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From Rural Electrification Board to Private Participants: Post Reform Developments in Bangladesh

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Abstract
Electricity sector in Bangladesh has gone through many problems related to generation, transmission and distribution. To manage the sector and to provide electricity to all the consumers across the country particularly to the rural households Bangladesh since its formation has taken many measures and formed institutional framework. But due to the problems, it had to undertake structure reform measures in the sector. These reforms allowed private operators to build and manage generation activities. These measures brought significant changes in the electricity sector of Bangladesh. The paper attempts to look into the sector from the pre-reform status to the post-reform changes.
Key words: REB, Power Development, Generation, Transmission, Distribution, Consumption

Introduction

Problems in the Bangladeshi electric power sector include high system losses delays in completion of new plants, low plant efficiencies, natural gas availability problems, erratic power supply, electricity theft and blackouts (such as the nationwide blackout in June 1998, 2006) (The Daily Star, 2006), shortages of funds for needed maintenance at the country's power plants and other power infrastructure, and unwillingness of customers to pay bills. Overall, the country's generation plants have been chronically unable to meet system demand over the past decade. With only around one third of the population connected to the electricity grid, and with power demand growing rapidly Bangladesh's Power System Master Plan (PSMP) projects a required doubling of electric generating capacity by 2010. Total investment required for this increased capacity is estimated at $4.4 billion through 2005 , which was not realised by the end of that year. In addition, Bangladesh also needed to replace 30%-40% of its generation capacity, due to aging infrastructure.

Along with the lack of physical infrastructure, Bangladesh power sector had been facing critical financial challenges, including insolvency (DESA owed to the BPDB Tk24748 million) (DESA, 2006). The Power sector has also suffered from poor accounting practices, which have resulted in delayed account and audit completion, overvaluation of assets, underestimation of expenses, and inadequate provision for bad debts (BPDB, 2006).

Rural Electrification Board (REB) of Bangladesh was established to provide electricity to consumers in the rural areas. It has substantial role to play in the electricity expansion programmes. REB occupies a major share in the total electricity distribution in the country. The PBSs operating under the supervision of the REB have an important role in Power Sector of Bangladesh. Since the inception of the REB, 57 PBSs have been established covering

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almost 90 per cent of the area of Bangladesh. Over 30,000 of a total of about 64,000 villages have been electrified and 4 million connections have been made. The REB recorded markedly lower system losses for distribution than either the BPDB or the Dhaka Electric Supply Authority. The later is responsible for distribution in metropolitan Dhaka.

Table 1
Bangladesh: Share of REB in overall consumption group in the pre and post reform era

Year	Total (nos)	REB (nos)	Percentage
1982	671032	25972	3.87
1985	1085499	196926	18.14
1991	1611875	708962	43.98
1992	1750951	798441	45.60
1995	2555462	1398926	54.74
2002	6398721	4708488	73.58

Source: Compiled and calculated on the basis of data provided by BPDB and REB in their respective Annual Reports from the study years. The total consumption data taken from BPDB, *Annual Report,* Dhaka, and the data related to REB taken from REB, *Annual Report,* 2003-2004, Dhaka.

In the pre and post reform consumer growth, the share of REB in the total consumption group increased enormously. Table 1 shows that in the pre reform period from 1981 to 1992, REB's share which was 3.87 percent in 1981 increased to 45.60 percent in 1992. This further substantially increased to 73.58 percent in the year 2002. Table 2 shows more clearly about this trend.

Table 2
Bangladesh: Year wise increase in the consumption group of REB

Year (Pre Reform period i.e. 1981-92)	Cumulative	Number Consumers added in the Year	Year (Post Reform period i.e. 1992-02)	Cumulative	Number Consumers added in the Year
1981-82	25,972	24,596	1992-93	798,441	90,479
1982-83	68,126	42,154	1993-94	930,601	132,158
1983-84	108,491	40,365	1994-95	1,174,571	243,972
1984-85	153,821	45,330	1995-96	1,398,926	224,355
1985-86	196,926	43,105	1996-97	1,661,510	262,584
1986-87	269,308	72,382	1997-98	2,005,380	343,870
1987-88	325,338	56,030	1998-99	2,379,202	373,822
1988-89	396,115	70,777	1999-00	2,891,647	512,445
1989-90	495,565	99,541	2000-01	3,395,721	504,074
1990-91	610,330	114,765	2001-02	4,058,362	662,641
1991-92	708,962	98,479			

