-		
Moinaoti Grid Station		132	2565	0.01			5127	0.012		
Total			35,246,675	100	32,594,813		43,229,068	100	32,662,517	

4.3 Import Energy Analysis

Figure 4.1-Graphical analysis import Energy ofComilla PBS-2

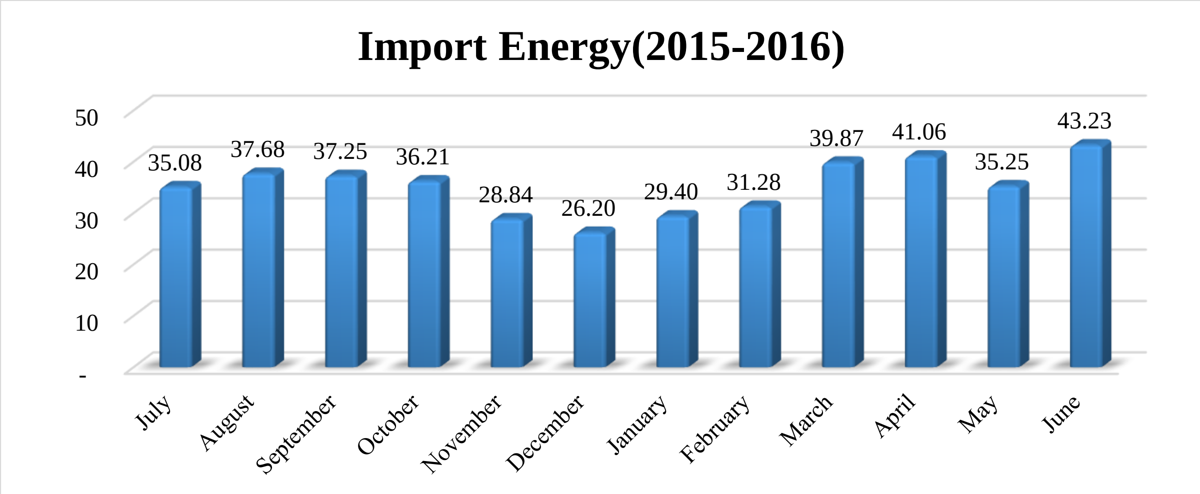
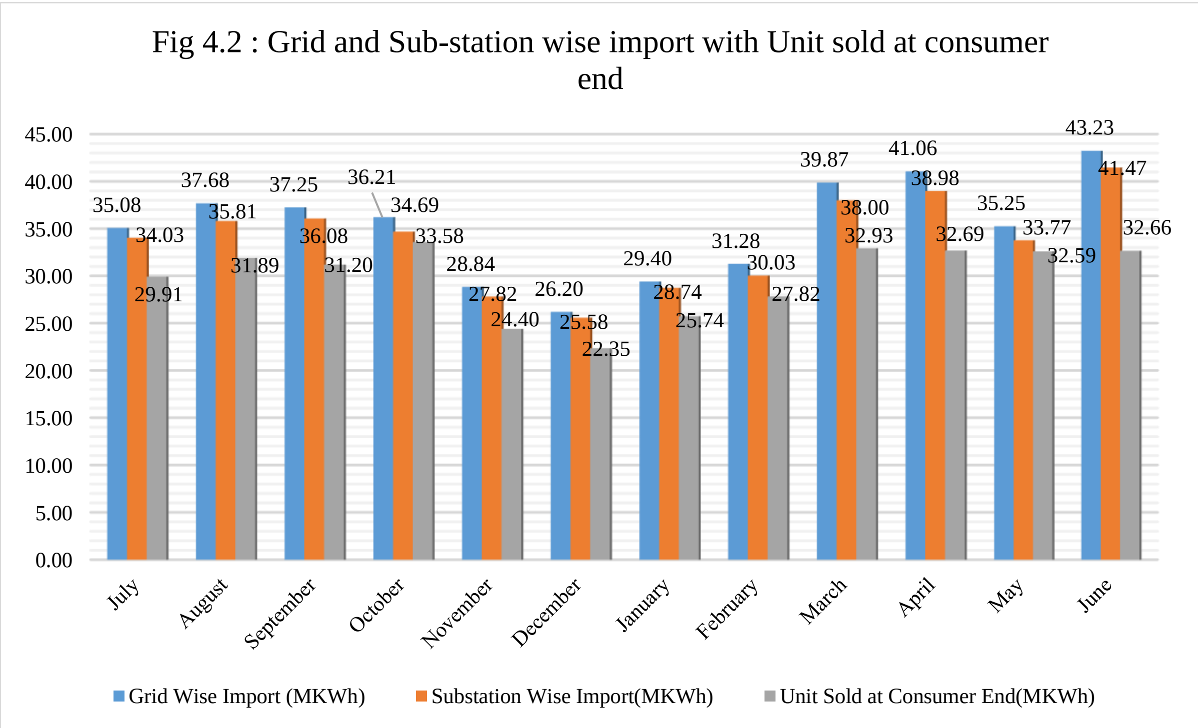


Fig 4.2 Grid & substation wise import with unit sold at consumer end



4.3.1Import Energy Analysis

The demand of electricity is increasing day by day. Crisis of power is one of the major problems in Bangladesh. For economic emancipation and in order to meet the consumer demands, the electricity growth that is generating more electricity, building more transmission/ distribution capacity, bringing more area/ population under electricity coverage and ensuring more efficient management of these are the essential issues. Government has taken to build power plants private govement.Independent Power Producers (IPPs) launched their business in Bangladesh. According to the power sector growth in the country, the CPBS-2 import 52MKWh power each month to meet the growing demands of the consumers and average import per month 35 MKWh for the year of 2015-2016. In this chapter brief the history of the public and private sector power plants in CPBS-2, their energy import scenario are discussed. CPBS-2 import electricity from both government and private sector to meet their consumer demand, CPBS-2 import electricity from several Public sectors i:e; Debpur Grid, Moinamoti Grid and Jangalia Grid, under PDB, CPBS-2 also import energy from CPBS-1, CPBS-4, B.Baris PBS, Sakura Captive Power 33 KV to provide electricity to the different level of consumers.

In July 2015, CPBS-2 import 35076452 KWh unit , Where 6110798 unit from Jangalia (Chouddagram) grid which is 17.42% of total unit import for this month, 55597 unit from Comilla PBS-1-11KV which is 0.16% of total unit, 1399156 unit from Jangalia (Kotbari)-11KV which is 3.99% of total unit for the month, 14100647 unit from Jangalia (Head Office) grid which is 40.20% of total unit import for this month, 4469785 unit from Jangalia (Moinamoti) which is 12.74% of total unit, 5259690 unit from Debpur Grid (B-para) which is 14.99% of total unit, 2105272 unit from Jangalia(Comilla PBS-4) which is 6.0% of total unit, 1575507 unit from Sakura Captive Power Ltd. which is 4.49% of total unit for the month .As per statistics Jangali(Head Office) grid provide major portion of electricity for CPBS-2.

In February 2016, CPBS-2 import 31277494 KWh unit ,Where 9508680 unit from Jangalia (Chouddagram) grid which is 30.40% of total unit import for this month, 57467 unit from Comilla PBS-1-11KV which is 0.18% of total unit, 1201064 unit from Jangalia (Kotbari)-11KV which is 3.84% of total unit for the month, 10361424 unit from Jangalia (Head Office) grid which is 33.13% of total unit import for this month, 4618440 unit from Jangalia (Moinamoti) which is 14.77% of total unit, 4575330 unit from Debpur Grid (B-para) which is 14.63% of total unit, 8086 unit from Narayonpur (B.Baria) which is 0.03% of total unit 164907 unit from Jangalia(Comilla PBS-4) which is 0.53% of total unit, 782096 unit from Sakura Captive Power Ltd. which is 2.50% of total unit for the month.

Energy import analysis showed in the table no 4.1. The consumer demand different in different seasons.we showed this summer and winter.we looks in this analysis summer consumer is very high ,so loss is also high in this seasons. In August 2015, the energy import

is 37683457 unit, which is high import from previous two month and system loss is also comparatively high.

Another seasons as like winter are low to compare another month.Its a seasonal effect.

Summer seasons 2016 for june 2016 energy import is 43229068 unit which highest amount of import for the year and the system loss is also comparatively high. 24.44 %..

CPBS-1 is 1772809627.91 tk and CBPS-2. There is no Contributor or Cross Subsidy in 2015-2016 Year.

4.4 substation Data of CPBS-2

In their CPBS-2 have 15 substation and connected with different grids.The energy storage different have a different size as theire location and area.CPBS-2 show theire capacity in table where is how amount have. PPBS-2 all substation names with their capacity listed below and the proposed are indicated with star (*) sign.

Table 4.2- Substation name of Comilla PBS-2

Chouddagram s/s	Palpara
Moinamoti	B.para
Kotbari	Chouddagram s/s-2
Baghmara	Sakura captive power
Head office	Narayonpur
EPZ	Chouddagram s/s-3
Harindhara	Laksham-2 s/s *
Barura	Chouddagram-2 s/s *
Sayedpur	Chouddagram-4 s/s *

4.5 System Loss

Table 4.3- System Loss of CPBS-2

Month	Grid Wise Import (MKWh)	Substation Wise Import(MKWh)	Unit Sold at Consumer End(MKWh)	33 KV Line Loss(MKWh)	Substation System Loss(MKWh)	Total System Loss(MKWh)
July	35.08	34.03	29.91	5.16	4.12	9.28
August	37.68	35.81	31.89	5.79	3.92	9.70
September	37.25	36.08	31.20	6.06	4.88	10.94
October	36.21	34.69	33.58	2.63	1.11	3.74
November	28.84	27.82	24.40	0.58	0.04	0.62
December	26.20	25.58	22.35	3.85	3.23	7.08
January	29.40	28.74	25.74	3.66	3.00	6.66
February	31.28	30.03	27.82	3.45	2.21	5.66
March	39.87	38.00	32.93	6.94	5.07	12.02
April	41.06	38.98	32.69	8.37	6.30	14.67
May	35.25	33.77	32.59	2.65	1.18	3.83
June	43.23	41.47	32.66	10.57	8.80	19.36
Total	**421.35**	**404.99**	**357.76**	**59.72**	**43.84**	**103.56**

In Table 4.2,

Total System Loss = Grid to sold energy at Consumer end
Sub-station System Loss = Substation to Sold energy at Consumer end
33 KV Line Loss = Energy loss between Grid and Sub-station.

We see this table tatal loss of energy in summer then winter.When heat is very high then loss is high,but 33kv loss are quite.Substation loss are huge.In ocober 2015 to 2016 january.Illegal use is badly increase summer and loss high so PBS try to people awareness about illegal step.PBS also loss for strom during.

4.6 Recommendation

It is possible to control load demand by proper load management, encouraging Independent Power Producers (IPP) and reducing transmission loss. Initiative should be taken to develop skilled manpower required for the power sector considering incorporating IPP and local Government (GOV), central GOV, private sector May take the responsibility to increase the power generation and ensure its proper use in Bangladesh. The process of energy import and distribution of PPBS-2 is low from some other PBS. PPBS-2 tries to reduce their problems.

CHAPTER 5
REVENUE OF COMILLA PBS-2

5.1 Introduction

Electric industry is one of the mother industries in each country, because today the production of all goods and the consumption of many are impossible without electric power. Utilizing many services like lighting, conditioning, freezing and much other services depends on electricity.

5.2 Description of Consumer Class

There are eight types of consumer in every PBS under BREB based on their demand and category of energy use. Those classes are bellows,

Types of Consumer Under This Category Will Be As Follows:

5.2.1 Domestic Consumers

Domestic consumers are those who consumed electrical energy in their resident through house-hold equipment. These consumers are classified based on amount of their consumed unit (kwh) energy. These consumers use single phase line.

