

Electricity Sector in the pre and post Reforms in Bangladesh

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Abstract

Electricity sector evolution and development in Bangladesh has a long history. It is one of the fastest developing countries in the world with an average GDP growth rate of about 7 percent. This growth rate requires significant amount of electricity production, and consumption. Due to historical problems the growth of electricity sector in Bangladesh had been very slow. To address the problems associated with the country's power sector, several reforms were introduced in 1990s on the recommendations of various committees which have recommended the measures including unbundling the electricity sector into generation, transmission and distribution entities, allowing private participation and institutional reforms. Based on these recommendations, reforms were introduced and targets for power generation were setup. The paper examines the implications of some of these reforms.

Key words: Electricity sector, Reforms, Generation, Transmission, Distribution, Consumption

Introduction

Bangladesh has a long history of electricity sector evolution and development. Electricity generation in present day Bangladesh began during the erstwhile British India and subsequently in the post independence period in the East Pakistan administration. In all these decades, though the installed capacity increased to 5275 MW in 2005 there had been significant system losses because of the older generating stations and lower maintenance. The loss was due to load shedding, failure in renovation and repair of existing old transmission lines and utilities, availability of raw materials for power generation as large percentage of power is thermal based on gas; inadequate infrastructures, investments, timely decision making and so on. To address these issues Bangladesh undertook series of reforms since 1991 based on various recommendations. Some of those reforms includes division of power sector into different vertical and horizontal entities, unbundling the same into generation, transmission and distribution activities and so on.

Institutional Setup in the Post reform period

Bangladesh's Ministry of Power, Energy, and Mineral Resources (MPEMR) controls the power sector in Bangladesh. This is done primarily through the Power Division and Power Cell, which were created in 1998 with a mandate of managing, regulating, and leading reforms in the power sector. Generation and distribution activities have been opened to foreign and private sector involvement, although both sectors remain dominated by state-owned entities. All grid-connected electricity transmission is carried out by state-owned Power Grid Company of

Bangladesh (PGCB). Distribution business is carried out by state owned companies BPDB, DESA and REB. Again BPDB is divided into West Zone Power Distribution Company, DESA is divided into DESA and DESCo. Similarly REB carries out distribution business in rural areas through PBSs.

Functional performance of Power Sector in Bangladesh in the Pre and Post Reform Era

The power sector development in any country depends upon the nexus between the power generation and demand for power. The demand for power comes from various consumer groups. The expansion of electrification at domestic consumption satisfies the social objective of bringing the overall population under power consumption groups, whereas the increase in the industrialisation, agricultural activities and commercial activities satisfies the economic development objectives. Before analysing the power expansion and development at this consumption level it is important to analyse how the availability of power has steadily improved over the years in the post-reforms period.

In Bangladesh, one can observe that there had been a significant increase in the installed capacity from 2146 MW in 1987-88 to 4995 MW in 2004-05, with overall increase of about 130 percent in the installed capacity and about with about 13.6 percent average growth per annum for 18 years from 1987 to 2004. In the total installed capacity about 95 percent comes from conventional thermal power (primarily natural gas) and the remaining 5 percent occupied by hydroelectric power (Tabors, 1990, p. 44). This is in contrast to the earlier or pre reform era (upto 1991-92). Moreover, the increase in the installed generation capacities was very slow between 1987-88 to 1991-92, there was an increase of only about 250 MW, with an overall growth of 5 percent per annum. Since the reforms were introduced, from 1992 to 2004 additional installation capacity was increased from 2608 MW in 1992-93 to 4995 MW in 2004-05 with per annum growth rate of about 9.4 percent. However in between the years 1992-94 and 1994-97 not a single MW was added to the existing installation capacity. Although there was a similar trend in the generation capacity, a difference in the years in the generation vis a vis installation was recorded. In 1987-88 the difference in the installation and generation capacity was 287 MW which increased to 1245 MW in 2004-05. The same was 674 MW in 1991-92. In the overall pre and post reforms period the gap between the installation and generation capacity has in fact increased. The load shedding also increased by about 200 MW from 550 MW from 1991-92 to 770 MW in 2004-05. This was about 300 MW in the pre-reform period of 1987 to 1991.

