

# A study of Bangladesh's Energy Situation and Probable Future in the Energy Sector

Nawshin Islam\*, Tanzia Mahbub Redi, Anna Mostarin, Nur-E-Tamrin Chowdhury, Md. Saniat Rahman Zishan

Department of Electrical and Electronic Engineering, Faculty of Engineering

American International University-Bangladesh (AIUB)

Dhaka, Bangladesh

\*nawshin.nishi12@gmail.com, redi.tanzia@gmail.com, anna.mostarin@gmail.com, tamrin.aiub@gmail.com, saniat@aiub.edu

**Abstract—** Bangladesh, being the typical developing country, has undergone the energy crisis situation for a very long period of time. The energy system of the country has gradually being improving with the electricity accessibility ratio increasing year by year. The study has been based on different analytical information and data analysis collected from several visits to power plants, regulatory offices and companies. The study investigates on the current energy condition of Bangladesh which seemed to have significantly shown some improvement from the past 5 years but the dependency on the natural gas is one of the major drawbacks of the system because due to this imbalance condition of the energy system the country will be facing scarcity of natural gases in near future. The initial goal of the study was to analyze the current situation of Bangladesh's energy sector; conventional and non-conventional. The secondary goal is to make an estimation of the future and suggest the future scopes of the system years ahead. Many researches have been made based on different aspects of the energy system in Bangladesh but mostly discussing problems with the system, policy making issues and efficiency. This study merges all these aspects into one conclusive probability in near future.

**Keywords—** energy sector, energy crisis, present situation; probable future; drawbacks

## I. INTRODUCTION

Bangladesh is one of the world's most densely and poorest nations. 17% of the population can be said "extremely poor" due to the lower incomes [1]. This is because of the low access to modern energy services. Its infrastructure is small, insufficient and poorly managed. So, that's why crisis of power is increasing day by day now. Because of this crisis, a huge gap has created by the poorly managed area of energy system. This gap between demand and production is now a huge issue in this country. The shortage of power and energy supply with respect to its growing demand was the prime cause. The demand for electricity has been on the rise due to growing population and increasing economic activities. Production of natural gas, coal, fuel, peat and other non-renewable energies are trying to fulfill the demand. Renewable energies are also come up to serve in different ways. In absolute terms,

due to population increase, the quantity of renewable energy consumed has increased remarkably. This topic is chosen to research in different ways about the present situation of energy compared with previous years and giving some advantageous solution for the future energy sector of this country. The purpose of this study is to analyze the present and past energy situation and their resources of Bangladesh, identify the problems; their solutions and the path that the country intends to take to meet its future power demands.

## II. PRESENT SITUATION OF ENERGY IN BANGLADESH

Bangladesh has a probability to progress towards increasing the demand of energy as it's a developing country. But now in this era Bangladesh is facing energy crisis. Around 70% of people having lack accesses to electricity and maximum numbers are living in the village, among them about 40% of them are living in below poverty line [2]. Here we are going to describe about the overall present situation of Bangladesh from where we can specify the lacking which should be improved.

### A. Gas Sector

Natural gas is the most important indigenous source of energy in Bangladesh which accounts for 75% of the commercial energy of the country [3]. So far people have discovered 24 gas fields of which 2 of them are located in offshore area. Currently gas is being produced from 18 gas fields (79 gas wells) [4]. Oil was tested in two of the gas fields (Sylhet & Kailashtila). For reducing the dependency on natural gas, alternative energy resource or scientific solutions must be explored. Despite the present government's efforts to create fuel-mix in energy generation, country's economic development and energy generation process will be dominated by natural gas for several years and it will continue. Now many of the government actions are in advance stages. Recently gas production has increased from 1750 to 2250 MMCFD and Presently 79 wells in 18 gas fields are in production [5]. Presently the total and dependable power generation capacity of Bangladesh is 6887 Megawatts and 5091 MW respectively that causes a shortfall of around 1674 MW a day [6].