Domestic consumers are classified into eight slabs. These are

1. Minimum kwh
2. 0-50 kwh
3. 0-75 kwh
4. 76-200 kwh
5. 201-300 kwh
6. 301-400 kwh
7. 401-600 kwh
8. Above 600 kwh

5.2.2 Commercial Consumers

Commercial consumers are actually related with business or commercial activities. Commercial consumers have higher electric demand than Domestic consumers. But they use single phase line as Domestic consumers.

Commercial consumer are following:

Community center and community hall, Rest house, Cinema hall, Mobile Tower, Petrol/CNG pump Station etc.

5.2.3 Charitable Institute

Charitable institutes are depends on charity of the Government or any private sector. Charitable institutes May any educational, religious or social development institutions.

Charitable consumer under following,
Masjid, Church, Pagoda, Madrasha, Orphanage,Charitable dispensary etc.

5.2.4 Irrigation

Basically all kinds of water pumps are used to irrigate in agriculture fields in this class. They May be single or three phase in connection.

5.2.5 General power

Where supply voltage is 230/400v keeps aand use secondary metering.Here different category will be as follows:
Mini industry,Govt. office.mini school etc

5.2.6 Large power

Which supply voltage will be 6350/11000 v then we called primary metering or large power .AND there are also energy same but some different.

Types of consumer under this category will be as follows:

All types of industries and industrial complex, Government complex, Government hospital complex,Education complex, Cantonment, air or naval base/installation etc., Police station, Camp, and BDR Camp, BOP Installation etc.

5.2.7 In case of 33KV

33KV consumers are mostly industries. They have an individual sub-station for consuming energy.

5.2.8 Street Lights

Consumed electric power by street lights is in this category. Street light is a raised source of light on the edge of a roadin rural area. These are develop the village

5.3 Description of Table and Its Analysis

In this table making income sheet and consumer wise and it calculate yearly

Table 5.1 Monthly Revenue (2015-2016)

Customer Class	Rate Tariff			July			August				
	Past	Present	Inc %	Unit	Consumers	Revenue	Unit	Inc %	Consumers	Inc %	Revenue
Domestic											
Minimum	0	0		97974	0	484,720	95077	-2.96	5833	0.00	524,970
1-50	3.36	3.36	0.00	2052534	32527	8,612,804	3561147	73.50	26021	-20.00	14,270,379
1-75	3.87	3.80	-1.81	7208546	20562	28,413,448	5236392	-27.36	21456	4.35	20,801,237
76-200	5.01	5.14	2.59	6737943	84439	35,874,114	10661937	58.24	85972	1.82	55,578,054
201-300	5.19	5.36	3.28	3879310	17877	20,583,540	1029600	-73.46	18285	2.28	5,950,749
301-400	5.42	5.63	3.87	549610	5350	3,115,636	542900	-1.22	5629	5.21	3,098,244
401-600	8.51	8.70	2.23	188205	2150	1,661,375	89200	-52.60	2306	7.26	861,742
600++	9.93	9.98	0.50	34688	328	367,652	38314	10.45	342	4.27	481,993
Total				20748810	163233	99113289	21254567	2.44	165844	1.60	101567368
Commercial	9.58	9.80	2.30	2433430	11836	24,235,742	2501887	2.81	11946	0.93	24,953,566
Charitable	4.98	5.22	4.82	474181	3201	2,519,928	466380	-1.65	3245	1.37	2,483,021
Irrgation	3.60	3.82	6.11	157354	2575	716,101	231191	46.92	2522	-2.06	987,225
General Power	7.42	7.66	3.23	795068	1935	6,464,649	953642	19.94	1944	0.47	7,644,554
Large Power	7.32	7.57	3.42	4071113	76	31,080,108	5034896	23.67	77	1.32	38,099,497
33KV	7.20	7.49	4.03	0	0	0	0	0.00	0	0.00	0
Street Light	6.93	7.17	3.46	1980	33	14,223	1980	0.00	33	0.00	14,223
Grand Total				28681936	182889	164144040	30444543	6.15	185611	1.49	175749454

Customer Class	September					October				
	Unit	Inc %	Consumer	Inc %	Revenue	Unit	Inc %	Consumers	Inc %	Revenue
Domestic										
Minimum	95609	0.56	5664	-2.90	512295	97181	1.64	0	-100.00	480800
1-50	2937664	-17.51	25107	-3.51	10598576	3729222	26.95	31569	25.74	14965279
1-75	5238413	0.04	21316	-0.65	20807373	5800166	10.72	20390	-4.34	22567286
76-200	7779500	-27.03	85436	-0.62	41130305	9960391	28.03	92059	7.75	53497915
201-300	3886719	277.50	18164	-0.66	20776487	2327100	-40.13	21201	16.72	13125921
301-400	839500	54.63	5295	-5.93	4700930	1169816	39.35	6416	21.17	6749659
401-600	76800	-13.90	2149	-6.81	752255	179690	133.97	2606	21.27	1628453
600++	35254	-7.99	342	0.00	424622	75024	112.81	354	3.51	757671
Total	20889459	-1.72	163473	-1.43	99702843	23338590	11.72	174595	6.80	113772984
Commercia	2330433	-6.85	11206	-6.19	23344782	2522955	8.26	11905	6.24	26034597
Charitable	475673	1.99	3149	-2.96	2519708	452016	-4.97	3303	4.89	2631961
Irrgation	219021	-5.26	2276	-9.75	916818	239385	9.30	2526	10.98	998954
General Po	905388	-5.06	1871	-3.76	7456262	840137	-7.21	1955	4.49	7004105
Large Powe	4124313	-18.09	77	0.00	32853093	4774139	15.76	78	1.30	37462286
33KV	0	0.00	0	0.00	0	0	0.00	0	0.00	0
Street Ligh	1980	0.00	33	0.00	14223	1980	0.00	33	0.00	14251
Grand Tota	28946267	-4.92	182085	-1.90	166807729	32169202	11.13	194395	6.76	187919138

Customer Class	November					December				
	Unit	Inc %	Consumer	Inc %	Revenue	Unit	Inc %	Consumers	Inc %	Revenue
Domestic										
Minimum	123355	26.93	0	0	1054560	376747	205.4	0	0	1801520
1-50	2166371	-41.9	53680	70	9560662	4269722	97.09	78555	46.339	18188819
1-75	1633633	-71.8	29739	45.9	6951280	4050314	147.9	38132	28.222	16344493
76-200	9755909	-2.05	79703	-13.4	52137947	3868014	-60.35	59524	-25.32	21369722
201-300	2058443	-11.5	11540	-45.6	11321754	619308	-69.91	5264	-54.38	3451091
301-400	249621	-78.7	3042	-52.6	1481416	187313	-24.96	1326	-56.41	1087722
401-600	171147	-4.75	1209	-53.6	1519204	184307	7.689	520	-56.99	1616485
600++	47376	-36.9	167	-52.8	476988	32972	-30.4	100	-40.12	331561
Total	16205855	-30.6	179080	2.57	84503811	13588697	-16.15	183421	2.4241	64191413
Commercia	2136639	-15.3	12104	1.67	21832940	2082627	-2.528	12287	1.5119	21350009
Charitable	379425	-16.1	3331	0.85	2140888	254936	-32.81	3373	1.2609	1509418
Irrgation	518584	116.6	2629	4.08	2068996	344039	-33.66	2732	3.9178	1413299
General Po	743470	-11.5	1968	0.66	6303870	977951	31.54	1963	-0.254	8052301
Large Powe	4503793	-5.66	81	3.85	35517016	4139895	-8.08	82	1.2346	32796827
33KV	0	0	0	0	0	0	0	0	0	0
Street Ligh	1980	0	33	0	14237	1980	0	33	0	14237
Grand Tota	24489746	-23.9	199226	2.49	152381758	21390125	-12.66	203891	2.3416	129327504

Customer Class	January					February				
	Unit	Inc %	Consumer	Inc %	Revenue	Unit	Inc %	Consumers	Inc %	Revenue
Domestic										
Minimum	214952	-42.9	0	0	1850640	356902	66.04	0	0	1877200
1-50	2138476	-49.9	83652	6.49		5464510	155.5	82813	-1.003	22848048
1-75	2522704	-37.7	39225	2.87	10743489	5104499	102.3	38895	-0.841	20374421
76-200	6459514	67	56129	-5.7	33765405	2284044	-64.64	60331	7.4863	13185261
201-300	1205687	94.68	4955	-5.87	6381391	1038907	-13.83	5836	17.78	5712160
301-400	502164	168.1	1440	8.6	2757729	253177	-49.58	1595	10.764	1462937
401-600	270460	46.74	569	9.42	2315840	164562	-39.15	640	12.478	1446624
600++	142373	331.8	162	62	1417814	43431	-69.49	170	4.9383	437571
Total	13456330	-0.97	186132	1.48	59232308	14710032	9.317	190280	2.2285	67344222
Commercia	2257615	8.402	12387	0.81	22159484	2416457	7.036	12541	1.2432	23670946
Charitable	250531	-1.73	3398	0.74	1395655	286949	14.54	3440	1.236	1679416
Irrgation	2880269	737.2	3738	36.8	10870070	4153551	44.21	3907	4.5211	15698483
General Po	1322280	35.21	1978	0.76	10213068	1085163	-17.93	1976	-0.101	8800177
Large Powe	4520178	9.186	78	-4.88	33164678	4111722	-9.036	77	-1.282	32556407
33KV	0	0	0	0	0	0	0	0	0	0
Street Ligh	1980	0	33	0	14223	1740	-12.12	29	-12.12	12905
Grand Tota	24689183	15.42	207744	1.89	137049486	26765614	8.41	212250	2.169	149762556

Customer Class	March					April				
	Unit	Inc %	Consumer	Inc %	Revenue	Unit	Inc %	Consumers	Inc %	Revenue
Domestic										
Minimum	345094	-3.31	21360	0	1706510	242710	-29.67	0	-100	1706510
1-50	7547128	38.11	46958	-43.3	30661976	7442706	-1.384	73025	55.511	30267313
1-75	5068223	-0.71	37543	-3.48	20197382	5733321	13.12	37676	0.3543	22751755
76-200	3874935	69.65	110462	83.1	21503091	5851467	51.01	77196	-30.12	31690465
201-300	373846	-64	48069	724	2111580	370359	-0.933	8632	-82.04	2093689
301-400	129283	-48.9	4800	201	769074	236283	82.76	2115	-55.94	1371484
401-600	54966	-66.6	6732	952	494329	128006	132.9	759	-88.73	1129777
600++	37222	-14.3	781	359	373846	759332	1940	144	-81.56	7580503
Total	17430697	18.5	276705	45.4	77817788	20764184	19.12	199547	-27.88	98591496
Commercia	2359889	-2.34	22176	76.8	25060102	2510709	6.391	12988	-41.43	25556451
Charitable	383367	33.6	1615	-53.1	2173839	467178	21.86	3533	118.76	2608801
Irrgation	5193956	25.05	864	-77.9	19960866	1412250	-72.81	3930	354.86	5561253
General Po	1058785	-2.43	2026	2.53	8651099	1098197	3.722	1980	-2.27	8974394
Large Powe	5175745	25.88	1187	1442	40609271	5142060	-0.651	79	-93.34	40453035
33KV	0	0	11	0	0	0	0	0	-100	0
Street Ligh	1740	0	51	75.9	12905	1740	0	29	-43.14	12905
Grand Tota	31604179	18.08	304635	43.5	174285870	31396318	-0.658	222086	-27.1	181758335