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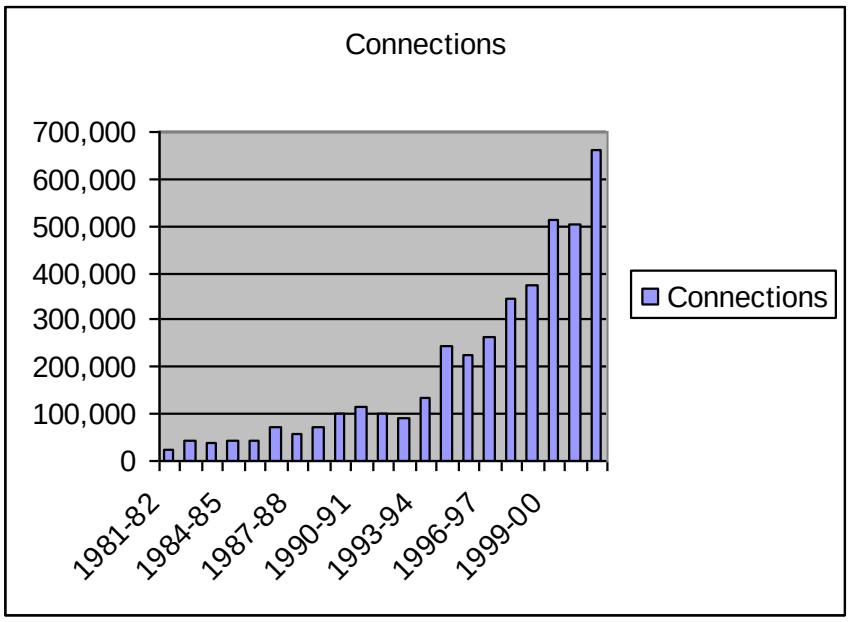
Source: REB, *REB and PBSs: Empowering Rural Bangladesh: 25th Anniversary ",* 2002, p. 49.

Table 2 shows the growth pattern of consumption groups of REB year wise. In the pre reforms period from 1981 to 1991 the consumers added to the existing cumulative consumption groups in those years were below one lakh. In the year 1981-82, the cumulative REB consumers were 25,972. In that particular year 24, 596 new consumers were added. In the year 1984-85 new consumers numbering 45,330 were added, which increased the cumulative consumers to 1,53,821. In the year 1991-92 the number of consumers were 7,08,962 in which 98,479 consumers were added in that particular year. In the post reform era from 1991-92 to 2001-02 the increase in the consumer pattern every year were in multiple lakhs. The cumulative consumers in the year 1992-93 were 7,98,441 in which 90,479 were added in that year. In the later years there was a sudden jump of about one lakh new consumers in one particular year 1994-95. In that year the cumulative consumption group increased to 11,74,571 in which 2,43,972 new consumers were added against the increase of 1,32, 158 in the previous year, i.e. 1993-94. The same trend continued in the later years. In 1997-98 about 90000 new consumers were connected with electricity facility. In the next five years this connections were given to 3 lakh more new consumers. The cumulative consumption also doubled from 20,05 380 in 1997-98 to 40, 58, 362 in the year 2001-02.

Figure 1
Bangladesh: Pattern of increase in REB Consumers since 1981 to 2002



Source: REB, *REB and PBSs: Empowering Rural Bangladesh: 25th Anniversary ",* 2002, p. 48.

Figure 1 shows that from the years 1981 to 1992-93 the electricity connections by REB remained below 1 lakh. From 1992 i.e. post reforms onwards the connections increased rapidly, touching 6,62,641 in 2001-02. This is multiple increase is in contrast to a slow

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increase in the previous decade. Unlike in the pre reform period, in the post reform period the increase in connections were faster and recorded a steadily positive up wards trend. This shows the success of REB.