It will be possible to supply 880 million cubic feet more gas per day to the national gas grid at the end of December 2015 under long term plan and after implementation of long term plan, it will be possible to supply additional 2800 Million Cubic Feet gas per day

to the national gas grid with presently supplied 2000 million cubic feet gas per day [7].

Data related to gas production are shown in Table 1.

TABLE I. BANGLADESH GAS SECTOR 2010-2011 [7]

Content	Amount
Total no of gas	24
Total recoverable reserve	20.605 Trillion Cubic Feet (TCF)
Total gas consumption upto June 2011	9.788 TCF
Total remaining reserve	10.817 TCF
Daily gas production	2000 MMCF
Daily demand of gas	2500+ MMCF
Daily shortage of gas supply	500+ MMCF

### B. Coal Sector

Coal is an important energy now in Bangladesh. The existence and development of the coal industry have very important significance to the national economic security. As late as 2009-10, the share of gas for electricity generation, for example, was 89% while the share of oil and coal was 5% and 3.5% respectively [8]. If Coal could replace gas, it would have been a good alternative in the above situation. But it was not to be, because coal issue suffered because of serious management crisis. Nobody in the last few decades gave coal mining a reasonable thought. That left the country totally unprepared for a crisis when gas was in short supply.

Coal provides 28% of our primary energy [9]. But that may change in the short term, thanks to the official projections of coal-based power plants to be installed. It has the potential to contribute more than what it has been so far. The projections estimate that power generation in 2020 would be about 20,000 MW, 50% of which would be coal-based [10]. The coal reserves in five fields of Bangladesh are estimated at 3.0 billion tones equivalent to 67 tcf of gas, which can conveniently serve the energy needs of Bangladesh for 50 years [11]. With the choice of technology and method of mining, recovery rate varies. About 85% coal from Barapukuria, Phulbari and Dighipara can be recovered if modern mining technology is adopted. It will ensure strong regularity supervision and monitoring. Khalaspeer can be an ideal candidate for Coal Seam methane while we can wait for some years for technological development for mining giant Jamalganj coal mine [12].

### C. Present Situation of Electricity

Bangladesh is having some serious problems due to the small and insufficient power infrastructure. In that case our consumption rate is not satisfactory with the increasing demand. This can cause an alarming condition for the energy sector of Bangladesh.

Electricity is the main source of power and the electricity generation should be more to meet the

demand of people. In 2008, 47% of the population had access to electricity but in 5 years it increased to 62% which means there has been a growth of 15%, which improvisation, but nevertheless more 38% are in dearth of electrical support and these issues haven't been overcome yet [13].

### D. Present Situation of Renewable Energy

Renewable technologies are massively used in most developing countries but it is still a very young system in Bangladesh. The technology requires good amount of investment and feasible conditions to attain a sustainable solution. Despite the dependency on the natural resources, government of Bangladesh is trying to upgrade the renewable energy systems.

Numerous fiscal incentives are being carried out by the government to Renewable Energy Projects. Bangladesh Bank, IDCOL and some private commercial banks are stepping forward to provide financial support. Moreover, government has extended fiscal incentives including duty exemption on certain renewable energy products, e.g. solar panel, solar panel manufacturing accessories, LED light, solar operated light and wind power plant [14].

TABLE II. NATIONAL CAPACITY OF RENEWABLE ENERGY BASED POWER IN 2014 [14]

Category	Achievements
SHS	100 MW
Solar Irrigation	1 MW
Roof top solar PV at Government, Power sector office buildings and at newly constructed buildings	14 MW
Wind Energy	2 MW
Biomass based electricity	< 1 MW
Biogas based electricity	5 MW
Hydro power	230 MW
<b>Total</b>	<b>403 MW</b>

Till 2014, the national capacity of the renewable energy based power has been insufficient to go hand in hand with the national grid. Further investment and increase in capacity would strengthen this system.