Customer Class	May					June				
	Unit	%	Consumer	Inc %	Revenue	Unit	Inc %	Consumers	Inc %	Revenue
Domestic										
Minimum	211463	0.671	0	0	1706510	204129	-3.468	0	0	1706510
1-50	7782705	24.7	73825	1.1	31562359	7771505	-0.144	74825	1.3546	31535469
1-75	5893323	18.7	38696	2.71	23354932	5863424	-0.507	39509	2.101	23239621
76-200	5981466	18.98	78991	2.33	32375110	5814778	-2.787	79191	0.2532	31515069
201-300	277057	0.879	8832	2.32	1595591	213137	-23.07	8632	-2.264	1250634
301-400	231201	0.734	2115	0	1342872	257003	11.16	2815	33.097	1493608
401-600	126007	0.4	769	1.32	1112486	116006	-7.937	747	-2.861	1025152
600++	758032	2.406	144	0	7567529	702406	-7.338	122	-15.28	7012177
Total	21261254	67.48	203372	1.92	100617389	20942388	-1.5	205841	1.214	98778240
Commercia	2450945	7.778	13166	1.37	24973983	2418616	-1.319	13184	0.1367	23917100
Charitable	447222	1.419	3593	1.7	2509749	550526	23.1	3614	0.5845	3047947
Irrgation	339672	1.078	3658	-6.92	1531565	215467	-36.57	3001	-17.96	994757
General Po	1300260	4.127	1973	-0.35	10530874	986443	-24.13	1958	-0.76	8127280
Large Powe	5708248	18.12	80	1.27	44744089	6290326	10.2	80	0	49187123
33KV	0	0	0	0	0	0	0	0	0	0
Street Ligh	1740	0.006	29	0	12905	1740	0	29	0	12905
Grand Tota	31509341	1	225871	1.7	184920554	31405506	-0.33	227707	0.8129	184065352

.rate decrement and increment in monthly. **Domestic consume** total 20748810 units, Number of total consumer 163233 and total revenue 99113289 TK where minimum slab was 97974 units, Number of consumer 0, and revenue 95077, In 1-50 was 2052534 units, Number of consumer 32527, and revenue 8612804 TK,

In 1-75 was 7208546 units, Number of consumer 20562, and revenue 28413448.In 76-200 was 6737943 units, Number of consumer 84439 and revenue 35875114 TK. In 201-300 was 3879310 units, Number of consumer 17877, and revenue 20583540 TK. In 301-400 was 549610 units, Number of consumer 5350, and revenue 3115636 TK.In 401-600 was 188205 units, Number of consumer 2150, and revenue 1661375 TK and Above 600 was 34688 units, Number of consumer 328 , and revenue 367652 TK.

In **Commercial consumer** consumed total 2433430 units, Number of consumer 11836 and revenue 24235742 TK. In **Charitable institute** consumer consumed total 474181 units, Number of consumer 3201, and revenue 2519928 TK. In **Irrigation** consumer consumed total 157354 units, Number of consumer 2575 and revenue 716101 TK. In **General power** consumer consumed total 795068 units, Number of consumer 1935, and revenue 6464649 TK. In **Large power** consumer consumed total 4071113 units, Number of consumer 76 and revenue 31080108 TK. There are no 33KV consumer. In **street light**, total consumed energy 1980 unit, Number of consumer 33 and revenue 14223 TK.

At August-2015, Domestic consumer consumed total **21254567** units, Number of total consumer **165844** and total revenue **101567368** Tk. where minimum slab was 95077 units, Number of consumer 5833, and revenue 524970 Tk. In 1-50 was 3561147 units, Number of consumer 26021, and revenue 14270379 Tk. In 1-75 was 5236392 units, Number of consumer 21456, and revenue 20801237.In 76-200 was 10661937 units, Number of consumer 85972, and revenue 55578054 TK. In 201-300 was 1029600 units, Number of consumer 18285, and revenue 5950749 TK. In 301-400 was 542900 units, Number of consumer 5629, and revenue 3098244 TK.In 401-600 was 89200 units, Number of consumer 2306, and revenue 861742 TK and Above 600 was 38314 units, Number of consumer 342 , and revenue 481993 TK.

In July-August,2015 Domestic consumers total increment by 1.60% where in minimum kwh consumers is stable, in 1-50 kwh consumers was Decreased by 20.0 %, In 1-75 kwh consumers was increases 4.35%, In 76-200 was increases 1.82 %, in 201-300 was increases 2.28 %, 301-400 was increases 5.21 %, in 401-600 slab was increases 7.26 %, and above 600 was increases 4.27 %.

Same for unit increment description.

In August, Commercial consumer consumed total 2501887 units, Number of consumer 11946 and revenue 24953566 TK. In this month, total consumed energy increases 2.81 % and number of consumer increase 0.93 %. In **Charitable institute** consumer consumed total 2519928 units, Number of consumer 3245, and revenue 2483021 TK. In this month consumed energy Decreases 1.65 % and number of consumer increase 1.37 %.

In **Irrigation** consumer consumed total 716101 units, Number of consumer 2522 and revenue 987225 TK. In this month consumed energy increases 46.92% and number of consumer Decrease 2.06%.

In **General power** consumer consumed total 953642 units, Number of consumer 1944, and revenue 7644554 TK. In this month consumed energy increases 19.94% and number of consumer increases 0.47 %.

In **Large power** consumer consumed total 5034896 units, Number of consumer 77 and revenue 38099497 TK. In this month consumed energy increases 23.67 % and number of consumer increases 1.32 %.

There are no 33KV Consumer.

In **street light**, total consumed energy 1980, Number of consumer 33 and revenue 14223 Tk. In this month consumed energy are not increased and also in this month consumer number are not increased.

In these process we calculate all the month of the year of 2015-2016

Here we divided 2015-2016 years in three season for our capitalize which are,

5.4 Graphical Analysis (Domestic)

In these process we calculate all the month of the year of 2015-2016
Here we divided 2015-2016 years in three season for our capitalize which are,

- Summer season(March-June)
- Rainy season (July-October)
- Winter season(November-February)

