ISSN 2229-5518

An Overview of Rural Electrification in Bangladesh

Tausif Ali, Iftekhar Zaman Arnab, Muhammad Omar Faruk

Abstract— Bangladesh is an energy hunger country. After the liberation war to meet up power crisis was one of the most important challenges for government. Day by day the challenge becomes really harder to harder to meet up power crisis, especially to meet up power crisis in rural area. So government formed Rural Electrification Board (REB) from Bangladesh Power Development Board (BPDB) to fulfill the power demand for village people. This organization is playing a vital role for the village people. After the establishment of REB now all most 50% of the villages are being electrified. The purpose of this paper is to give an overview of REB and at the same time emphasis is given socio economic impact of REB.

Index Terms— REB; BPDB; DPDC; DESCO; EGCB; WZPDL; PGCB; Organization; PBS; Operation & Maintenance; Distribution system; Generation; socioeconomic impact.

1 INTRODUCTION

Bangladesh is a developing country [1]. Shortly after the creation of an independent Bangladesh, in 1972, the first Government of Bangladesh, in an effort to speed up the investment in the sector issued an Ordinance creating the Bangladesh Power Development Board (BPDB) [2]. The BPDB is responsible for major portion of generation and distribution of electricity mainly in urban areas of the country. The Board is now under the power Division of the ministry of power, Energy and Mineral Resources [3]. As of April 2010, the total numbers of transmission and distribution lines are recorded to 8,359 km and 266,460 km respectively. However, 53,281 villages have been electrified so far. In Bangladesh per capita generation is 220 KW hr which is comparatively lower than other developed countries in the world [4].The forecast of maximum demand for FY 2010 was 6454 MW. Total installed capacity was 5823 MW. During this year 16,072 GWh of net energy was generated in the public sector power plant. In addition about 11,398GWh of electricity was purchased by BPDB. As a result, the net energy generated by public and privet power sector power plants stood at 27,470 GWh, 7.21% higher than the previous year's net generation of 25,622 GWh. The overall thermal efficiency (Net) of the generators in the public sectors in FY 2010 was 32.12% compared to 31.99% in the previous year. Government has given priority to power sector development and has made commitment to provide access to electricity to all citizens by 2021. In order to achieve this goal Government has taken a number of reform measures, some of them have already been implemented [5]. In the recent past a number of Generation and Distribution companies have been created under the reform programme. Ashuganj Power Station Company Ltd. (APSCL), Electricity Generation Company of Bangladesh (EGCB), North West Power Generation Company Ltd.(NWPGCL) and West Zone Power Distribution Company Ltd. (WZPDCL) has already started functioning as company under BPDB [3].EGCB is now executing 2*120 MW peaking power plant. NWPGCL has stared procurement process of 450 MW CCPP at Shiddirganj & 360 MW CCPP power plant at Haripur. Under the reform program Dhaka electric Supply Authority (DESA) for the proper management & electrification in Dhaka city and its adjoining districts in 1990.DESCO has started functioning from 1997 [5]. Since 1971, the Government of Bangladesh (GOB) accelerated the RE Program to provide electricity in the rural areas as early as possible. But it was soon realized that the country wide electrification program was a gigantic task [8].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 Power Energy and Minerals Resources, which was responsible for electrifying Bangladesh. 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 rural areas, whereby there would be improvements in the standard of living and quality of life for the rural people [9].Most of the people in our country lives in rural areas. Government of Bangladesh is giving a lot of emphasis to this rural people. So, this paper gives an overview on the rural electrification board of our country.