Reserve margin generally indicates the additional generation capacity of a power station. To meet the demand fluctuations power companies generally maintains this reserve margins (Committee on Alternatives, 2001, p. 144). During the year 1987-88 this reserve margin was about 41 percent which gradually declined to 3 percent in 1991-92 to 0 percent in 2004-05, indicating the growth of demand. It also indicates the vulnerability of power sector vis-à-vis growing demand and resulting systemic increase in load shedding due to unavailability of power.

Per-capita Generation and Consumption in the Pre and Post Reform era

Any country's development in the modern era is directly related with the availability of electricity to its consumers. The high per-capita consumption indicates the development that country has achieved. In the socio-economic area, the electrification can lead to the increase in study hours at night for school going children, and can fasten day-to-day activities of rural people leading to drastic changes in the socio-economic relations of the people (Sachidananda and Verma, 1983, p. 157). It is observed that even the basic electric appliances have an important role in the social and economic development in the low income countries (IEA, 1997, p. 30). Bangladesh has significantly increased in power generation capacity from 667 MW in 1974-75 to 3720 MW in 2004-05 (BPDB, 1999-2000 & 2004) which is about 6 fold increase. In spite of this phenomenal growth, per capita consumption of electricity in Bangladesh according to *World Development Report*, 2000 averaged only about 106 kWh. This was one of the lowest as compared to other Asian countries (The World Bank, 1993, pp. 45-67). This low level of consumption of electrical energy in Bangladesh is mainly due to the inability of the public sector dominated system to augment the supply rapidly (The World Bank, 1993, pp. 45-67).

An observation of the data on the same, we can find that there was a significant increase in the per capita power consumption in Bangladesh from 19.43 kWh in 1980 to 139.68 kWh in 2004-05 which was about 7.5 fold increase. However, in the post reform era the per capita consumption increased significantly than the pre reform era. During the period 1980-1990 there was about 2.5 fold increase from 19.40 kWh to 44.60 kWh. After the reforms were introduced this increase was significantly higher than the previous era. The per capita power consumption increased from 44.60 in 1990 to 139.68 kWh in 2004, which was about 3 fold increase. The per-capita generation capacity also shows the similar trend. In the year the 1976-77 the per-capita generation which was 19.80 kWh increased to 74.77 kWh in 1991. This was about 4 fold increase. From 1991 to 2004 however, the per-capita power generation recorded a hefty increase to 160.13 kWh. There was also a significant reduction in difference between per capita power generation and per capita consumption. This availability of power to satisfy demand is very much necessary to satisfy the objective of electricity expansion to various groups by the year 2020.

In the pre reform era from 1980-85 the per-capita power generation growth rate was about 11.3 percent whereas per-capita consumption grown at 10.1 percent. From the year 1986 to 1990 the per-capita power generation recorded a growth rate of 6.5 percent whereas per-capita power consumption grew at 9.3 percent. In the post reform era in the initial period from 1991 to 1996 the per-capita power generation grew at 10.1 percent whereas the per-capita consumption recorded a growth of about 4.8 percent.

In the later period from 1997-2004 the per-capita power generation and per-capita power consumption witnessed a growth rate of 7.4 and 6.2 percent respectively. This shows an

interesting trend that the first half of the decades 80's and 90's the per-capita power generation growth rate was higher than the later period in both the decades. The per-capita consumption shows a relatively different picture. From the beginning of 1980 to 1996 there was a gradual decline in the growth rate of per-capita consumption. Only in the later half of the 1990s beginning from 1997 there was a slight change towards positive growth.

The difference between the per capita power generation and per capita power consumption in the year 1980-81 was about 10.3 kWh, which increased to 17.2 kWh in 1984-85. By the year 1990 this difference reached to 30.17 kWh. This clearly shows two important development viz., availability of power increased and despite this power generation capacity there was no significant increase in the power consumption. It could be because of high system losses and lack of distributional facilities combined with policy problems. In the post reforms era there is a slight decline in the difference between power generation and power consumption. The gap between these two decreased from 25.62 in 1991 to 20.46 by the year 2004. This however shows a healthy trend in three important ways. Firstly, there is an effort to reduce this gap to facilitate power availability to more consumer groups. Secondly, there has been a conscious effort to increase the per-capita consumption rate, and thirdly there must have been a reduction in the system losses and improved distributional facilities.