Table 3

Bangladesh: Year wise Distribution Lines Laid in the Pre and Post Reform period

Year (Pre Reform)	Line Constructed (Km)	Cumulative (Km)	Year (Post Reform)	Line Constructed (Km)	Cumulative (Km)
1981-82	2622	5075	1992-93	5198	49119
1982-83	1965	7040	1993-94	7280	56399
1983-84	2040	9080	1994-95	8803	65202
1984-85	2415	11495	1995-96	9749	74951
1985-86	4635	16130	1996-97	10176	85127
1986-87	4665	20795	1997-98	10467	95594
1987-88	5030	25825	1998-99	9505	105099
1988-89	4202	30027	1999-00	11408	116507
1989-90	5327	35354	2000-01	12989	129496
1990-91	5039	40393	2001-02	14641	144137
1991-92	3528	43921			

Source: REB, *REB and PBSs: Empowering Rural Bangladesh: 25th Anniversary ",* 2002, p. 48.

Table 3 shows year wise distribution lines constructed in pre and post reform period. In the year 1982 about 2622 km lines were constructed thereby increasing the cumulative available distribution lines in that year to 5075 km. Since then by the end of 1991-92 a total of 43921 km lines were under operation. The average line construction in the pre reform period was 2500 km with the maximum of 5327 km laid in the year 1989-90. During this period the distribution line construction was laid in a much slower manner than the post reform period. In the post reform period the lowest annual line construction was 5198 km construction in 1992-93 which was the initial period of reform. Thereafter the line construction was more than doubled in 1996 with 10176 km in that year. By the end of 2001-02 it increased to 14641 km per annum.

In the beginning of 1992 the cumulative distribution lines were 49119 km which increased to 144127 km in 2001-02, an almost three fold increase. During this period the average annual distribution line construction stood around 8000 km almost four fold to the pre reform period.

Post Reform Developments in the Sector Organization

Inadequate electricity supply and very low levels of access to electricity are major constraints to Bangladesh economic growth even after reform process. Only about one third of the population (32 percent) has access to electricity and per capita generation is among the lowest in the world, about 160 kilowatt-hours (kWh) per year. At the same time, demand is rising.

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Consumption grew at an average annual rate of 8.2% from the year 1994 to 2004, and it is forecasted to grow at about 8% per year for the next 10 years. The dependable generating capacity is about 3,950 MW during the year 2004, load in the range of 2694MW was shed for a total of 951 hours over 232 days. Bangladesh is likely to face an anticipated shortfall of about 2,500 MW of generating capacity over the next 5 years from 2004. Hence there is a strong need to attract more domestic and foreign investment.

Overall system losses based on gross generation decreased from 37% in the year 1994 to 27% in 2004, while billing collection rates rose from 80% in the year 1994 to over 90% in 2004. The Government's reform initiatives culminated in the Cabinet Committee on Economic Affairs' approval of corporatization plans for BPDB in January 2004, BPDB's northwest zone distribution network in March 2004, and DESA in July 2004.

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Regional Disparity in Power Development

The Padma-Jamuna-Meghna river system divides Bangladesh into two zones, East and West. The East contains nearly all of the country's electric generating capacity, while the West, with almost no natural resources, must import power from the East. Electricity interconnection from the East to the West was accomplished with a 230-kilovolt (kV) power transmission line and none of the transmission lines were built from that year. The vast majority of Bangladesh's electricity consumption takes place in the East, with the entire region west of the Jamuna River accounting for only 22% of the total. Greater Dhaka alone consumes around half of Bangladeshi electricity. Out of 4125 MW total installed generation capacity of power in Bangladesh under public sector, Eastern region produces about 3180 MW of power where as Western region produces about 805 MW of power. Out of 19 power generation