2 ORGANIZATION AND FUNCTIONS OF REB

After starting functioning REB has gone to a lot of changes. But to ensure a proper function a board was crated. It consists of a Chairman, four full time members and four part time members. Also to ensure direct participation of the beneficiaries, each project area should form an electric cooperative, called a Palli Bidyut Samity (PBS).These PBSs consists of several members. But PBS is directed by a member of REB.A organization chart of REB is given below:

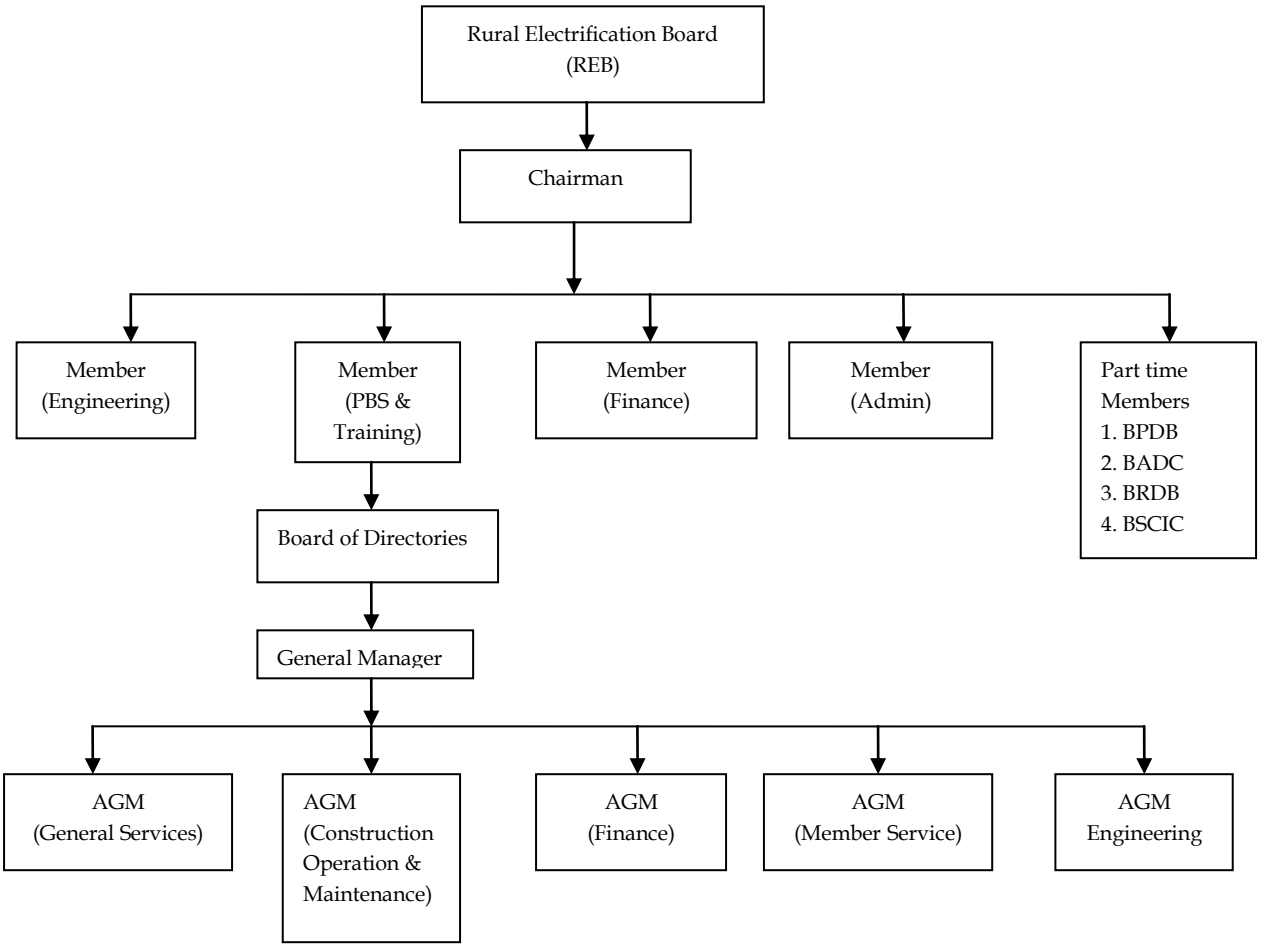

Fig 1.Organogram of REB

2.1 CHAIRMAN

Chairman is the Chief Executive of the organization. He is responsible for administration, development and supervising the entire REB. Under him there is four fulltime & four par time member.