Figure-5.1

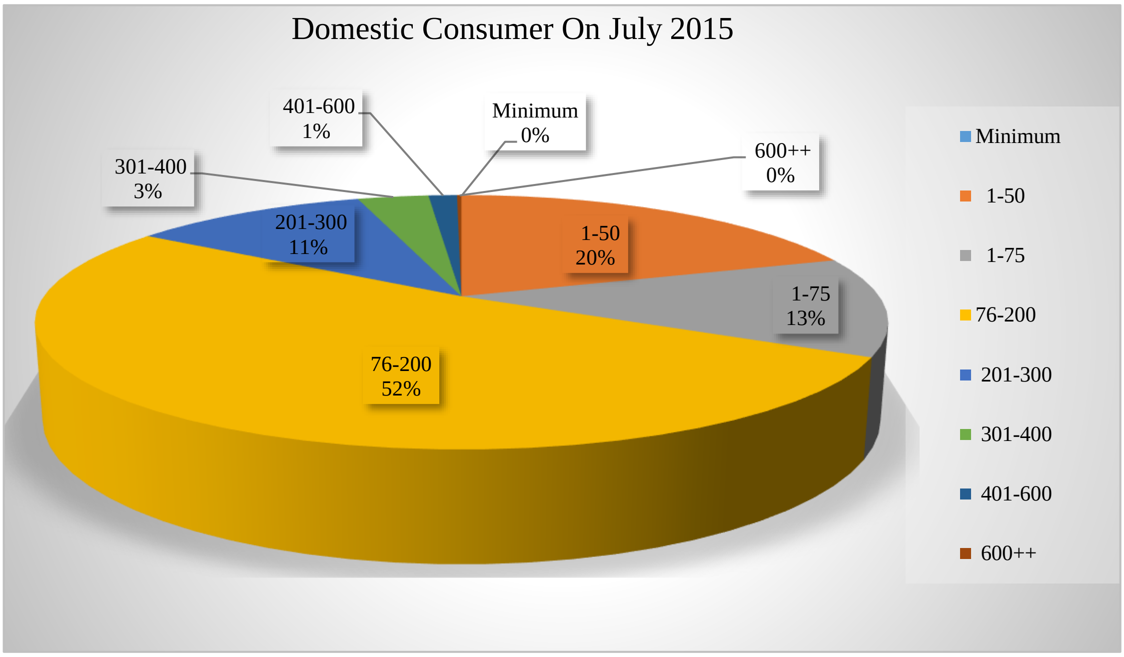


Figure -5.2

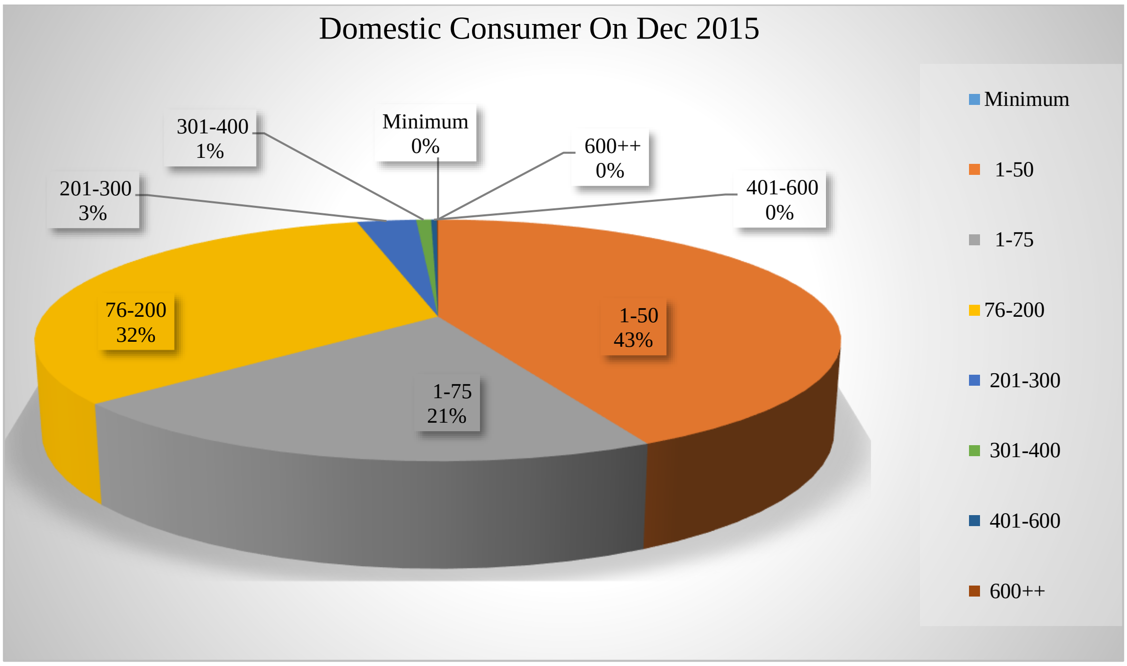


Figure -5.3

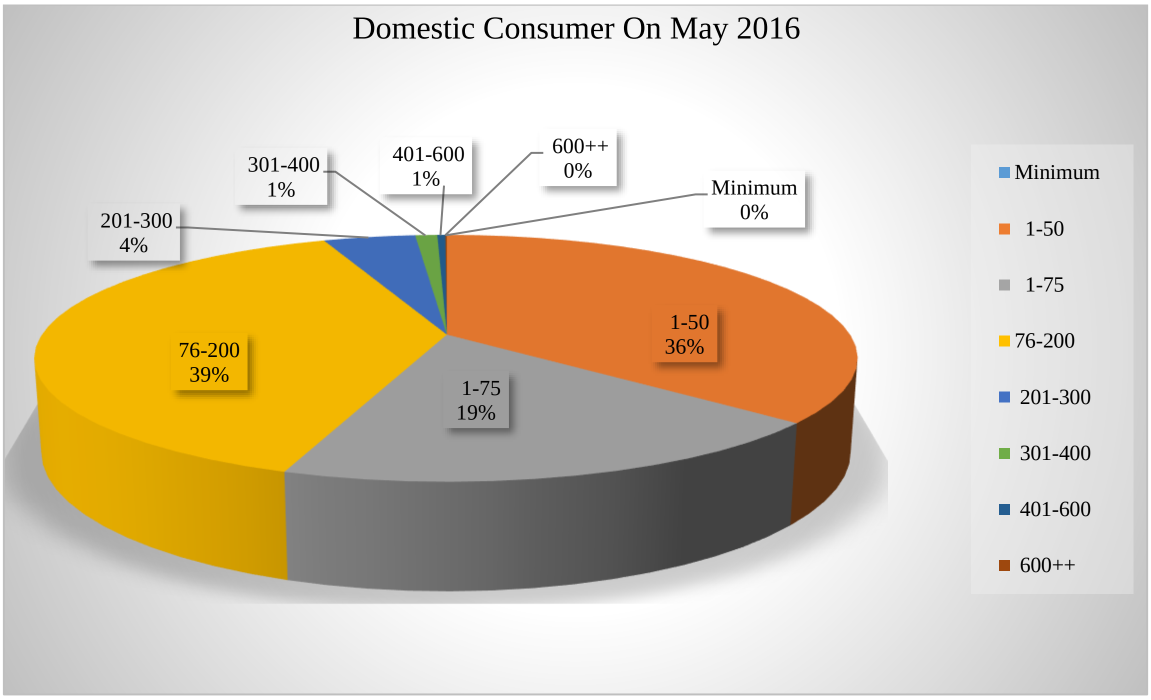


Figure 5.4

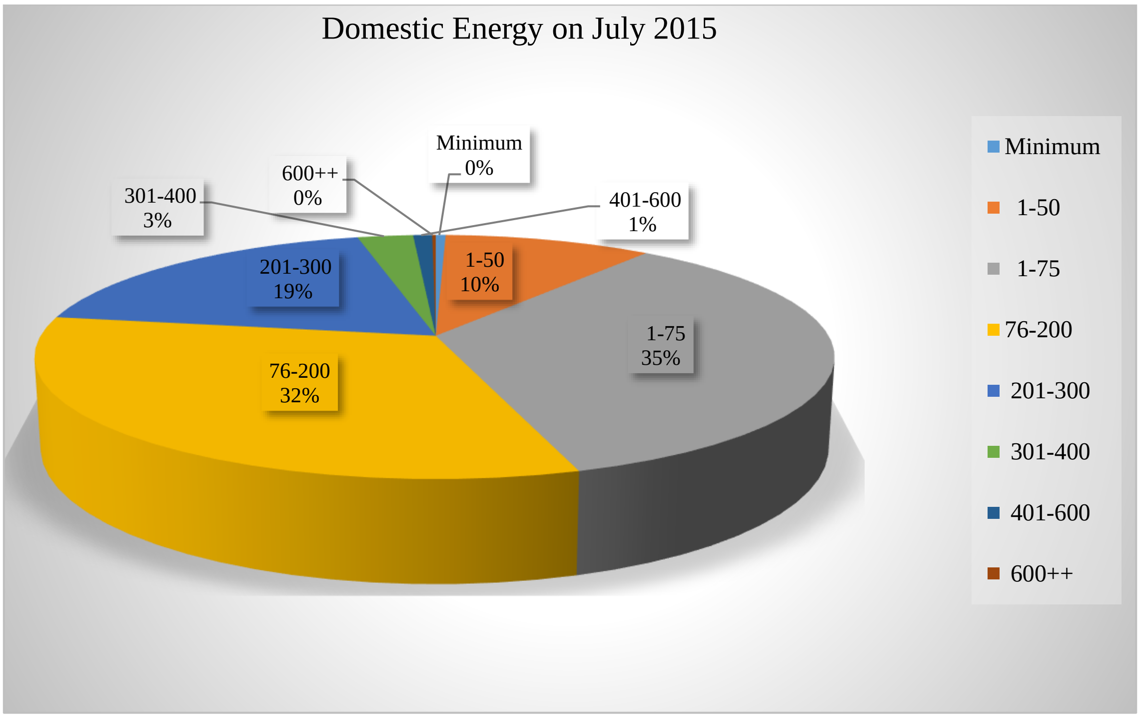


Figure 5.5

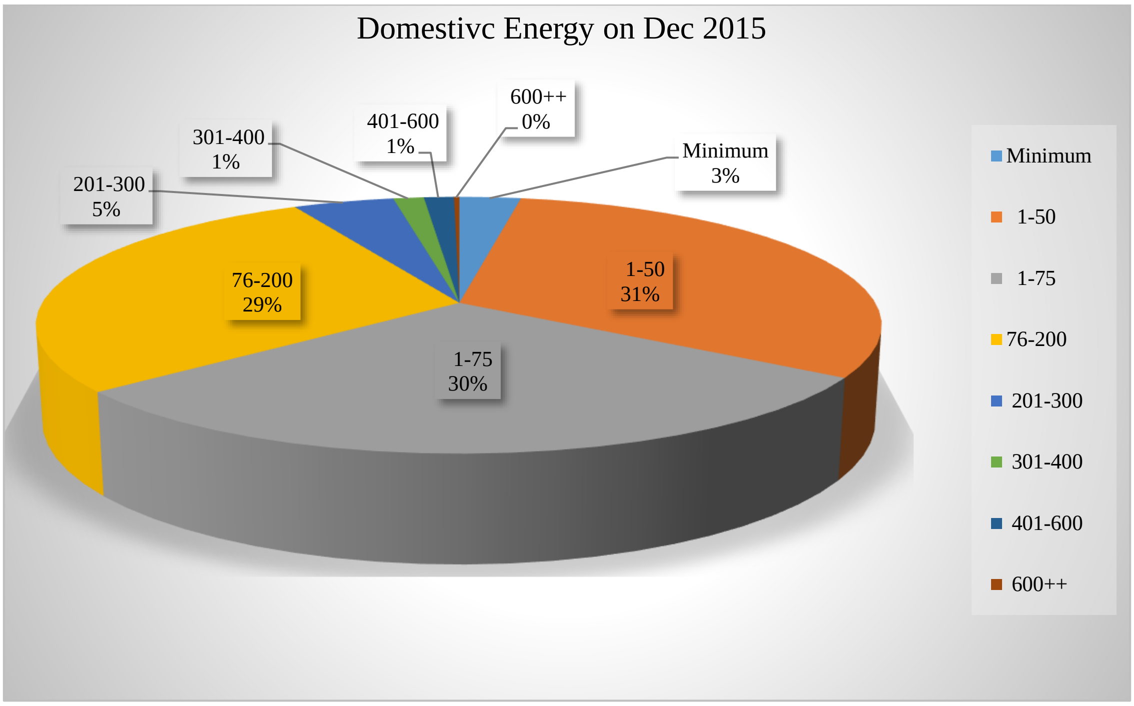
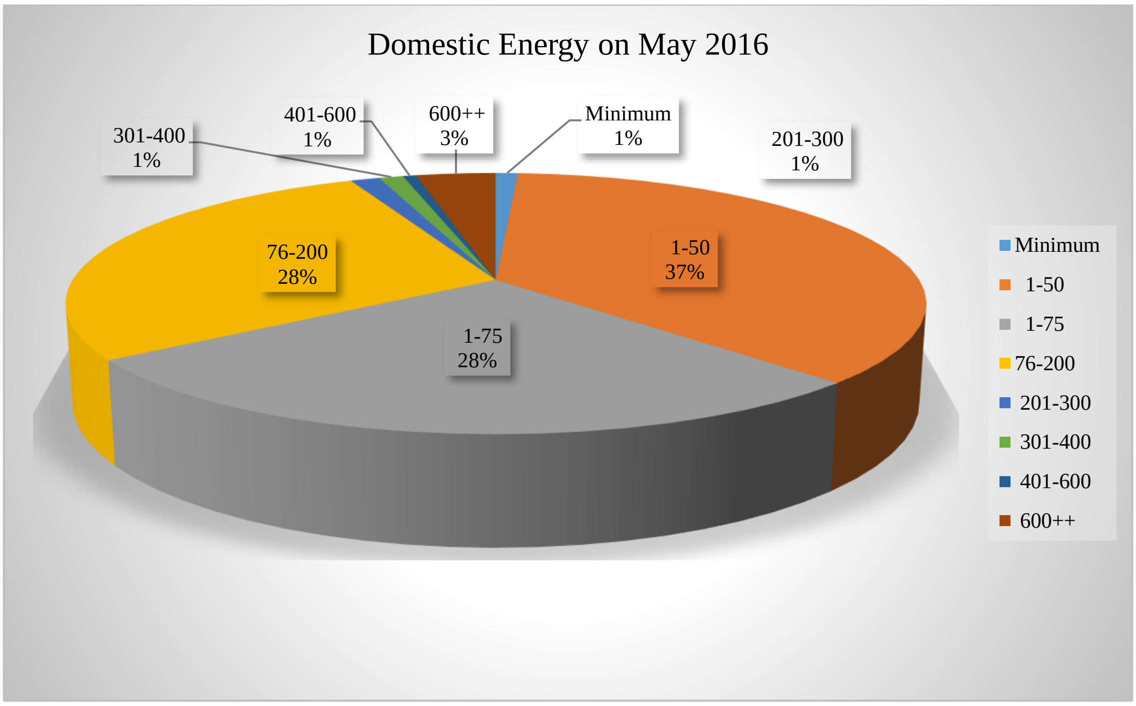


Figure 5.6



5.5 Comparison

Here, we compare domestic energy, consumer & revenue with total energy, consumer, and revenue. And category of lifeline, minimum, slab 1-75 compare with domestic. In BREB select the category, minimum is 1-50 KWh, lifeline is 1-20 Kwh.

Table 5.2 Comparison (Energy, Consumer, revenue)

Month	Total			Domestic Compare with Total						Lifeline(1-50KWh) compare with Domestic					
	No of Consumer	Energy(Kwh) Consumption	Revenue	No of Consumer	%	Energy(Kwh) Consumption	%	Revenue	%	No of Consumer	%	Energy(Kwh) Consumption	%	Revenue	%
Jul	182889	28681936	164144040	163233	89.25	20748810	72.34	99113289	60.38	32527	19.93	2052534	9.89	8612804	8.69
Aug	185611	30444543	175749454	165844	89.35	21254567	69.81	101567368	57.79	26021	15.69	3561147	16.75	14270379	14.05
Sep	182085	28946267	166807729	163473	89.78	20889459	72.17	99702843	59.77	25107	15.36	2937664	14.06	10598576	10.63
Oct	194395	32169202	187919138	174595	89.81	23338590	72.55	113772984	60.54	31569	18.08	3729222	15.98	14965279	13.15
Nov	199226	24489746	152381758	179080	89.89	16205855	66.17	84503811	55.46	53680	29.98	2166371	13.37	9560662	11.31
Dec	203891	21390125	129327504	183421	89.96	13588697	63.53	64191413	49.63	78555	42.83	4269722	31.42	18188819	28.34
Jan	207744	24689183	137049486	186132	89.60	13456330	54.50	59232308	43.22	83652	44.94	2138476	15.89		0.00
Feb	212250	26765614	149762556	190280	89.65	14710032	54.96	67344222	44.97	82813	43.52	5464510	37.15	22848048	33.93
Mar	304635	31604179	174285870	276705	90.83	17430697	55.15	77817788	44.65	46958	16.97	7547128	43.30	30661976	39.40
Apr	222086	31396318	181758335	199547	89.85	20764184	66.14	98591496	54.24	73025	36.60	7442706	35.84	30267313	30.70
May	225871	31509341	184920554	203372	90.04	21261254	67.48	100617389	54.41	73825	36.30	7782705	36.61	31562359	31.37
Jun	227707	31405506	184065352	205841	90.40	20942388	66.68	98778240	53.66	74825	36.35	7771505	37.11	31535469	31.93