## III. PROBABLE FUTURE OF ENERGY SECTOR IN BANGLADESH

Bangladesh has experienced some problems due to the severe power crisis for nearly a decade. Known reserves such as Natural gas and coal of commercial primary energy sources are the known reserves in Bangladesh but they are limited compared to the development requirements of the nation. By acknowledging some initiatives of government and working towards them properly, Bangladesh could possibly meet its unprecedented energy demands.

### A. Natural Gas

The gas demand has always been high in Bangladesh. Natural gas has been supplying for

majority energy production till now and the gas demand has been annually increasing and by the year 2015, as predicted by the production and marketing division of Petro Bangla, the demand will raise upto 4162 MMCFD [15].

In 2013, with the production 2270 MMCFD, a shortage of 470 MMCFD [13] has been encountered so in the future if the dependency on natural gas is not minimized then there will be greater shortfall range.

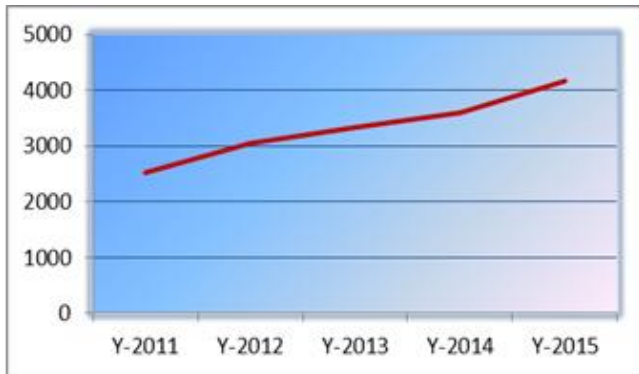


Fig. 1. Gas Demand Projections from 2011 to 2015 [13]

Minimization of natural gas usage is essential to have a balanced or partially balanced energy system in Bangladesh.

Since several researches have been going on regarding the high dependency on natural gas then eventually it has grabbed the attention of the government of Bangladesh. Even people are aware of the poor conservation of natural gas. Henceforth, there is a probability of shifting away the demand towards other available resources like coal, fuel, nuclear and renewable energy. This dependency minimization would be largely affected by any economical drawback because if so then gas might seem to be the cheapest means of fulfilling the national energy demand.

### B. Coal and Fuel

Coal has the potential to contribute more than what it has been so far. The Coal Policy which has been pending since 2005 can bring a significant change in the energy system by compensating on behalf of

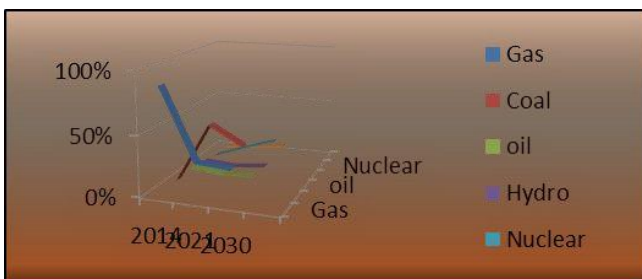


Fig. 2. Power Generation ratio target till 2030 [16]

natural gas. Ignorance regarding coal based power plant installation may make the condition worse since natural gas solely being unable to cater for all the demand[17][18].

In 2025, if the coal fired power plants supply 32,837 MW of electricity of total 41,899 MW of production then

the condition would improve. According to the projection for high GDP growth, by 2025 the power sector alone will consume 449.44 MT (450 MT approximately) of coal [16]. These have been stated and brought under consideration for the National Coal Policy by the Government. According to the statistical data and forecasting on coal energy, if this rate of annual demand stays fixed at 32,837 MW in the years following 2025 energy consumption will be for next five years additional 375 (5x75) million tons and for next ten years additional 750 (10x75) million tones will be needed. That will make total demand for coal 825 million tons till 2030 and 1200 million tones till 2035 from 2005. So the present coal reserve is not sufficient to meet the demand for even 25 years. Fuel import will depend on the economic state of the country.