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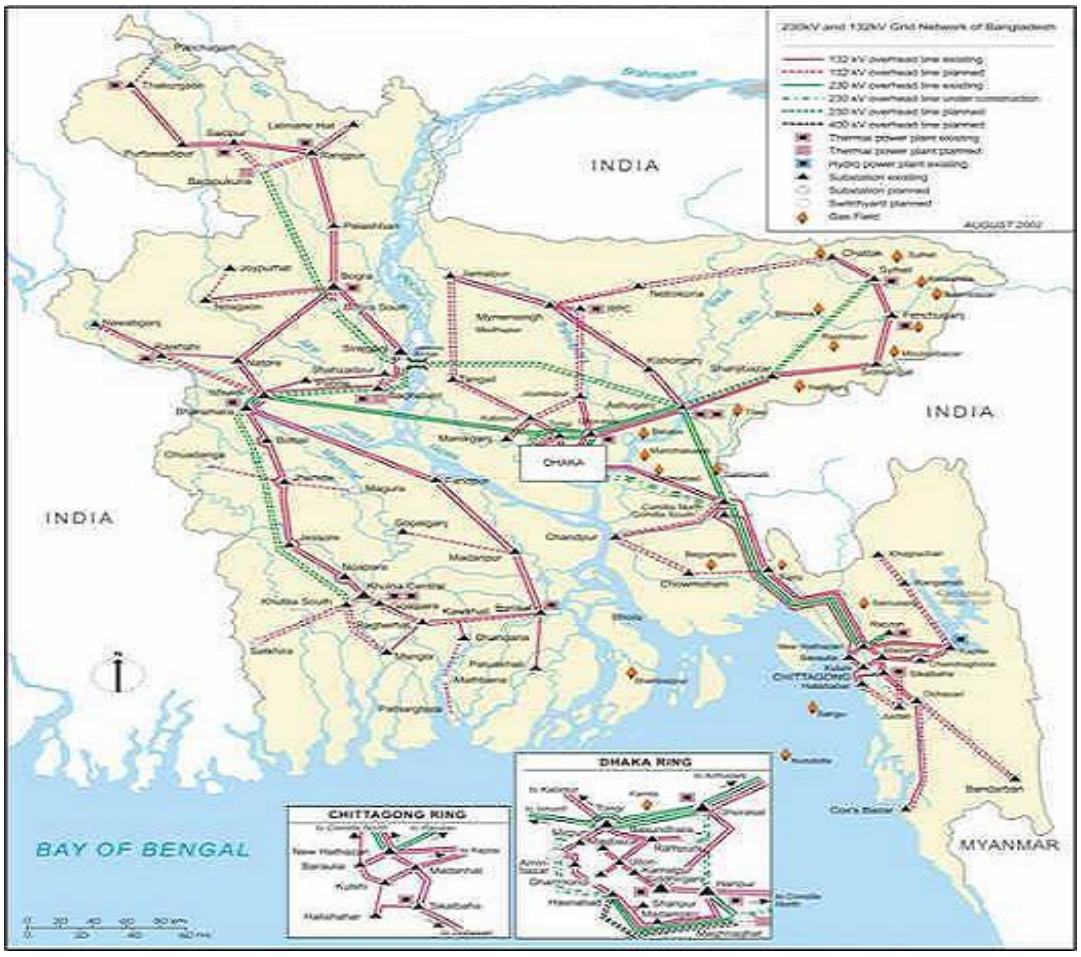
stations existing in the Western region non of them are based on natural gas. They are based on furnace oil and combustion turbine. In the Eastern region about 36 power plants are existing and they are based on Natural Gas and Hydro power sources.

This disparity can be attributed to the availability of Natural Gas. All Natural Gas fields are located in the Eastern region and the fuel composition of power production is highly tilted to natural gas in Bangladesh is one of the source of concentrated natural gas power plants in Eastern Region. The country's only Hydro based power plant is also located in the Eastern Region.

The electricity produced in the Eastern region transmitted through a 230kV transmission line built in 1982, but which began operating from 1989. Power exchange between two zones has led to substitution of oil based generation in the West with gas based generation in the East. Since the construction of first transmission line between two region non of the transmission lines were constructed in two decades. The second transmission line between Eastern and Western region which is about 230 kV is under construction and is expected to be completed by the end of 2007. This transmission line is expected to reduce dependency on the first East West inter connecting transmission line and reduce overall transmission losses.

Figure 2

Bangladesh: Inter Regional Transmission Line



Source: PGCB, *Annual Report 2002-03*, Government of Bangladesh, Dhaka, 2003, p. 53.

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Private Sector Participation

Given Bangladesh's electricity supply shortage, the government decided in October 1996 to issue a "Private Sector Power Generation Policy of Bangladesh" and began to solicit proposals from independent power producers (IPPs) in the hope of easing the country's electricity supply shortage. Several IPPs broke ground on new power stations after 1996, and more recently Bangladesh has attracted large investment proposals. In May 2005, U.S.-based Vulcan Energy signed a memorandum of understanding (MOU) with the government of Bangladesh for the construction of $1.6 billion in gas, coal, and fertilizer projects that would bring an additional 1,800 MW in generating capacity online.