Month	Minimum(1-20KWh) Compare with Domestic						Slab 1-75 Compare with domestic					
	No of Consumer	%	Energy(Kwh) Consumption	%	Revenue	%	No of Consumer	%	Energy(Kwh) Consumption	%	Revenue	%
Jul	0	0.00	97974	0.47	484720	0.49	20562	12.60	7208546	34.74	28413448	28.67
Aug	5833	3.52	95077	0.45	524970	0.52	21456	12.94	5236392	24.64	20801237	20.48
Sep	5664	3.46	95609	0.46	512295	0.51	21316	13.04	5238413	25.08	20807373	20.87
Oct	0	0.00	97181	0.42	480800	0.42	20390	11.68	5800166	24.85	22567286	19.84
Nov	0	0.00	123355	0.76	1054560	1.25	29739	16.61	1633633	10.08	6951280	8.23
Dec	0	0.00	376747	2.77	1801520	2.81	38132	20.79	4050314	29.81	16344493	25.46
Jan	0	0.00	214952	1.60	1850640	3.12	39225	21.07	2522704	18.75	10743489	18.14
Feb	0	0.00	356902	2.43	1877200	2.79	38895	20.44	5104499	34.70	20374421	30.25
Mar	21360	7.72	345094	1.98	1706510	2.19	37543	13.57	5068223	29.08	20197382	25.95
Apr	0	0.00	242710	1.17	1706510	1.73	37676	18.88	5733321	27.61	22751755	23.08
May	0	0.00	211463	0.99	1706510	1.70	38696	19.03	5893323	27.72	23354932	23.21
Jun	0	0.00	204129	0.97	1706510	1.73	39509	19.19	5863424	28.00	23239621	23.53

5.6 Graphical Analysis

Figure 5.7 Total Unit

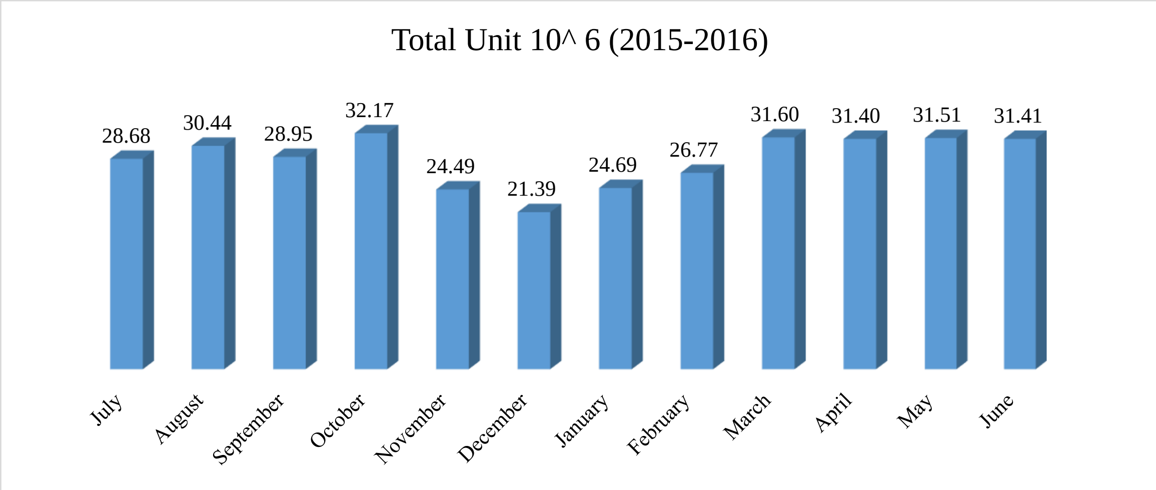


Figure 5.8 Total Consumer

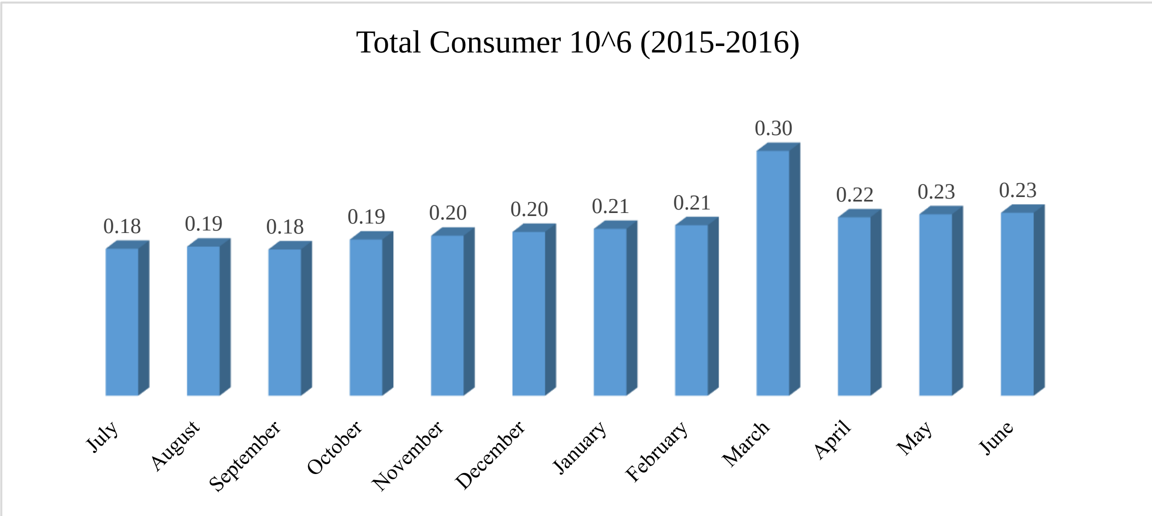


Figure 5.9- Total Energy & Domestic Energy Comparison

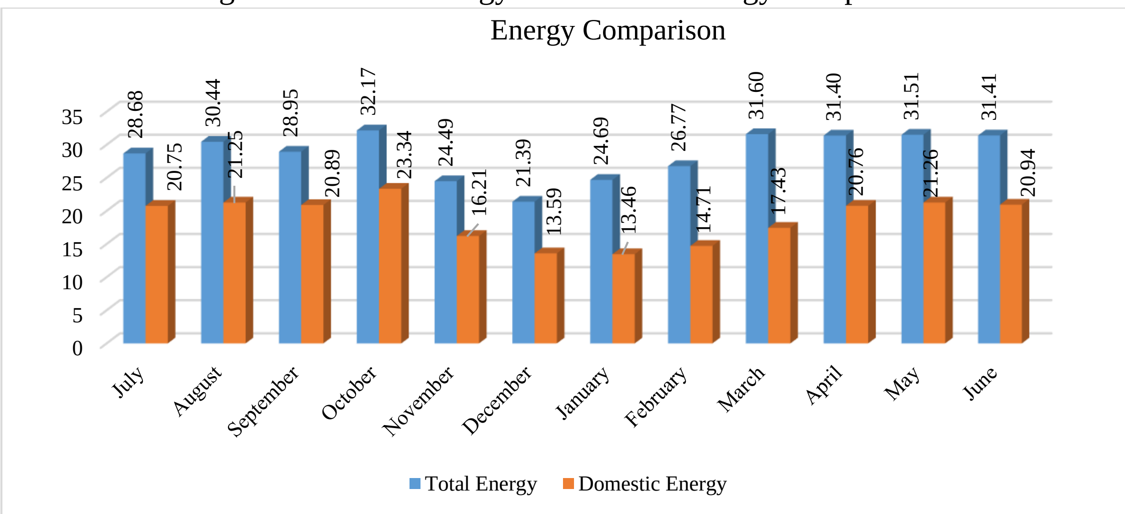


Figure 5.10- Domestic & Lifeline & Slab 1-75 Energy Comparison

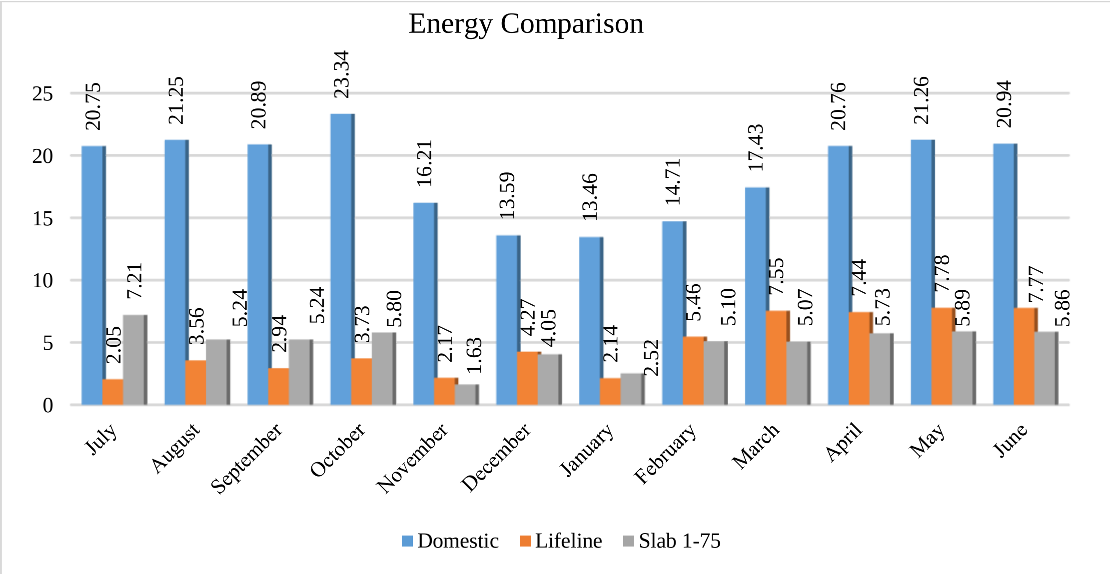
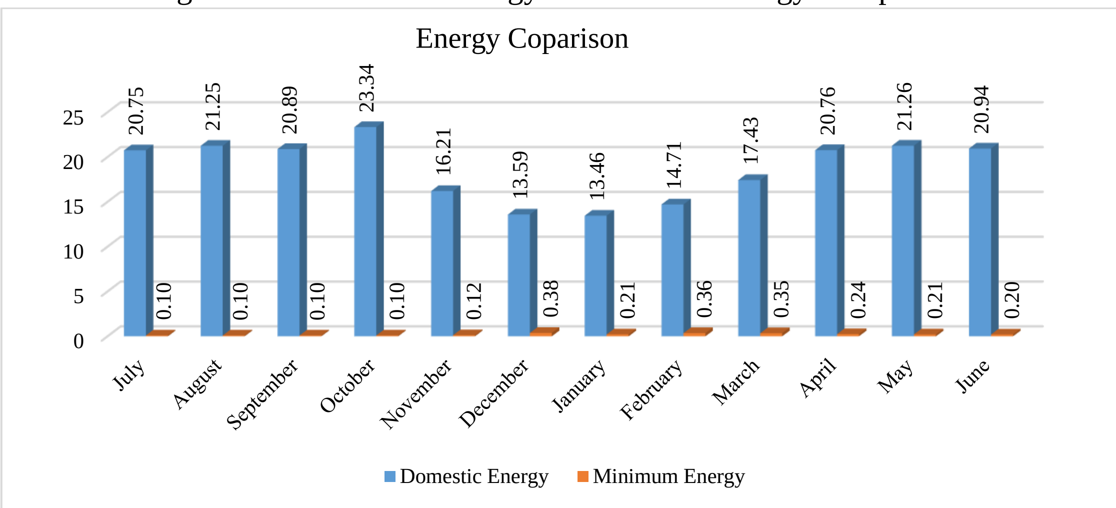


Figure 5.11- Domestic Energy & Minimum Energy Comparison



5.7 Class Wise Tariff

In before 2009 slab 0-20 tariff is 0, slab 0-100 tariff 2.53-2.90, slab 101-300 tariff is 2.57-2.95, slab 3001-500 tariff is 3.89-4.15, and slab 500++ tariff is 4.99-5.95. In commercial tariff is 5.11-5.15 , charitable tariff is 3.28-3.35, Irrigation tariff is 2.60-3.05 , general power tariff is 3.91-4.10 , large power tariff is 3.80-3.95 , street light tariff is 3.75-3,85

Table 5.3 Class wise Tariff (2009-march 2012)