In future, if the National Coal Policy is brought in action then couple of energy crisis issues will be resolved. The energy system will be smart and sufficient, provided the fact environmental measures are taken to avoid pollution due to coal harnessing process. Once the country prepares to invest a good amount of money on the coal policy, the road to attaining sustainable energy system will be easier. Meanwhile, poor resource management would lead to importing fuel from abroad which is definitely hinder the economic growth of the country.

### C. Future of Power Sector

An energy mix has been recommended by the planning commission of the government of Bangladesh and they have planned this for the period 2010-2021 [19]. Fig.3. depicts that government aims to double generation capacity of electricity by 2020 and also targets to double the substation capacity.

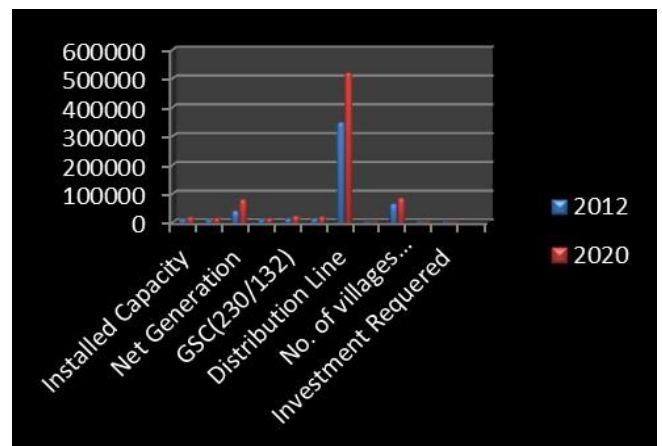


Fig. 3. Power Sector Forecast for the year 2020 [20]

To fulfill the target of 2020, our government needs to invest more than the previous. With this increased investment they can maximize the installed capacity and net generation along with per capita generation. Power Sector of Bangladesh has impressively flourished within a short time and if this continues then soon the electricity crisis will be overcome. Intrusion of effective renewable energy and nuclear energy would change the scenario within few years of implementation.



#### D. Renewable Energy

Bangladesh government has planned to generate 5% of total electricity from renewable energy by 2015 and 10% by 2020. Biogas and biomass can be the sources to generate 800 MW and 400 MW of electricity respectively. In hilly areas it is possible to get 20 MW of electricity by 2020 if our government sets micro (<100 KW) and mini (<1000 KW) hydro power plants [21].

Bangladesh is technologically lagging behind compared to other developed countries. Renewable Energy is nothing but new technology and it is weary for a mismanaged and economically unstable country like Bangladesh to turn over the system towards renewable within few years. Intrusion of smart grid system might take place after the balanced resource system is attained by the country. Meanwhile, the awareness campaigns of the NGOs are motivating the inhabitants to start off with the basic energy efficient processes and within few years the system will be vastly extended.

#### IV. DRAWBACKS

No system is considered to be ideal. One of the main drawbacks is the energy distribution of the Country is unbalanced and hence natural gas has to bear most of the load of energy production. The energy sector of Bangladesh is having such problems that need to be focused.

##### A. Natural Gas

Though Bangladesh is rich in natural gas but still the progress in this sector is not satisfactory due to lack of funding and balanced energy plan. The lack of funding for developing its natural gas resources and to promote energy efficiency, along with some concerns of energy security are creating pressure to take the way of unsustainable energy development.

##### B. Coal

Coal is another energy resource of our country. It's in significant reserve, lying unutilized. Bangladesh does not have long term energy security but at present it could certainly get to better position in terms of energy supply if available resources are properly utilized. The present crisis of coal is high and a useful solution to this crisis is not in sight.

Fig.4. depicts that, Bangladesh has increased the coal consumption rate in 25 years but very insignificantly. Due to the poor technological advancement, the coal consumption rate is not high like other countries. The government planned for a large scale power generation by imported coal but it is expected to fall short of target because of the destructive economic condition and lack of infrastructure.