2.2 Member (Engineering)

He is responsible for a system design, equipment standards & specifications. He also looks after project works related to engineering & construction. He supervises PBS feasibility, power supply, electrical operations and maintenance and also repair of major equipment.

2.3 MEMBER (PBS & TRAINING)

PBS is a major part of REB. So, to look after this section a member is appointed. He looks after electric service regulation, business operation and financial maters. Since there are a board of directories and lots of members under this person, this member of REB has to provide all the facility for them.

2.4 MEMBER (FINANCE)

This member is responsible for all the financial maters of REB. It includes financial planning, capital security, control of REB funds, REB budget, PBS loan accounting system & PBS planning.

2.5 Member (Admin)

He is the recent addition to the Board. He is responsible for facilities and personnel of REB.

2.6 Part time members

This part time member is sent from different boards including Bangladesh Power Development Board (BPDB), Bangladesh Agricultural Development cooperation (BADC), Bangladesh Rural Development Board (BRDB) and Bangladesh Small and Cottage Industries Corporation (BSCIC).Under these members various offices and directories carry out the policies and procedures to achieve the programs goal. As mentioned before, a Board of Directories works under member of PBS & Training. Under these directories there is a General Manager who administrates five Assistant General Manager (AGM) of PBS. They look after general services, construction, operation, maintenance, finance, member service and engineering areas.

They are related to the people who are beneficiaries of having electricity.

3 OPERATION & MAINTAINENCE OF PBS DISTRIBUTION SYSTEM

Bangladesh's population is very huge. About 80% People lives in rural areas. There are about 84,320 and 460 upzilla. All these places and people come Under REB. So, to provide electricity to these people distribution system needs to be strong. The operation and Maintenance is two key factors.Some operational issues that must be addressed by PBS are Power supply plan & Coordination, Voltage Regulation, Power factor correction and customer service and quality.

In order to provide electricity to the rural people PDS and local BPDB officials make an annual plan. And the adequate measure is taken to maintain the supply demand balance. Single Phase step-type regulators are used in distribution system. They can lower or raise the voltage by 10%.When the voltage is normal lamp life is shortened. Poor power factor leads to a high system loss. This impacts quality of service to the members. Capacitor is installed in line's and member's end to reduce losses and increase voltage. In order to provide good service PBS has implemented "one point service". A customer can report problems to any PBSs office and can have the problem solved within the PBS office. These features make the operational system more stable and profound. Statistics of Distribution system is given below:

TABLE 1

DISTRIBUTION SYSTEM

Number of Approved Projects	45
Number of Approved PBSs	70
Number of PBSs organized	70
Number of PBSs electrified	70
Number of District included in RE program	61
Number of Upazillas included in RE program	433
Number of villages energized	48,799
Distribution Line constructed (Km)	2,26,455
No. of Meter connections	7,235,142
Number of 33/11KV Sub-station	432
Average system loss (70 PBSs)	14.31%
Average system loss(at grid meter)	15.05%
Number of population in Programme Area	9,25,13,296
Bill Collection	100.26%
Monthly Billing	$35.36

As it is seen from the statistics, the distribution system is very expensive. Replacement of the system is also costly. So we need to have a proper maintenance system. Some problem areas on this regards are-

- Over loaded line section/feeder.
- High interruption area/line section /feeders.
- Pilferage areas.

In order to observe the whole situation a map of distribution system should be maintained. The main objectives of maintenance should be to:

- Prolong the system life.
- Provide the quality service to the customers.
- Protect the Public and PBS Personnel from unsafe conditions.

With a stable operation & maintenance system a good distribution system can be achieved, which will help to provide electricity to most rural people.