Consumer Class	Slab	Before Dec,2009	Dec-09	Slab	1-Dec-12	1-Feb-12	1-Mar-12
Domestic	0-25	0	0	Minimum	0.00	0.00	0
	0-100	2.53-2.90	2.64-3.03	00-100	2.77-3.18	2.90-3.34	3.08-3.55
	101-300	2.57-2.95	2.81-3.23	101-300	3.25-3.73	3.45-3.95	3.67-4.20
	301-500	3.89-4.15	4.28-4.56	301-500	5.21-5.54	5.63-5.98	5.98-6.35
	500++	4.99-5.95	5.64-6.72	500++	6.87-8.18	7.42-8.83	7.88-9.38
Commercial		5.11-5.15	5.62-5.66	Flat	6.80	7.33	7.79
				Off-peak	5.23	5.88	6.25
				Peak	9.31	9.66	10.26
Charitable		3.28-3.35	3.28-3.35		3.45-3.52	3.62-3.70	3.85-3.93
Irrigation		2.60-3.05	2.60-3.05		2.73-3.20	2.87-3.36	3.05-3.57
General Power		3.91-4.10	4.30-4.51	Flat	5.27	5.67	6.02
				Off-peak	4.41	4.86	5.16
				Peak	6.75	6.90	7.33
Large Power		3.80-3.95	4.18-4.34	Flat	5.14	5.55	5.90
				Off-peak	4.40	4.86	5.16
				Peak	7.55	7.60	8.08
33KV				Flat	4.88	5.28	5.61
				Off-peak	4.30	4.78	5.08
				Peak	7.34	7.44	7.91
Street Light		3.75-3.85	4.12-4.23		4.90	5.28	5.61

In September 2015 slam minimum tariff is 0, slab 1-50 tariff is 3.36, slab 1-75 tariff 3.80, slab 76-200 tariff is 5.14, slab 201-300 tariff is 5.36, and slab 301-400 tariff is 5.63, slab 401-600 tariff is 8.70, slab 600++ tariff is 9.93. In commercial tariff is 9.80, charitable tariff is 5.22, Irrigation tariff is 3.82, general power tariff is 7.66, large power tariff is 7.57, 33KV tariff is 7.49 street light tariff is 7.17,

Table 5.4 Class wise Tariff (Sep 2012- sep2015)

Consumer Class	Slab	1-Sep-12	Slab	Mar-14	Sep-15
Domestic	Minimum	0.00	Minimum	0.00	0.00
	00-75	3.36-3.87	1-50	3.74	3.36-3.87
	76-200	4.05-4.63	1-75	3.87	3.80
	201-300	4.18-4.79	76-200	5.01	5.14
	301-400	6.88-7.30	201-300	5.19	5.36
	401-600	7.18-7.62	301-400	5.42	5.63
	600++	9.38	401-600	8.51	8.70
			600++	9.93	9.98
Commercial	Flat	9.00	Flat	9.58	9.80
	Off-peak	7.22	Off-peak	8.16	8.45
	Peak	11.85	Peak	11.85	11.98
Charitable		4.45-4.54		4.98	5.22
Irrigation		3.39-3.96		3.39-3.96	3.82
General Power	Flat	6.95	Flat	7.42	7.66
	Off-peak	5.96	Off-peak	6.64	6.90
	Peak	8.47	Peak	9.00	9.24
Large Power	Flat	6.81	Flat	7.32	7.57
	Off-peak	5.96	Off-peak	6.62	6.88
	Peak	9.33	Peak	9.33	9.57
33KV	Flat	6.48	Flat	7.20	7.49
	Off-peak	5.87	Off-peak	6.55	6.82
	Peak	9.14	Peak	9.28	9.52
Street Light		6.48		6.93	7.17

CHAPTER 6
POWER FACTOR CALCULATION

6.1 Introduction

The relation between active power and reactive power is called power factor. This standard value of power factor is 0.95 which is fixed by BREB. The value of Power factor increased by capacitor or auto PFI plant.

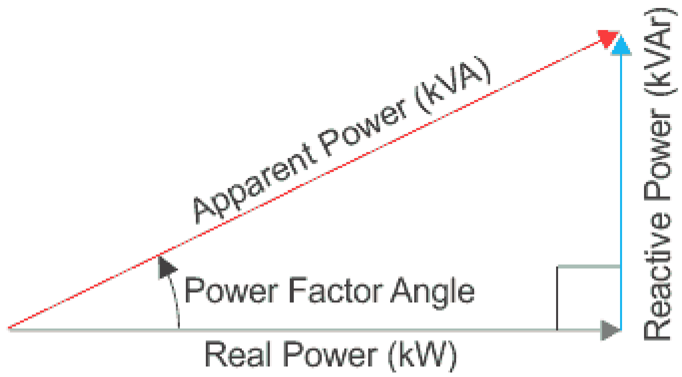


Fig 6.1

To help understand this better all these power are represented in the form of triangle. Mathematically, $S^2 = P^2 + Q^2$.

6.2 Power Factor Calculation

Power factor calculate by voltmeter and ammeter.we know $P = VI\cos\theta$ watt.

For this $\cos\theta = P/VI$

In this way we get power factor.

6.3 Power factor adjustment

6.3.1 In Domestic (House-hold) Applicability

When rules established in the Palli Bidyut Samity then applicable for single and three phase connecting of the following category as like household and water use 1.5 H.P

6.3.2 In Commercial Applicability

When it was established rules and regulations of the Palli Bidyut Samity then applicable for single and three phase electricity connection of the following category as like
Commercial enterprise, Private clinic and community hall etc.

6.3.3 In Case of Charitable Institution Applicability

When Palli Bidyut Samity build then applicable use single phase and three phase electricity connection of the following category of client:
Masjids, Temple, Churchs, Pagoda, Madrasha, Club, Orphanages etc.

6.3.4 Power Factor Adjustment for Domestic, Commercial, Charitable Institution

BERC issued time to time because its depend on client sequence.

6.3.5 In Case of Irrigation Applicability

Whole Palli Bidyut Samity help the people for easy life creating where farmer use pump maching for irrigation then REB discount on bill payment, it's a good decision for farmer future.

6.3.6 In Case of General Power

Palli Bidyut Samity have some rules and regulation. when REB supply voltage to the consumer in 230/400 v then we knows it general power. There are some type of general client bellow following:

- All charitable and religious
- Small industry
- Government office
- Poribar Kalian Kendra

6.3.7 In Case of large power

Large power use of habiate industry where supply voltage 6350/11000 and another household use supply voltage 250/400 v ,its loss for PBS But large power is a very profit site for PBS .There are some large power sector showed following:

- All habiate industries and industrial complex.
- Big complex office
- Big hospital complex as like squre,popular etc
- Cantonment, Air, Naval base etc.
- BDR Camp, BOP Installation etc.

6.3.8 Power Factor Adjustment for Irrigation, General power, large power

When consumer agree to 15 horse power use then unity power factor as possible. PBS fixed the power factor with 0.95.

6.4 P.F Correction Multiplication Factor:

Power factor will be fixed by PBS and if increase by actual kwh then multiplying by kwh.If P.F equal to 0.95 consumer and the consumer charge by actual kwh as per meter reading. If will be change time to time.

6.4.1 P.F. Penalty Formula:

Consider,

x/y = z

E * z = EC

EC * R = Energy Billed for P.F. penalty

Where,

x = 0.95

y = consumer P.F.

z = Multiplying factor

R = Energy Rate

EC = Energy calculate after P.F. Penalty

E = Energy consumed (KWh)

6.5 Power Factor Correction Example

PBS allow F.P is 0.95 but bellow P.F is 0.81 which lower then 0.95

$$=\frac{\text{Acceptable power factor}}{\text{Average power factor}}=\frac{0.95}{0.81}=1.17$$

When P.F is greater then 1 then we have to pay an extra bill.

If per unit rate is 5 Taka, then the amount of extra bill = (510× 5) Taka =2550 Taka

6.6 The Benefits for High Power Factor:

- P.F when high then power loss and voltage loss decrese
- If voltage drop is less then SL loss low
- If voltage drops is less than system loss also less.
- When power factor high then instrument efficiency is increase

6.7 Power Factor Penalty:

As per electricity tariff, the consumer should keep his average power factor in between 0.95 to 1.0. If power factor is lower than 0.95 the loss in providing your supply by the utility department is very high. To compensate this loss by the consumer, an extra charge is levied as Power Factor Correction charge (PFC).

Table 6.1: Power Factor Penalty CPBS-2 (2015-2016)

Month	KWh	Taka	
July	1544	10989	Per Unit 7.333tk
August	138451	1014328	
September	31125	251262	
October	33279	276273	
November	26828	198922	
December	7278	59137	
January	13973	87813	
February	18278	104979	
March	29446	184054	
April	17175	127065	
May	16427	133598	
June	339702	2490908	

CHAPTER 7
ELECTRICITY COST & RATE

7.1 Electricity Cost

It is a very important for business to keep the calculation .When we keep calculation of business then we measure profit or loss.PBS electrical is one of the business sector.Electrical power is the very important whole the world. Its increase our economy.

7.2 Electricity Purchase Cost

Distribution paid take to generation company by transmission company for bulk and wheeling charge.Where IPPs bulk price paid to PGCB for wheeling charge.

7.2.1 Bulk rate

Bulk rate is a rate which sale the BPDB to distribution company. BERE fixed this rate as per place private sector sale their electricity to the distribution company.

7.2.2 Wheeling Charge

Wheeling charge which is paid by distribution company.Distribution company take undevelop area to develop.But need to be new .We decrease our grid transmission loss then we found low price electricity.To enhance private and government sector to competiveness and substation increase between the different catagories of customer.

7.3 Distribution Cost

Distribution cost which is contain consumer expense, administration expense, maintenance expense, depreciation expense. tax expense, interest expense etc.

Table 7.1 Distribution & Total Supply Cost

Month	EC	Distribution Cost						Distribution cost	SL (10^7Tk)	Supply Cost
		OME	CSE	AGE	DAE	TE	IE			
July	14.683	0.943	0.993	0.452	0.888	0.000	0.630	3.905	0.371	18.959
August	15.857	0.584	0.706	0.355	0.895	0.000	0.630	3.170	0.441	19.469
September	16.704	0.944	0.982	0.556	0.898	0.050	0.630	4.059	0.524	21.288
October	16.270	0.637	0.772	0.429	0.910	0.000	0.630	3.378	0.092	19.740
November	12.978	1.321	0.781	0.488	0.960	0.050	0.673	4.273	0.363	17.613
December	11.746	0.766	0.800	0.402	0.898	0.198	0.630	3.692	0.296	15.734
January	13.199	1.784	1.505	0.593	0.898	0.051	0.630	5.460	0.233	18.893
February	14.053	0.586	0.783	0.466	0.898	0.004	0.630	3.367	0.192	17.612
March	17.918	0.631	0.694	0.384	0.898	0.050	0.630	3.286	0.657	21.861
April	18.437	0.661	0.778	0.495	0.898	0.407	0.630	3.869	0.961	23.268
May	15.837	0.726	0.705	0.406	0.898	0.000	0.631	3.365	0.097	19.299
June	19.422	1.694	1.985	4.171	0.898	0.218	0.779	9.744	1.533	30.699
Grand total	**187.104**	**11.275**	**11.485**	**9.196**	**10.837**	**1.027**	**7.749**	**51.569**	**5.761**	**244.434**

7.3.1 Operation & maintenance expenses (OME)

All expenses is not operational and maintenance expense as like substation expenses, overhead line expenses, meter expenses, operation and maintenance expense etc

7.3.2 Consumer selling expenses (CSE)

Consumer selling expenses means consumer related expense as like meter reading expenses, consumer collection expenses, consumer selling expenses etc

7.3.3 Administration and General Expenses (AGE)

AGE is a two part one operation and maintenance expenses, with the bulk rate operation base. .Its also contain different expense as like operation expenses, office supplies expense and administrative expenses.

7.3.4 Depreciation & amortization expenses (DAE)

Monthly depreciation cost at the end of month. DPBS-1 calculate 5% depreciation of its assets.

7.3.5 Tax expenses (TE)

Tax expenses such as expense for revenue. Tax on municipal, Tax on development etc.