Table 4
Bangladesh: Private Sector Participation

Generating Station	Type of Fuel	Capacity (MW)	Project Cost (Million Taka)	Commissioning Date
Baghabari (West Mont) IPP	Gas	40	N.A.	April 2006
Baghabari (West Mont Second Stage) IPP	Gas	130	3900	July 2007
Seajganj 450 MW Combined Cycle Power Plant	Gas	450	13807	FY 2009
Meghnaghat (450 MW Unit 2) IPP	Gas	450	12050	FY 2008
Meghnaghat (450 MW Unit 3) IPP	Gas	450	12050	FY 2009
Small IPP	Gas/ F. Oil	450	17822	FY 2007
Meghnaghat (450 MW Unit 4) IPP	Gas	450	12050	FY 2011
Serajganj (450 MW Combined Cycle Power Plant Unit 2)	Gas	450	12050	FY 2012
MymenSingh (RPC)	Gas	70	N.A.	April 2006
Subtotal Private		**2940**	**83729**	

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Sector (2006-10)				
Existing Private Power Stations				
Haripur BMPP – 8	Gas (CT)	110	-	30/06/1999
KPCL – 18	F. Oil (D)	110	-	12/10/1998
Haripur, AES – 1	Gas (CC)	360	-	01/12/2005
Baghabari BMPP	Gas (CT)	90	-	26/06/1999
Meghnaghat, AES – 1	Gas (CC PP)	450	-	26/11/2002
REB 11*3	Gas	30	-	
Sub Total		**1140**		
Total Private Sector (upto 2010)		**4080**		
Total Installed Capacity by June 2006		**5235.75**		

Source: Unpublished reports collected from BPDB on June 22, 2006.

Table 4 shows the private participation in Bangladesh power sector in the post reform period. By 2006 June, private sector is producing about 1140 MW of power out of 5235 MW which accounts about 21.77 percent. The Bangladesh approved 9 new power generating stations which will add up to 2940 MW of power by the year 2010. BPDB also approved 17 new power generating stations with the capacity of about 3350 MW which will come into operation by 2012.

Table 5
BPDB power plants planned

Generating Station	Type of Fuel	Capacity (MW)	Project Cost	Commissioning Date
Barakpura 2 * 125 MW	Gas	2*125	17098	Feb/06 March/06
Sylhet(Fenchuganj) 90 MW CCPP	Gas	60 GT 30 GT	7172	May/07 August/07
Sylhet 150 CCPP(100 MW CT)	Gas	100	4071	FY 2008
Siddhirganj 2 * 120 MW peaking power	Gas	240	6851	FY 2008
Chandpur 150 MW CCPP(100 MW GT)	Gas	100	6399	FY 2008

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Sikalbaha 150 MW Gas turine	Gas	150	4135	FY 2008
Siddhirganj 2 * 150 MW Gas Turbine P/S	Gas	300	8643	FY 2009
Haripur 150 MW Combined cycle Power plant	Gas	150	5654	FY 2009
210 MW Khulna Thermal Power station	Gas	210	6561	FY 2009
Bhola 150 MW CCPP	Gas	150	6251	FY 2009
Khulna 100 MW Peaking Power plant	Gas	100	4149	FY 2009
210 MW Siddhirganj Thermal Power plant	Gas	210	9300	FY 2009
Bogra/Siraganj 150 MW Gas Turbine	Gas	150	4119	FY 2009
Kaptai Power Plant extension 2*50 MW	Gas	100	6560	FY 2010
Sikalabaha 450 Combined Cycle Power plant	Gas	450	17466	FY 2010
Sylhet 150 MW Gas Turbine	Gas	150	4135	FY 2011
Bheramara 450 Combined Cycle Power	Gas	450	17466	FY 2012
Sub Total (Public Sector)		**3350**	**136030**	

Source: Source: Unpublished reports collected from BPDB on June 22, 2006.

Table 5 shows the total public sector investment in the power sector up to 2010. BPDB is investing 136030 Million Taka to generate 3350 MW additional installation capacity. This will increase the installed capacity of Bangladesh including public and private participation upto 11525 MW of power installed capacity by the year 2012.

In the initial period of IPP investment because of lack of experience in handling the private investment in power sector the government approval became time consuming and complex. The negotiations were carried out by the BPDB. It felt that the implementation of private power projects was not a simple process.

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