4 GENERATION OF REB

REB doesn't generate any electricity. They purchase electricity from national grid or from selected IPPs at the 33Kv voltage level. They are responsible for providing electricity to their 70 PBSs members and customer. In Bangladesh electricity is in big crisis now. So, recently REB has taken initiative to generate its own electricity. REB selected 3 (three) sites, namely Dhaka PBS-1, Narsingdi PBS-1 and Comilla PBS-1 for implementing its 1st phase of Small Scale Power Generation as Pilot Project. Guaranteed Net Plant Capacity of each of the power station is 11 MW. Power generation of said three PBS has already been commissioned. Recently another six IPP has been commissioned.The power plants details are given below:-

TABLE 2

GENERATION OF REB

Sl No.	Name of PBS	Name of the Power Plant	Capacity (MW)
1.	Dhaka-1	(i) Ashulia Power Plant (ii) Ashulia Expansion Power Plant	11.00 33.75
2.	Narshingdi-1	(i) Madhabdi Power Plant (ii) Madhabdi Expansion Power Plant	11.00 24.30
3.	Comilla-1	(i) Chandina Power Plant (ii) Chandina Expansion Power Plant	11.00 13.50

4.	Narshingdi-2	NORSINGDI POWER PLANT	22.00
5.	Hobigonj	HOBIGONJ POWER PLANT	11.00
6.	Sirajgonj	ULLAPARA POWER PLANT	11.00
7.	Mymensingh-2	MAONA POWER PLANT	33.00
8.	Feni	FENI POWER PLANT	11.00
9.	Narayangonj	Rupgonj Power Plant	33.00
		Total	225.55

This 226 MW of electricity is very small compared to the generation of electricity by other Power Companies. But additional generation capacity would help in developing load growth thus improving the viability of the PBSs and enhancing the quality of their service to consumers through uninterrupted reliable power supply.

A comparison of power generation between REB and other companies is given below:

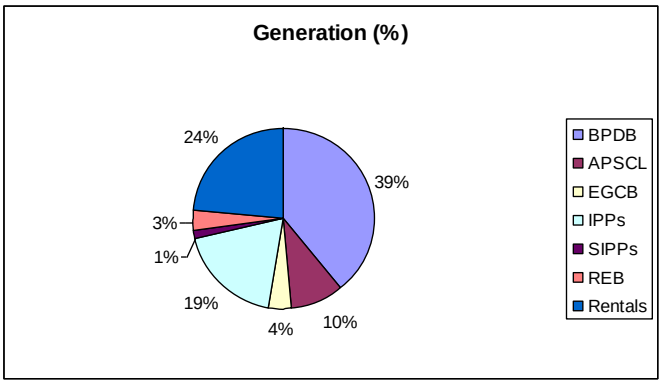

Fig 2.Genaration comparison

GOB aims at providing electricity to entire rural population by 2020. Connecting more than 700,000 consumers every year, it would take more than 20 years to provide access to all. So, REB is looking on to the Renewable energy sector. They are going to provide electricity in areas not reached by the grid by making solar home systems (SHS) available to household. A total of 13,000 SHS has been installed. Training of personnel, Installation guideline, Billing and bill collection procedures, Monitoring are some of the administrative criteria which will make this program successful. Also, REB has undertaken four solar PV projects in deferent areas of Bangladesh till to date. These are as follows:

- Diffusion of Renewable Energy Technologies (Pilot Project)
- Diffusion of Renewable Energy Technologies-2nd Phase
- Rural Electrification through Solar Energy IDA Credit No.3679 BD
- Promotion of the Use of Renewable Energies in the rural Areas of Bangladesh

So, by generating electricity by conventional fuel and renewable energy REB is trying to distribute electricity to the rural people.

5 Socio Economic Impact

As mentioned earlier 80% people of Bangladesh lives in rural areas. Most of them don't have access to electricity. But the RE program has a significant impact on the socio-economic conditions of rural people. Some of the impacts on the rural people are-

5.1 Agricultural sector

By providing electricity, a huge positive impact is on agricultural sector. Both land use intensity and cropping intensity with electrified pumps (DTW/STW/LLP) is higher than diesel operated. Average yield per acre under electrified pumps is 24% higher than that of diesel operated ones. Electrified pumps contribute one-third of the food self-sufficiency in Bangladesh. It covers 4.1 million acres of land for HYV Boro and Aman and produces 6.43 million tons of HYV Boro and Aman, which is about 29% of all similar types of rice, produced in Bangladesh. As agricultural productivity has increased, availability of rice & other food items in villages have helped rural people maintain better food habits.