7.3.6 Interest expenses (IE)

Interest expense on loans from bank, BREB or from any other loans are included as IE. CPBS-2

7.3.7 System loss Tk/Unit (SL)

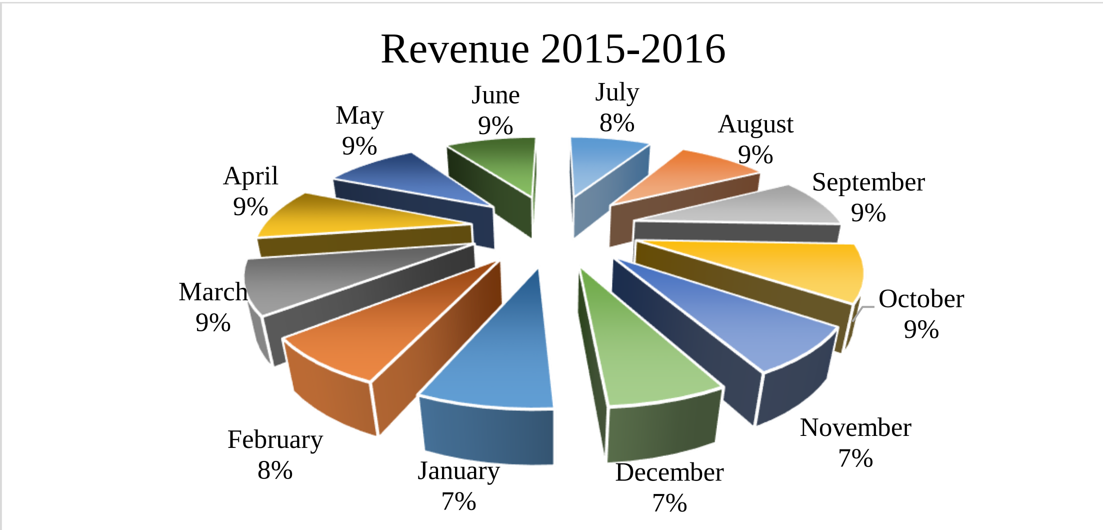
System loss (Tk/Unit) is calculated the price of each unit in system loss. Where,

System loss (Tk/Unit) = ((Purchase cost/Sell Energy)-(Purchase cost/Import Energy))*10

7.4 Total Revenue

Revenue meanse income ,pbs earn into the consumer service but consumer maintain service is so low.

Figure7.1



7.4.1 Total Revenue (TR)

We calculate the revenue in the end of month.REB earn two source one is from sale energy and another operating source.

Total revenue = Revenue from other + Revenue from salse others.

7.4.1.a Revenue from Sales Energy

This revenue collect from consumer from different catagory.

Table7.2: Import energy, Purchase cost, Expenditure, Sell energy, Revenue, Distribution cost of energyaccording to the Thesis Calculation

Month	Energy Import (MU)	Energy Purchase Cost (10^7Tk)	Energy Sell (MU)	Distribution cost (10^7Tk)	Total Supply Cost (10^7Tk)	Revenue from Sell Energy (10^7Tk)	Revenue from other sources (10^7Tk)	Total Revenue (10^7Tk)	System Loss%	Surplus (+/-) (10^7Tk)	System Loss (10^7Tk)	System Loss (Tk/Unit)	Distribution Cost (Tk/Unit)	Total Revenue (Tk/Unit)
July	35.076	14.598	29.914	3.905	18.959	16.944	0.276	17.221	14.717	-1.739	0.371	0.718	1.458	4.909
August	37.683	15.828	31.895	3.170	19.469	18.198	0.424	18.622	15.362	-0.847	0.441	0.762	1.141	4.942
September	37.251	16.620	31.196	4.059	21.288	17.700	1.490	19.191	16.255	-2.097	0.524	0.866	1.496	5.152
October	36.210	16.226	33.580	3.378	19.740	19.433	0.466	19.898	7.264	0.158	0.092	0.351	1.046	5.495
November	28.841	12.911	24.396	4.273	17.613	15.230	0.515	15.745	15.414	-1.868	0.363	0.816	1.927	5.459
December	26.198	11.711	22.349	3.692	15.734	13.369	1.317	14.686	14.690	-1.048	0.296	0.770	1.800	5.606
January	29.403	13.167	25.740	5.460	18.893	15.078	0.494	15.572	12.459	-3.321	0.233	0.637	2.224	5.296
February	31.277	14.024	27.823	3.367	17.612	15.456	0.465	15.921	11.046	-1.691	0.192	0.557	1.289	5.090
March	39.870	17.885	32.926	3.286	21.861	18.028	1.532	19.560	17.415	-2.302	0.657	0.946	1.208	4.906
April	41.060	18.395	32.685	3.869	23.268	18.761	0.801	19.562	20.396	-3.706	0.961	1.148	1.491	4.764
May	35.247	15.801	32.595	3.365	19.299	18.986	0.609	19.595	7.524	0.296	0.097	0.365	1.073	5.559
June	43.229	19.383	32.663	9.744	30.699	18.977	0.879	19.856	24.443	-10.843	1.533	1.451	3.464	4.593
Grand total	421.35	186.55	357.76	51.57	244.43	206.16	9.27	215.43		-29.01	5.76			

7.4.1.b Revenue from others

Revenue from others is actually summation of operating revenue from other sources, non-operating margins- interest and non-operating margins-Others.

Revenue from others = other operating revenue + Non-operating Margins- Interest + Non-operating Margins-Others

7.4.1.c Other operating revenue

Late payment charge, miscellaneous service revenue, rent for electric property and other electric revenue are calculated as other operating revenue.

7.4.1.4.d Non-operating Margins- interest

Interest from bank deposit, interest from employee loans (Home loan) related with this part. PBS calculates this as revenue and employee have to pay about 10% interest on their home loan.

7.5 Total supply cost (TC)

Total supply cost means which supply voltage supply into the consumer at the door. DPBS-1 showed about 71.425 core taka as their total supply cost.

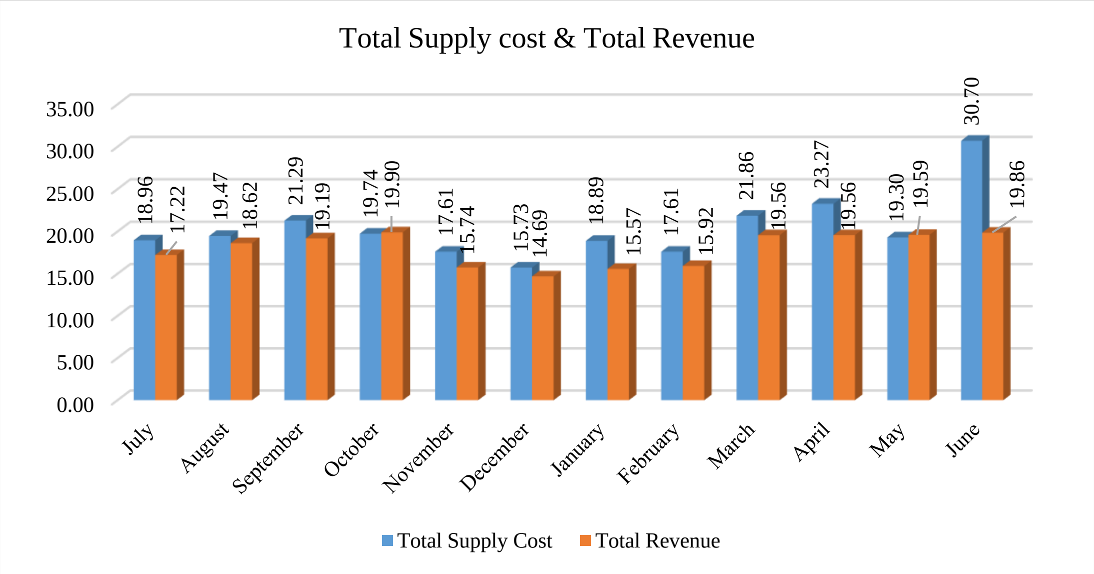
Total supply cost (TC) = Energy Purchase Cost+ System Loss (in Tk) + Distribution cost (DC)

7.6 Surplus

Surplus defines profit or loss of a PBS. It's also known as operating margin.

Surplus = Total Revenue - Total Supply Cost

Figure -7.2 Total Supply Cost & Total revenue



7.7 Per Unit Cost Calculation

REB calculate the unit cost as theire fixed taka.Then we calculate the profit or loss about PBS.

7.7.1 Distribution Cost (Tk/Unit)

In July, 2015

CPBS-2 had 18.96 core taka Total Supply Cost, 14.60 core taka Energy Purchase Cost and Energy sell is 29.91 MU. So the Distribution cost (Tk/Unit) of July, 2015 is

Distribution Cost (Tk/Unit) = ((Total Supply Cost - Energy Purchase Cost) / Energy Sell)*10

= ((18.96 – 14.60) / 29.91) * 10

= 1.458Tk / Unit

7.7.2 Revenue (Tk/Unit)

In July, 2015 CPBS-2 had 17.22 core taka Total income and import 35.08 MU energy. So Revenue on July, 2015 was

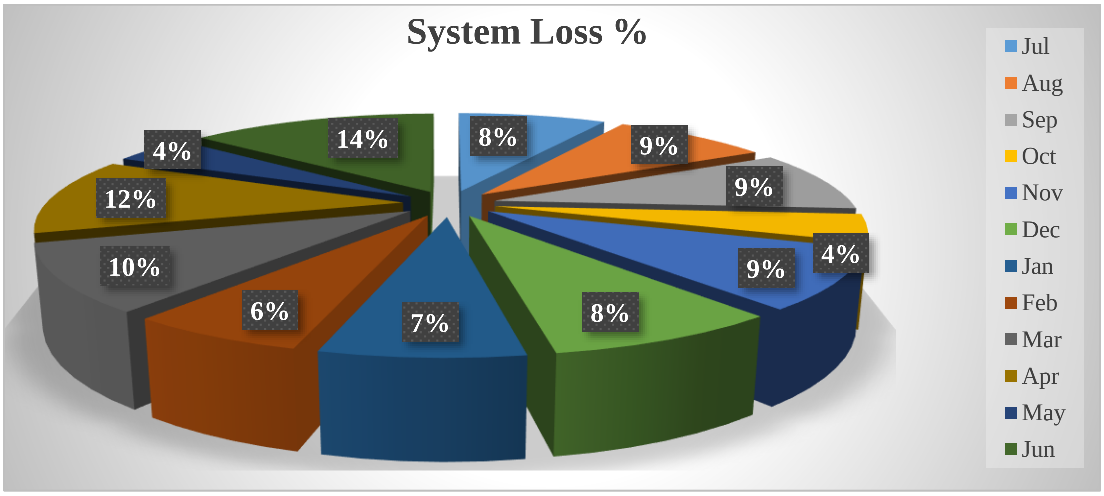
Income (Tk/Unit) =(Total Revenue / Energy Import)*10

= (17.22/ 35.08) * 10

= 4.10 Tk / Unit

7.7.3 System Loss (Tk) = Import Energy X System loss (Tk/Unit)

Figure 7.3 System Loss



7.8 Summary

In this chapter show that CPBS-2 is a lossPBS because total revenue is less than total supply cost.

CHAPTER 8
CNCLUSION

8.1 Introduction

Now it is possible to control load demand by proper load management, encouraging Independent Power Producers (IPP) and reducing transmission loss or system loss. Initiative should be taken to develop skilled manpower required for the power sector May take the responsibility to increase the power generation and ensure its proper use in Bangladesh.

8.2 Limitations

At first we planned lots of thing to do for this work. We got only one year data (2015-2016). If we got 4-5 years data then fulfil our work. After analyzed this data I think they input randomly some of data in their data store. I mean, they are not input accurate data. Although non-cooperating attitude in Comilla PBS-2 authority. There are no information in Comilla PBS-2 website. We also want to visit one or more substation to understand the whole process of substation but that is not done because of some problem which was unavoidable. But we finished this task properly. That’s all.

8.4 Future Plan of Comilla PBS-2

Tosupply electricity in all house, Comilla PBS-2Authorities take some task.