T& D Losses in the Pre and Post Reform Period

The most pressing problem in the power sector has been with the distribution system, which had been characterised by heavy system loss and poor collection performance. The distribution system seldom got the priority in reform initiatives.¹ It could be found that system loss in any power distribution system in Bangladesh should not exceed 10%, i.e. collection–import (CI) ratio be kept above 90%. To maintain the system loss and the CI ratio at the recommended level, the malpractice by the utility personnel must be stopped fast. This will help to achieve economic sustainability (Alam et al., 2004, pp. 1773-1783).

In the pre-reform era 1978-79 to 1990-91 there was a gradual increase in the T&D losses from 31.53 percent to 41.11 percent, although there was slight reduction in the losses during 1981-1983. The average T&D losses in this era stood at 33.19 percent in the total production. In the post reform era the T&D losses were reduced significantly from 28.27 percent in 1991-91 to 10.16 percent in 2003-04. The average system losses in this era were 16.57 percent. A comparison of T& D losses in these two periods show that the losses were gradually reduced to almost 50 percent to the previously existing figures.

It also clearly indicates the improvement of power systems in terms of reducing the T& D losses. The creation of DESA and DESCO, along with WZPDC, and REBs helped BPDB to reduce its distributional losses and the creation of Power Grid Company of Bangladesh (PGCB) helped it in

¹ The main purpose behind the establishment of REB, DESA, DESCO and WZPDC are for improving distribution facilities to reach maximum number of consumers in their respective areas. The crux can be found in Annual Reports of respective distribution companies. WZPDC does not publish annual report and works under the supervision of BPDB.

transmission sector.² The reduction of T&D losses clearly indicated the availability of power for growing demand.³ The T&D losses increased gradually from 1978-79 to 1990-91. However in the post reform period the T&D losses were on the path of reduction. This shows the healthy trend in the T&D segment in the analysis of the impact of reforms in the power sector.⁴

The system losses in the pre reform period decade from 1981 to 1991 averaged about 20.55 percent. Till the year 1986 the system losses were above 20 percent. In the next 5 years they stood between 20 percent to 16 percent. However the real reduction came after reform process was initiated in 1991. In the post reform period they averaged 16.34 percent in the following decade. These losses slightly rose to 18 percent by year 2000. Although REB does not involve in generation process and is confined only to distribution activity, its system losses reduction has a positive role in controlling the overall T&D losses of power sector in Bangladesh.

Consumer Growth in the Pre and Post Reform period

The consumer growth is a very important ingredient in the development of power sector. The policies of government aimed at providing 100 percent electrification and bringing all the population under the electrification consumption group by the year 2020 needed a substantive increase power production every year. In Bangladesh by 2002 about 64 lakh consumer connections were given and this numbers had been increasing every year. The cumulative percentage increase in the first half decade of pre reform till 1985 was about 61.77 percent which fell down to 48.49 percent by the year 1991. In the initial years of post reform period till 1995 this increase in the connections further fell down to 45.95 percent. But in the later half of reforms period till 2002 the cumulative percentage significantly increased to 150 percent. By that year the reform process hastened and the consumer growth followed in the form of increase. During the half decade of 1980's from 1981 to 1985 the cumulative percentage recorded at about 61.77 percent. This growth decreased to 48.49 percent in the next five years. In the initial period of reform from 1992 to 1995 the growth recorded at 45.95 percent. But the later period of reform is a large scale beneficiary to consumer growth rate. It recorded almost triple growth with 150.39 percent. There has been a gradual but slow increase in the consumers from the year 1981 to 1995. However from the year 1995 we observe a vertical increase in the number of connections given to the consumers.

Conclusion

The reforms introduced in electricity sector of Bangladesh have restructured the entire sector institutionally and several improvements were recorded in the functional aspects. The major

² Analysis based on the Annual Reports of these entities.

³ This means reduction of 1 percentage in 100 MW is equal to availability of 1 MW, reducing the production cost to produce this 1 MW as well as increasing 1 MW extra for consumption.

⁴ This analysis is based on figures provided by BPDB. The distributional losses of DESA, DESCO and REB are not included in the T&D losses above.

reforms at institutional levels had introduced decentralisation of management and division of responsibilities with relative autonomy. As a result the private sector was also allowed to function in generation and distribution activities, which had brought new technology and investments into the sector. Over a period of time the functional performance of the sector had been significantly improved and availability of electricity to all the sections of people, regions at affordable prices can also be seen.

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