5.2 Industrial Sector

Industry is the second highest consumer of rural electricity. It uses 41.53% of the total MWH. A substantial growth in industrial output and value has been added to the national economy. This is very helpful for rural people.

5.3 Education

The quality of education is better in electrified households. Literacy rate has also increased. By educating rural people GOB can attain success in every sector.

5.4 Women Empowerment

RE program have profound impact on women in various ways such as, participation with husband in decision-making, purchase/sale of land/livestock, construction/repair of houses, marriage, health and education. They can do extra work after household job and add to family earnings. Women are getting self-dependent, making small groups of income generating purposes, specially rearing poultry and cattle, making vegetable farms & taking-up weaving and sewing projects and opening small shops. The use of light during evening ensures women's safe movement from one place to another

5.5 HEALTH

After the start of RE program there are more hospitals and clinics in rural areas .So people are getting treatment when they need it. That is, a healthy is growing in rural areas.

5.6 COMMERCIAL

Business turnover in electrified shops was found to be two times greater than shops without electricity. This was true for both wholesale and retail outlets.

Besides these people are having lot of benefits by having electricity. The Re program has given them the enlightenment towards modern lining, freedom from poverty, malnutrition and hunger.

USAID has done a study on socio economic impact of the rural electrification program in Bangladesh. Some of their findings and assessments are:-

- Presently 55.41% villages and 5.08 million rural households are electrified and no. of beneficiaries is 30.5 million.
- Literacy rate in the electrified House Hold (HHs) is 71%, where 54% in the un-electrified HHs.
- In the electrified HHs students study 23 minutes more than the non-electrified HHs daily.
- 78.2% HHs reported an increase on working house.
- 62.0 % HHs reported an increase in HHs income.
- 93.7% reported an increase in children's study time.
- 92.0% reported an increase in amusement as well as standard of living.
- 94.7% reported an improvement in security.
- The annual infant mortality rate in the electrified HHs is 42.7/1000 live births, in the non-electrified HHs 57.8/1000.

So it is seen that RE program have profound and far-reaching economic, socio-cultural and demographic impacts on life and living of the rural people in Bangladesh. It has great impact on agricultural growth, industrialization and business and commercial activities. Thus, in order to accelerate the process of economic growth, strengthening pro-poor orientation in the growth process access to electricity of the households and social and economic institutions should be expanded within shortest time.

6 CONCLUSION

Bangladesh is still now can not reach to the final goal to meet up power crisis. It is because from the liberation war still now in power sector corruption is acting like a backbone. Something like this without corruption development is impossible. So as a power sector organization REB is also within the corruption. At the same time distribution loss and transformer threat is a major problem for REB. Sometimes REB fails to deliver the power on demand. It is because sometimes BPDB fails to give the power on demand of REB. Besides this things REB is really a profitable organization. REB can become more profitable if government keeps more budgets for this organization and gives strong emphasis to develop its infrastructure. Modernization of distribution system and man power development must be ensured by the government. Only then REB can keep great contribution for development of power sector in rural areas.

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BIOGRAPHIES

Tausif Ali was born in Dhaka, Bangladesh on 23rd January, 1990. Currently He is pursuing his undergraduate study under the dept. of Electrical and Electronic Engineering (EEE) in American International University- Bangladesh (AIUB). His research interests include power electronics and renewable energy. He can be reached at **tau9097@gmail.com**

Iftekhar Zaman Arnab is pursuing his undergraduate study under the dept. of Electrical and Electronic Engineering (EEE) in American International University- Bangladesh (AIUB). His research interests include power and energy engineering. He can be reached at **iz.arnab@gmail.com**

Muhammad Omar Faruk is pursuing his undergraduate study under the dept. of Electrical and Electronic Engineering (EEE) in American International University- Bangladesh (AIUB). His research interests include power and energy engineering. He can be reached at **saifan4eee@gmail.com**