There are 10 MVA substation proposed in Comilla sadar-1 which is 10 Km. 20MVA substation proposed in burichong which is 10 Km. 10 MVA substation proposed in B-para-2 which is 26 Km. 20 MVA substation proosed in sadar south-1 which is 12.83 Km. Also 132/33 KV grid susstion proposed in choudagram grid which is 0.70 Km .

In Comilla PBS-2 established some 33/11 KV substation.

There are two 33/11KV substation proposed in jangalia Grid (Comilla South). Also in this grid 19 Km 33kv line are proposed in Noapara. And 12 Km 33 KV line proposed to chaouddagram feeder. Also 41 Km REB 33 KV line proposed in Laksam.

In Fen Grid one 33/11 KV substation proposed in Chouddagram-2 Location. And 1.50 Km underground line & 10.04 Km overhead line proposed form REB Feeder.

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Appendix A

Total revenue = Revenue from sales of energy + revenue from others

Revenue from others = other operating revenue + Non-operating Margins- interest+ Non-operating Margins-Others

Distribution cost = Operation & maintenance+ Consumer selling expenses + Administration & general Expenses + Depreciation & amortization +Tax Expenses+ interest Expenses

Total supply cost = Energy Purchase Cost+ System Loss + Distribution cost

System Loss (Tk) = Import Energy×System loss (Tk/Unit)

Surplus (Tk) =Total Revenue − Total supply cost

Energy Purchase Cost=Energy×Rate

Rate= Bulk rate + Wheeling Charge

System loss (Tk/Unit) = $\left(\frac{\text{Purchase cost}}{\text{Sell Energy}} - \frac{\text{Purchase cost}}{\text{Import Energy}}\right)\times 10$

System Loss % $= \frac{\text{Energy Import} - \text{Energy Sell}}{\text{Energy Import}} \times 100$

Distribution Cost (Tk/Unit) $=\frac{\text{Total Supply Cost} - \text{Energy Purchase Cost}}{\text{Energy Sell}} \times 10$

Total Revenue (Tk/Unit) $=\frac{\text{Revenue from other sources}}{\text{Energy Import}} \times 10$

Load Factor $=\frac{\text{Total Unit kWh(Purchase)}}{(\text{Total Peak demand}\times 1000)\times 24\times 30)} \times 100$

Unit KWh (Purchase) % $=\frac{\text{Reference grid unit KWh}}{\text{Total Unit KWh purchase}} \times 100$

Increment % $=\frac{\text{Present value} - \text{Past value}}{\text{Past value}} \times 100$

Grand Total = Sum of all values

How REB calculate:

Revenue from others = other operating revenue Margins-Others

Distribution cost = Operation & maintenance

Total cost of electric service = Operation & maintenance+ Consumer selling expenses + Administration & general Expenses + Depreciation & amortization +Tax Expenses+ interest Expenses.

Appendix B

There are 15 substations under CPBS-2 which are connected with different grids. Here, are the substation data in 2015-2016 years.

Import point	July					August				
	Peak Demand	Unit kWh (Purchase)	Total KWh(sold)	SL %	Load Factor	Peak Demand	Unit kWh (Purchase)	Total KWh(sold)	SL %	Load Factor
Chouddagram-S/S	11.50	5,618,750				9.15	4,929,750			
Moinamoti-S/S	11.68	4,900,000				12.30	5,357,000			
Comilla PBS-1-	0.25	52,205				0.30	64,395			
Kotbari-Alampur-	3.00	1,356,021				3.25	1,506,578			
Baghmara-S/S	10.20	3,893,000				10.33	4,246,000			
Head Office-S/S	12.50	4,701,500				12.50	4,922,500			
EPZ-S/S	6.03	1,614,000				6.38	2,135,000			
Harindhara-33KV	-	-				-	119,100			
Barura S/S	-	-				-	-			
Sayedpur-33/.24Kv	-	-	29,914,412	12.10	62.15	-	0	31,894,711	10.93	62.49
Palpara-33Kv	0.20	110,640				-	0			
B.Para S/S	10.50	4,632,375				11.70	5,020,125			
Chouddagram-SS-2	7.75	3,701,000				11.11	4,398,000			
Sakura Captive Power	-	1,575,507				-	1,200,148			
Narayonpur(B.Baria)	-	0				-	0			
Comilla PBS-4	-	1,878,961				-	1,911,930			
Chouddagram-SS-3	-	0				-	0			
Moinamoti Grid	-	0				-	0			
Total	73.61	34,033,959				77.02	35,810,526			

Import point	September					October				
	Peak Demand	Unit kWh (Purchase)	Total KWh(sold)	SL %	Load Factor	Peak Demand	Unit kWh (Purchase)	Total KWh(sold)	SL %	Load Factor
Chouddagram-S/S	9.15	4,825,500				9.00	4,398,000			
Moinamoti-S/S	10.89	4,728,000				9.50	5,394,710			
Comilla PBS-1-	0.30	60,685				0.25	59,095			
Kotbari-Alampur-	3.25	1,529,818				3.00	1,432,815			
Baghmara-S/S	10.00	4,166,000				8.50	4,166,000			
Head Office-S/S	11.50	4,873,500				9.00	4,576,500			
EPZ-S/S	6.41	1,809,000				6.30	2,015,000			
Harindhara-33KV	-	0				-	0			
Barura S/S	-	0				9.50	4,882,625			
Sayedpur-33/.24Kv	-	0	31,196,061	13.53	68.35	-	0	33,579,598	3.20	69.33
Palpara-33Kv	0.20	119,100				0.20	83,006			
B.Para S/S	10.50	5,181,000				-	0			
Chouddagram-SS-2	7.75	3,847,000				7.50	3,702,000			
Sakura Captive Power	-	1,434,162				-	889,436			
Narayonpur(B.Baria)	-	0				-	0			
Comilla PBS-4	-	2,233,734				-	520,647			
Chouddagram-SS-3	3.36	1,270,690				4.50	2,569,310			
Moinamoti Grid	-	0				-	0			
Total	73.31	36,078,189				67.25	34,689,144			

Import point	November					December				
	Peak Demand	Unit kWh (Purchase)	Total KWh(sold)	SL %	Load Factor	Peak Demand	Unit Wh(Purchas	Total KWh(sold)	SL %	Load Factor
Chouddagram-S/S	7.20	3,210,875				7.200	3,144,000			
Moinamoti-S/S	8.90	4,140,457				8.900	3,544,748			
Comilla PBS-1-	0.20	42,930				0.200	53,620			
Kotbari-Alampur-	2.25	1,067,033				2.250	959,466			
Baghmara-S/S	6.70	3,550,000				6.700	3,481,000			
Head Office-S/S	8.00	3,333,000				8.000	3,650,500			
EPZ-S/S	6.25	1,900,000				6.250	1,872,817			
Harindhara-33KV	-	0				-	0			
Barura S/S	-	0				-	0			
Sayedpur-33/.24Kv	-	0	24,395,771	12.30	66.04	-	0	22,349,286	12.62	58.77
Palpara-33Kv	-	93,455				-	0			
B.Para S/S	6.75	3,562,625				6.750	2,964,500			
Chouddagram-SS-2	7.00	2,869,000				7.000	2,834,000			
Sakura Captive Power	-	419,991				-	1,037,794			
Narayonpur(B.Baria)	-	0				-	0			
Comilla PBS-4	-	1,729,002				-	152,769			
Chouddagram-SS-3	5.25	1,899,000				5.250	1,882,000			
Moinamoti Grid	-	0				-	0			
Total	58.50	27,817,368				58.500	25,577,214			

Import point	January					February				
	Peak Demand	Unit kWh (Purchase)	Total KWh(sold)	SL %	Load Factor	Peak Demand	Unit kWh (Purchase)	Total KWh(sold)	SL %	Load Factor
Chouddagram-S/S	9.50	3,394,875				8.00	2,816,000			
Moinamoti-S/S	10.00	4,007,240				10.00	4,541,220			
Comilla PBS-1-	-	53,530				0.20	54,325			
Kotbari-Alampur-	-	994,281				2.50	1,180,708			
Baghmara-S/S	8.50	4,034,000				7.50	4,409,000			
Head Office-S/S	10.00	4,018,000				9.50	4,125,500			
EPZ-S/S	6.50	1,814,000				7.00	1,816,000			
Harindhara-33KV	-	0				-	-			
Barura S/S	-	0				7.50	-			
Sayedpur-33/.24Kv	-	0	25,739,596	10.43	57.87	-	-	27,822,641	7.35	65.18
Palpara-33Kv	-	0				-	102,953			
B.Para S/S	8.75	4,221,250				-	4,424,750			
Chouddagram-SS-2	8.75	3,173,000				7.50	3,573,000			
Sakura Captive Power	-	913,102				-	782,096			
Narayonpur(B.Baria)	-	0				-	8,086			
Comilla PBS-4	-	149,545				-	158,287			
Chouddagram-SS-3	4.75	1,965,000				6.50	2,038,000			
Moinamoti Grid	-	0				-	0			
Total	66.75	28,737,823				66.20	30,029,925			

Import point	March					April				
	Peak Demand	Unit kWh (Purchase)	Total KWh(sold)	SL %	Load Factor	Peak Demand	Unit kWh (Purchase)	Total KWh(sold)	SL %	Load Factor
Chouddagram-S/S	10.00	4,504,125				10.00	4,613,500			
Moinamoti-S/S	14.00	6,339,583				14.00	6,664,000			
Comilla PBS-1-	0.30	66,515				0.30	78,251			
Kotbari-Alampur-	3.00	1,505,568				3.00	1,513,171			
Baghmara-S/S	10.00	5,112,000				10.00	5,200,000			
Head Office-S/S	12.00	5,456,500				12.00	5,414,500			
EPZ-S/S	7.00	2,074,000				7.00	2,423,000			
Harindhara-33KV	-	-				-	-			
Barura S/S	-	-				-				
Sayedpur-33/.24Kv	-	-	32,926,208	13.35	63.53	-	-	32,685,297	16.15	67.34
Palpara-33Kv	-	0				-	0			
B.Para S/S	9.00	5,604,500				9.00	5,150,750			
Chouddagram-SS-2	8.00	3,762,096				8.00	3,735,467			
Sakura Captive Power	-	916,040				-	1,186,595			
Narayonpur(B.Baria)	0.10	4,454				0.10	658			
Comilla PBS-4	-	177,814				-	245,919			
Chouddagram-SS-3	7.00	2,476,000				7.00	2,757,000			
Moinamoti Grid	-	0				-	0			
Total	80.40	37,999,195				80.40	38,982,811			

Import point	May					Juna				
	Peak Demand	Unit kWh (Purchase)	Total KWh(sold)	SL %	Load Factor	Peak Demand	Unit kWh (Purchase)	Total KWh(sold)	SL %	Load Factor
Chouddagram-S/S	11.50	4,075,875				12.00	4,784,625			
Moinamoti-S/S	15.00	5,448,000				16.00	7,541,782			
Comilla PBS-1-	0.30	57,770				0.40	71,548			
Kotbari-Alampur-	3.00	1,127,616				1.50	991,063			
Baghmara-S/S	12.00	4,200,000				12.00	5,600,000			
Head Office-S/S	12.00	4,450,000				11.00	5,493,500			
EPZ-S/S	8.50	2,587,000				8.50	2,717,000			
Harindhara-33KV	-	-				-	-			
Barura S/S	-	-				-	-			
Sayedpur-33/.24Kv	-	-	32,594,813	3.48	50.83	-	-	32,662,517	21.23	65.15
Palpara-33Kv	-	0				-	-			
B.Para S/S	11.00	4,441,170				11.00	5,700,000			
Chouddagram-SS-2	8.50	3,806,000				8.50	4,384,000			
Sakura Captive Power	-	867,891				-	1,092,466			
Narayonpur(B.Baria)	-	0				-	239			
Comilla PBS-4	-	182,027				-	196,102			
Chouddagram-SS-3	7.50	2,524,000				7.50	2,888,000			
Moinamoti Grid	-	2,563				-	5,125			
Total	89.30	33,769,912				88.40	41,465,450			