In that case, our government needs to take some advanced technological movement to meet the requirements of the country. Bangladesh needs some well-trained workers for coal mining as well so that we could get the desired result like other countries.

##### C. Fuel

Bangladesh is a fuel importing country so it can be an economic burden for Bangladesh if CNG driven vehicle system is terminated because it will cause more pressure of importing high amount fuel. Moreover, Bangladesh's demand for fuel and diesel is growing sharply as a shortfall of natural gas forced it to turn to costly oil-fired power plants to resolve its crippling electricity shortages. Our government needs to focus and make proper plans to consume more fuel and make it feasible for everyone.

##### D. Renewable Energy

Renewable energy system is still underdeveloped in Bangladesh. Whereas countries like Australia, India, Canada has initiated revolutionary renewable techniques to improve their energy system. When other countries are integrating Renewable Energy System, Bangladesh is still under research of implementing renewable energy based power plants and implementing SHS to the villages. Also the current cost of renewable energy system is high enough as it is a new technology and has extremely large capital cost. Another shortcoming is the dependency of renewable energy upon the weather and due to the unpredictable weather it might be difficult to generate the necessary energy.

#### V. RECOMMENDATIONS

Future of the energy sector in Bangladesh is mainly depends on the reserve recourses. And if the scarcity of natural resources occurs then the country will be dependent on imported energy source which is not feasible because it's not cost-effective for a developing country like us. In that case we need to take some proper initiatives which can be the right way to improve the future of our energy sector. Improving the production of coal, importing fuels from other countries and implementation of advanced renewable technology system can be the good way of reserving natural gas.

The Energy distribution System should be more balanced and dependency on the natural gas need to be reduced in order to save the resources from running out. Like many other developing countries, Bangladesh is facing enormous challenges to provide affordable, reliable and equitable energy supply to its

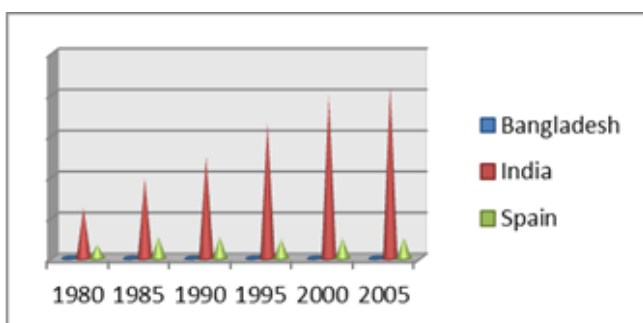


Fig. 4. Coal consumption rate of Bangladesh, India and Spain in 25 years [13]

citizens. It is because of the improper plan to utilize the available resources. This needs to be overcome.

To improve the energy sector in Bangladesh, technological advancement is highly appreciable. We can rely on the most impressive concept which is "Smart Grid". It provides secured, reliable, clean, high quality electricity supply and it can adopt various sources of electric power generation, highly market-oriented electric power exchanges, customer needs etc. Again the country needs to search for options to import gas and electricity. Bangladesh has a scope of electricity import from Tripura on a small scale. Lately, the Indian government expressed their interest in large scale power transmission plan for transmission of electricity from the Subansiri 2000 MW hydropower plant in Arunachal Pradesh to West-Bengal-Bihar via Bangladesh territory [22]. This would be a great opportunity for Bangladesh. Since Bhutan and Nepal have huge hydropower potential along with trading power with India for more than a decade, Bangladesh should shake hands with them as a power trading partner.

## VI. CONCLUSION

Energy crisis in Bangladesh has been a long outcry and it seems to persist for the coming decade if our government overlooks the sector wise problems of our energy system. After all the discussion we have known the alarming condition of our energy system along with some future initiatives that is needs to be executed properly. Also if our government can make proper utilization of non-conventional energy resources along with the advancement of the technology then it would be a turning condition of the energy system of Bangladesh. Utilizing the resources in a balanced and proper way, the energy demand can met and attain a surplus as well.

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